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**Charging apparatus, charging method, charging system and recording medium**

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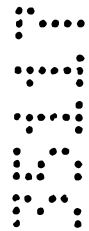
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## ABSTRACT OF THE DISCLOSURE

In a secondary cell charging apparatus and secondary cell charging method, an internal power supply circuit of a PC is used as a power supply for performing a charging  
5 operation on a secondary cell.

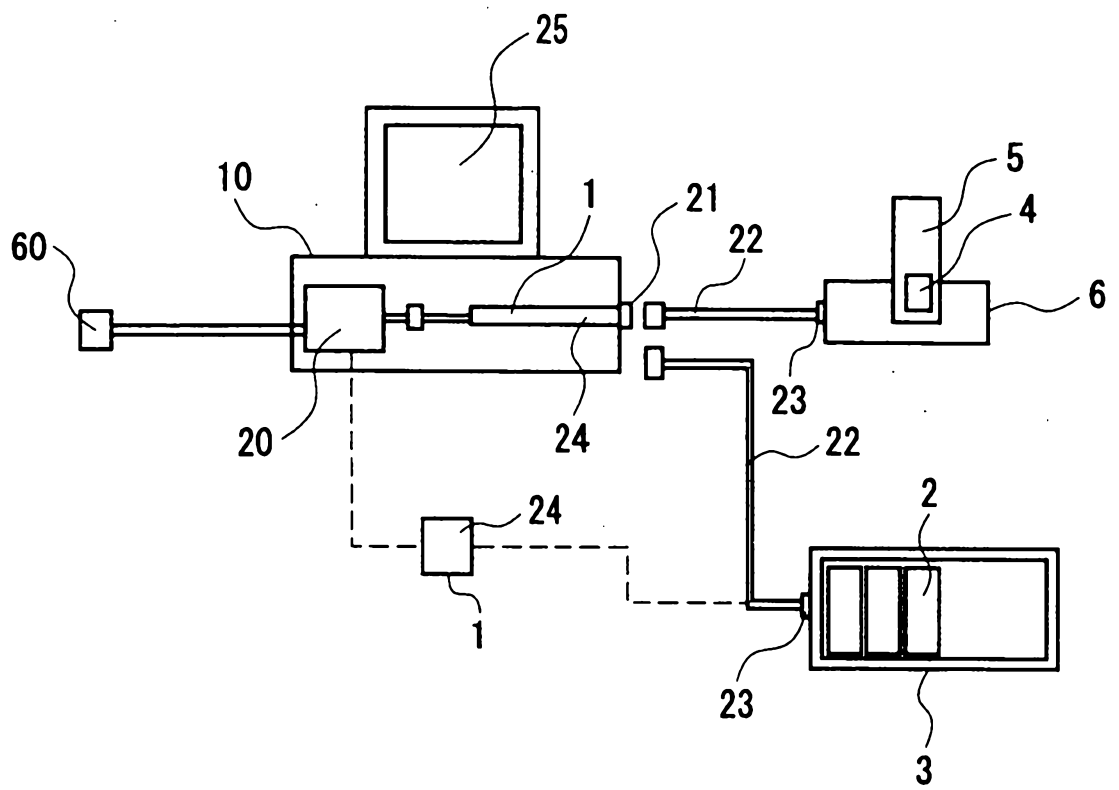


What is claimed is:

1. A secondary cell charging apparatus which uses a computer apparatus as a part of construction elements of said charging apparatus.
- 5 2. A secondary cell charging apparatus according to claim 1, wherein said apparatus comprising a charger for a secondary cell using an internal power supply circuit of a PC as a power supply required for a charging operation.
3. A secondary cell charging apparatus according to  
10 claim 1 or 2, wherein said PC is selected from a group of a general-purpose PC including a desktop PC, a laptop PC, a mobile type PC, a dedicated game-use PC, and a TV PC with a bi-directional communication capability.
4. A secondary cell charging apparatus according to any  
15 one of claims 1 to 3, wherein said charger is either a charging processing operation program required for a charging operation on a secondary cell or is an apparatus into which a charging processing operation program required for a charging operation to a secondary cell is built.
- 20 5. A secondary cell charging apparatus according to any one of claim 1 to claim 4, wherein said charger is provided within said PC or provided external thereto.
6. A secondary cell charging apparatus according to any one of claim 1 to claim 5, wherein said charger is connected  
25 to a battery holding apparatus, which holds at least a secondary cell requiring charging processing.
7. A secondary cell charging apparatus according to any one of claim 1 to claim 5, wherein said PC is provided with a driving controlling program for driving a charging

**Fig. 1**

100



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**COMPLETE SPECIFICATION**

**STANDARD PATENT**

APPLICANT: **ZIP CHARGE CORPORATION**

Invention Title: **CHARGING APPARATUS, CHARGING METHOD,  
CHARGING SYSTEM AND RECORDING MEDIUM**

The following statement is a full description of this invention, including the best method of performing it known to me:

## SPECIFICATION

Charging apparatus, charging method, charging system,  
and recording medium onto which is recorded a charging  
5 method

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to a charging apparatus  
10 and a charging method, and more specifically to a novel,  
next-generation charging apparatus and charging method for  
secondary cells requiring charging.

#### 2. Description of the Related Art

15 In recent years, there has arisen an urgent need for  
the development of a charging apparatus or charging method  
for efficiently executing charging processing of a secondary  
cell.

More specifically, while at present a huge number of  
20 secondary cells are used in a wide range of fields, because  
there is no simple, efficient charging apparatus or method  
available, secondary cells which can still be charged are  
treated as if they are secondary cells that cannot be charged,  
there being an increasingly large number of such secondary  
25 unutilized secondary cells to be found in homes, resulting  
in not only worsening environmental problems, but also a great  
amount of waste and increase in cost.

In the past, equipment manufacturers made products  
that could not be used unless the secondary cells therein were

charged by a charger, designing equipment that encompassed the characteristics of the secondary cell to be used, thereby forcing consumers to purchase a charger as part of the product.

5           For this reason, consumers themselves unconsciously came to think of the charger as being part of the product, so that even if better batteries or chargers were to be available on the market, there was absolutely no effort made to correct the mistaken impression of consumers that these  
10       would be an added expenses, and that only the batteries and charger provided by the manufacturer could be considered proper components that could enable them to avail themselves of the maximum performance, so that in the extreme cases batteries and chargers were considered inviolable holy cows,  
15       with all second-source batteries and chargers considered inferior by comparison, these concepts controlling the minds of consumers.

          The only exception to the above-noted situation is that which occurs when a single primary cell of a toy, a  
20       flashlight or a TV terminal or the like becomes depleted, in which case the users gets by with another battery purchased at a supermarket or appliance store.

          The most common typical example of the current situation is that of cellular telephones, the reason for this  
25       being that sealed battery covers of the slide-in type are common in the field of secondary cells, the secondary cell being housed therewithin. It is not even possible for the consumer to open the sealed secondary cell cover, and even if a second source battery maker were to manufacture a good

secondary cell, it would be nearly impossible to accommodate hundreds of different types of cellular telephone covers, not to mention the fact that cellular telephone manufacturers continue to introduce new models to the market every three months, making it impossible to keep up with manufacturing of secondary cell covers to accommodate the constantly appearing new models of cellular telephones.

Large-capacity electrical tools also fall into this category.

Given the above-described situation, nickel-hydrogen secondary cells that should be able to tolerate more 1000 charges and nicad batteries that should be able to tolerate over 1500 charges are no longer able to hold their capacity after just 200 or 300 charges, thereby forcing consumers to replace relatively high-cost pack batteries prematurely.

The main reason for this is that the a charging method developed more than 40 years ago, this being the negative delta V method, in which overcharging, which is the most severe treatment of secondary cells, inevitably occurs is used in the chargers provided by all manufacturers. The resulting overcharging causes a breakdown of the chemical function with in the secondary cell, so that at 200 to 300 charges the consumer is forced to spend a high amount of money to replace the secondary cell.

In a negative delta V charging system of the past, nicad and particularly nickel-hydrogen charging requires as long a time as 2 hour and 30 minutes, and even after this charging discharging tests on nickel-hydrogen batteries of



typical Japanese manufacturers reveals no more than 60% or 75% charge ratio, and it is not possible to expect 100% charge ratio.

In particular in the case in which there is, for example, 25% of capacity remaining in a battery, the ideal method for increasing the charging ratio is to achieve a 100% discharge, so as to bring the battery to the 0% charge level, and then perform charging. Unless this is done, it is almost impossible with negative delta V charging to raise the charge of the battery from the residual charge of 25%, that is to raise the charge level from 26% to 100%. This being the case, if the discharging time is 1 hour, a charging time of 3 hours is necessary, this representing a considerable disadvantage to a user wishing to quickly charge the battery.

The above situation is caused by the "memory effect," which is a characteristic of nicad and nickel-hydrogen batteries.

In the case of an electric drill, of course, unless the battery can be charged completely in approximately 10 minutes, it would be necessary for an electrical worker to carry five or six electric drills with fully charged batteries. Recently, however, if slight battery damage is allowed, rechargeable electric drills with a charging rate of 6C (10 minutes) have become available. These products, however, make a high-cost switching regulator type power supply in order to source a high current at one time an essential part, so that such electric drills that can be charged in 10 minutes must be priced at approximately 40,000 yen or higher for retail sale.

Because of overheating of the secondary cells that are used, replacement is necessary after approximately 100 charges.

What is most required when performing charging is a  
5 charging method that is suited to the characteristics of the battery or battery pack at the time of charging.

This is easy to express in words, but in reality (1) the characteristics and internal resistances of batteries of various battery manufacturers are mutually different, (2)  
10 there are differences in charging characteristics of batteries of even the same manufacturer, (3) if a battery or battery pack is left unused for a long period of time, in the case of an absolutely new battery there are a great many cases in which the battery is almost entirely unactivated  
15 (unformed), and such batteries must be activated when being charged, and (4) in particular in the case of a battery pack formed by 4 or 6 single cells connected in series, if just one of the cells is unformed or faulty, it is almost impossible to achieve the desired battery capacity.

20 A charging method for a secondary cell that reliably solves the numerous above-noted problems is a pre-requisite as a next-generation secondary cell charging method.

The present invention is directed not only at educating consumers with regard to the various above-  
25 described problems, but also at removing the above-noted problems by operating a PC, a device which is highly accessible to today's consumers, thereby providing an ideal method of charging, thereby providing consumers with a significant social advance.

Accordingly, it is an object of the present invention, to improve on the above-noted drawbacks in the prior art, to provide a charging apparatus and a charging method capable of reliably achieving full charging of a prescribed secondary  
5 cell in a short period of time and using a simple apparatus. It is a further object of the present invention to provide a charging apparatus and charging method which, by extending the life of a secondary cell, can solve both environmental and resource problems, and which can execute charging  
10 processing of a secondary cell, making easy use of a home-use PC(PC) in an interactive manner.

#### SUMMARY OF THE INVENTION

To achieve the above-noted objects, the present  
15 invention adopts the following base technical constitution.

Specifically, a first aspect of the present invention is a secondary cell charging apparatus which uses a computer apparatus as a part of construction elements of the charging apparatus and more specifically, the charging apparatus of  
20 the present invention is formed by a charger for a secondary cell using an internal power supply circuit of a computer apparatus (hereinafter referred to as a PC. or PC) as the power supply required for a charging operation.

More specifically, this charger is either a charging  
25 processing program required for a charging operation on a secondary cell, per se, or is a charging apparatus formed by a charger with a charging processing program required for a charging operation on a secondary cell built therein.

A second aspect of the present invention is a charging

system formed by a PC having an internal power supply circuit,  
a charger having built into it a charging processing operation  
program using the internal power supply circuit of the PC as  
the power supply in the charging operation, a display means  
5 connected the PC, a input means connected to the PC, a  
controller for driving the PC, and an internal power supply  
means for driving the PC, wherein the above-noted charger is  
directly or indirectly connected to a battery holder, the  
battery holder having a holder part configured so as to accept  
10 and enable a charging processing operation on one or a  
plurality of secondary cell of various sizes separately that  
require charging processing, or a stand part that enables  
direct insertion of either a battery package into which a  
plurality of secondary cells of the same size that require  
15 charging processing are packed into a prescribed pack or a  
cellular telephone with a built-in battery package.

In this embodiment of the present invention, the  
charging system can be configured so that the above-noted  
charging processing operation program can either be built  
20 into the PC by inserting a floppy disk, a CD-ROM, or an IC  
card into which the charging processing program has been  
stored into a prescribed location in the PC so as to built  
the charging program into the PC, or by inserting an expansion  
board having an IC chip that includes this charging processing  
25 operation program into an expansion slot of the PC so as to  
build the charger into the PC.

A third aspect of the present invention is a secondary  
cell charging method for a charger to which is connected to  
a holder part configured so as to accept and enable a charging

processing operation on one or a plurality of secondary cell  
of various sizes separately that require charging processing,  
or a stand part that enables direct insertion of either a  
battery package into which a plurality of secondary cells of  
5 the same size that require charging processing are packed into  
a prescribed pack or a cellular telephone or the like with  
a built-in battery package, this charger being internally or  
externally connected to a PC, and the internal power supply  
circuit of the PC being connected to the charger for use as  
10 a power supply for a charging operation. More specifically,  
this is a method for charging a secondary cell, whereby a  
charger provided either internal within or external to a PC is  
connected to the internal power supply circuit of the PC as  
well as is connected to a battery holding means which  
15 holds a secondary cell requiring charging processing being  
connected directly or via an appropriate connector or cable  
to an appropriate signal output terminal, and this charger  
having built into it a charging processing operation program  
for the purpose of charging the secondary cell.

20 By adopting the above-described technical  
constitution, a charging apparatus, charging method, and  
charging system according to the present invention not only  
provide a charging apparatus and charging method capable of  
reliably fully charging a secondary cell quickly with a simple  
25 apparatus, but also provide a charging apparatus and charging  
method which, by extending the life of a secondary cell, solve  
both environmental and resource problems, while enabling each  
charging processing of a secondary cell using a home-use PC  
in an easy-to-use interactive manner.

That is, a charging apparatus and charging method according to the present invention have a configuration that is completely different from the idea of a charging apparatus of the past, and can rightfully be characterized as a  
5 secondary cell charging apparatus and secondary cell charging method that will serve as the next-generation charging apparatus and next-generation charging method.

More specifically, a next-generation charging apparatus according to the present invention, using a PC,  
10 which can now be found in any business or home, regardless of whether it is a desktop PC, a laptop PC, or even a smaller mobile PC, and regardless of the operating system type, be it DOS/V or Macintosh or the like, enables use of the PCI (PC interface) built thereinto, which is a de facto worldwide  
15 standard, to use an interface that is variously called a PCI board or a PCI card, or an expansion board inserted into a PC expansion slot as a charger, thereby using the PC as a platform thereof.

A circuit board on a part of a card or an expansion  
20 board, for example, at a center thereof, provided with a chip having within it the above-noted charging processing operation program is assembled and inserted into the PC, and the calculation functions of the PC are utilized to drive the charging processing operation program, so as to execute  
25 the prescribed charging processing operation on a secondary cell requiring prescribed charging.

Thus, the charger of the present invention is formed by using the internal power supply circuit of the PC as the power supply required for a charging operation on a secondary

cell, and the PC used can be selected as a general-purpose PC, a dedicated game PC, or a television PC having a TV receiver with bi-directional communications capability or the like.

Additionally, the charger used in the present  
5 invention can be either a charging processing operation program per se, required for a charging operation on a secondary cell, or an apparatus with such a charging processing operation program required for charging of a secondary cell built thereinto, this charger being provided  
10 either within or external to the PC, and having a battery holder with either a holder portion or a stand portion for holding a secondary cell requiring charging processing.

In the present invention, it is preferable that the battery holder can be formed with a size thereof as being large  
15 as possible so that various number of the secondary cell batteries to be charged, can be inserted thereinto, as possible.

The apparatus that forms the charger according to the present invention is desirably selected from a group of an  
20 International standard of PCI (PC interface) comprising a PCI board or PCI card, an IC chip installed on an expansion board, a CD-ROM, a floppy disk, or an IC card onto which has been stored the charging processing operation program, or a hard disk of the PC(HD), onto which the charging processing  
25 operation program has been installed.

As shown in Fig. 4 of the accompanying drawings, which will be described below, charging can be done in the case of SUM-3 (ANSI type AA cells) which share more than 70 % of the world market thereof a battery holder 41 for the SUM-3

battery is connected to an expansion board 42, onto which is mounted a chip 43 into which is stored the above-noted charging processing operation program and making connection to a charger according to the present invention. In the case of a cellular telephone or the like, as shown in Fig. 5, charging can be done without any regard to the battery pack that is attached to the cellular phone by sliding, by the consumer inserting the cellular telephone into a stand part 6 that is configured so as to charge the secondary cell for the cellular telephone that is always provided as a part when the consumer purchases a cellular telephone, this being then connected the charger of the present invention.

According to this method, regardless of the type of cellular telephone or how the battery pack changes in the future, it is possible without interrupting calling (the telephone being in the condition in which it can receive a call) to perform quick charging using the VR charging method for secondary cells indicated already by the inventors of the present invention in Japanese Patent No. 2739133, Japanese Patent No. 2732204, or Japanese Patent No. 2743155.

The second major feature of the present invention, as shown in Fig. 6, is the use of the power supply of the PC in place of a switching regulator for the purpose of causing a large amount of current to flow when performing charging at a rate, for example, of 6C (for 10 minutes).

In the present invention, a conventional charging processing method such as so called minus-delta V or the like also can be used, instead.

By adopting the above-described constitution, the



cost of the switching regular and the like, which is the largest cost involved in manufacturing a charger is eliminated, thereby enabling a great cost reduction.

Furthermore, because the PC used in the present invention generally has a power supply with a power capacity of 250 to 450 watts, even if the above-noted high-speed charging method is used, it is fully possible to perform 4C or 6C high-speed charging processing.

It is possible on the display means (display) of the PC used in the present invention to view directly all the charging characteristics of batteries made by the manufacturer of the battery the consumer is about to charge, and more particularly it is possible to view an index (database) of the type (nicad, NiMh), the battery characteristics (rapid type, whether or not the battery is intended for high-speed charging), and the ideal charging time (6C, 4C, 3C, or 1C (1 hour)) and the like for all the secondary cells marketed worldwide.

At the point at which the consumer recognizes the characteristics of the battery to charge, these are clicked on the PC and data is input to on the screen, after which a start location is selected to start charging by the new "VR" charging method (as established already by patent), after which the voltage gradually increases, the charging curve being observable in real time along the time and voltage axes, the voltage stopping as soon as the charging reaches a peak, enabling observation of the "peak cut" that is characteristics of VR charging, the voltage curve after transition into trickle charging reaching completion, and the

user being notified of this event by the sounding of a loud alarm.

Note that, in the present invention, by operating the control condition inputting means consisting either a key  
 5 board or a mouse of the PC, at least one of information selected from a group of charging processing information, charging processing condition, information of a battery to be charged, situation of charging process proceeding, charging history or the like is selected so as to make a control based upon  
 10 the selected information and then the result thereof is displayed on the display means of the PC.

And further note that in the present invention, the charging process operation program may be created individually based upon the type of battery, model thereof  
 15 or application thereof or the like, respectively.

It is naturally possible to enter the data of the charging and the charging number and the like using a keyboard, to print out the charging curve as a history of the charged battery or battery pack, or to keep this information on hard  
 20 disk, so as to enable saving of all battery data, thereby enabling use as reference data when performing the next charging.

While it is possible to purchase the charger as the software stored on one or two floppy disks as shown in Fig.  
 25 7, it also possible to view all instructions and charging curves, in the form illustrated in Fig. 8, via the Internet.

In the present invention, the user can purchase a complete set, providing a kit for the above-noted next-generation charger, this set including the items listed below,

from an appliance store, a supermarket, or a convenience store.

(1) A PCI board, PCI card, or expansion board or the like onto which is installed the charger, for insertion  
5 into a PCI slot

(2) A battery case for four type AA cells, and an adapter for insertion of a charging terminal for a cellular telephone

(3) Floppy disk for a PC (with software)  
10 (4) Required connection and interface cables and the like

(5) Manual describing the procedure for the charging method and charging conditions and the like

(6) Secondary cells that are most suited for the  
15 charging method recommended for the charging processing operation program (for example, several ANSI type AA cells)

Additionally, in the present invention, it is possible by disclosures made via the Internet at an interval of, for example 3 months, to provide for use by the consumer  
20 a revised index that reflects, with regard to secondary cells, information with regard to new types of cells that are constantly being introduced by the world's manufacturers, including removal of information with regard to discontinued types.

25 In the present invention, it is possible at any time to download the latest charging control software from the Internet, via a prescribed billing system, and to order the above-noted complete kit or a part thereof via the Internet in the same manner, thereby making use of e-commerce.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the general configuration of a charging apparatus according to the present invention.

5 Fig. 2 is a block diagram showing an example of the detailed configuration of a charging apparatus according to the present invention.

Fig. 3 is a block diagram showing a specific example in which a charging apparatus according to the present invention is connected via the Internet.

Fig. 4 is a drawing showing an example the storage structure of a charging processing operation program using an expansion board, and an example of the configuration of a charger formed by a holder part connected to this expansion board, according to the present invention.

Fig. 5 is a drawing showing an example of the configuration of a stand part used for charging a device such as a cellular telephone, which includes a secondary cell, according to the present invention.

20 Fig. 6 is a drawing showing the relationship between the PC processor part, the expansion slot part, and the internal power supply used in the present invention.

Fig. 7 is a drawing showing configuration examples of the configurations of a floppy disk, a CD-ROM, and an IC card into which is stored a charging processing operation program used in the present invention.

Fig. 8 is a drawing showing a screen displayed on the display means during a charging operation according to the present invention.

Fig. 9 is a drawing showing an example of the configuration of a display screen before the start of charging of the display means in the present invention.

Fig. 10 is an operational flowchart showing an example of the operating procedure in a charging method according to the present invention.

Fig. 11 is a drawing showing an example of a charging apparatus for the case in which a charger according to the present invention is implemented using a portable PC.

Fig. 12 is a drawing showing another embodiment of a charging apparatus for the case in which a USB terminal of the PC is used for the charging process of the present invention

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of a charging method and a charging apparatus according to the present invention are described in detail below, with references made to relevant accompanying drawings.

Specifically, Fig. 1 is a drawing illustrating the general configuration of an example of a charging apparatus according to the present invention, this drawing showing a charging apparatus 100 wherein the internal power supply circuit 20 of a computer apparatus (PC) 10 is used as the power supply of a charger 1 required for a charging operation on a secondary cell.

The PC in the present invention is desirably selected as a general-purpose PC, a dedicated game PC, or a TV PC having a TV with bi-directional communications capability.

This PC can be a desktop type PC, a laptop PC, and even a smaller portable or mobile PC.

Additionally, the charger 1 used in the present invention can be a charging processing operation program 24 itself, which is required for a charging operation on secondary cells 2 and a packed secondary cells 4, and can alternatively be selected as one apparatus into which is built the charging processing operation program required to charge secondary cells 2 and 4, for example, selected as one of either an international standard PCI (PC interface) selected from either PCI board or PCI card, an IC chip 43 installed onto an expansion board 42 or the like, a CD-ROM, a floppy disk 48, an IC card into which is stored the charging processing operation program, or a hard disk of a PC into which the charging processing operation program has been installed.

The charger 1 of the present invention can be provided within the PC 10 and can alternatively be provided external to the PC.

Additionally, in the present invention battery holders 3 and 6, which hold a secondary cell requiring charging processing, must be connected to the charger 1.

That is, in the charging apparatus 100 according to the present invention, the charger 1 is connected to the internal power supply circuit 20 of the PC 10, and also to the battery holders 3 and 6, either directly or via an appropriate connector and/or a cable 22.

In the charging apparatus 100 of the present invention, in the case in which the charger 1 is provided within the PC 10, the charger 1 is preferably connected to the internal

power supply circuit 20 of the PC 10, and is connected to the battery holders 3 and 6, either directly or via an appropriate connector and/or cable 22, via a signal output connector 21 of the PC 10.

5           As the battery holder in the present invention, it is possible to use a holder part 3, which accepts individually and enables charging of one or a plurality of secondary cells of various sizes requiring charging processing, and alternatively possible to use as the battery holder stand part  
10 6, which enables direct insertion of either a battery package into which a plurality of secondary cells of the same size that require charging processing are packed into a prescribed pack or a cellular telephone with a built-in battery package.

          The secondary cell holder part 3 or stand part 6  
15 preferably is formed so as to be matched to the size and shape of each of the secondary cells 2 and 4.

          The battery holding means 3 and 6 of the present invention are provided with a terminal part 23 for connection to the connector and/or cable 22.

20           Additionally, the secondary cell holder part 3 or stand part 6 in the present invention is desirably configured so as to be suitable for all the dimensions and shapes of each of the secondary cells 2.

          The charger 1 connected to the internal power supply  
25 circuit 20 of the PC 10 of the present invention has built within it a charging processing operation program required for charging of the secondary cell 2, and it is desirable that this secondary cell charging processing operation program execute high-speed charging processing.

Additionally, it is desirable that the high-speed charging processing in the present invention execute charging processing at a charging rate of at least 2C, for example, using the VR charging method for secondary cells proposed  
5 already by the inventors of the present invention in Japanese Patent No. 2739133, Japanese Patent No. 2732204, or Japanese Patent No. 2743155.

In the present invention, as shown in Fig. 7, the charging processing operation program can be built into the  
10 PC 10 either by inserting a floppy disk, a CD-ROM 49, or an IC card 50 onto which the charging processing program has been stored into a prescribed location 30 in the PC 10, or as shown in Fig. 4, by inserting an expansion board a PCI board or PCI card 42 or the like, each having an IC chip 43, that  
15 includes this charging processing operation program into an expansion slot 47 of the PC 10 as shown in Fig. 6.

The charging processing operation program of the present invention must be provided with mutually different charging processing operation conditions for each factor,  
20 such as the manufacturer, type of secondary cell, model, construction, quantity, battery capacity, and internal resistance of each of the secondary cells 2 and 4 to receive charging, and it is preferable that this charging processing operation program have a function that distinguishes at least  
25 part of the factors such as manufacturer name, secondary cell type, model, construction, quantity, battery capacity, and internal resistance of the secondary cells 2 and 4 requiring charging processing inserted in the holder part 3 or the stand part 6.



In the present invention, it is also desirable that the display means 25 of the PC 10 display information with regard to the secondary cells 2 and 4 requiring charging processing inserted in the holder part 3 or the stand part

5 6.

In the present invention, as shown in Fig. 2, it is further possible to adopt a configuration in which a user can use an appropriate input means 26 associated with the PC 10, for example, a mouse or a keyboard, to input information with regard to the secondary cells 2 and 4 requiring charging processing inserted in the holder part 3 or the stand part 6, causing it this information to be displayed on the display means 25 of the PC.

In the present invention, it is further possible to adopt a configuration in which when the user uses an appropriate input means 26 associated with the PC 10 to input information with regard to the secondary cells 2 and 4 requiring charging processing inserted in the holder part 3 or the stand part 6, causing this information to be displayed on the display means 25 of the PC, if at least one information is input that is different from the information of the secondary cell requiring charging processing inserted in the holder part 3 or the stand part 6 is input, an alarm means 27 is driven.

In the present invention, it is possible to adopt a configuration in which the user makes a selection of various conditions required for charging of the secondary cell 2 from information of the secondary cell 2 requiring charging processing from a large number of alternatives displayed on

the display means 25 of the PC 10 as part of information with regard to the secondary cell requiring charging processing.

In the present invention, at the PC 10, of information with regard to the secondary cell 2 requiring charging processing as recognized by the PC 10, or of information with regard to the secondary cell 2 requiring charging processing input by the user to the PC 10 via the input means 26, selection is made from a plurality of types of charging processing conditions stored in the charging processing operation program of charging processing conditions most suited to the secondary cell requiring charging processing, these being displayed on the display means 25.

A salient feature of the present invention is that a predicted charging characteristics graph with regard to the charging operation conditions for the selected secondary cell 2 requiring charging processing can be displayed on the display means 25.

It is desirable that the above-noted predicted charging characteristics graph, for example as shown in Fig. 9, shows the relationship between the battery current and the charging time or the relationship between the battery temperature and the charging time.

By performing the above-noted display, it is possible for the user to obtain a general understanding of the charging operation, without a deep level of experience or knowledge with regard to battery charging technology.

Additionally, in the present invention the display means 25 of the PC 10 performs a display with regard to charging operation conditions for a selected secondary cell 2

requiring a charging operation, such as battery model, battery capacity, charging rate, charging power supply, and the like, and a display indicating whether charging is started or in progress, and during the charging operation of the secondary cell the display means 25 can display the battery voltage and battery temperature of the secondary cell, which change with the elapse of charging time, or a graph showing the relationship between the battery voltage and the charging time or the battery temperature and the charging time, so that, as shown in Fig. 8, it is possible to gain a visual understanding of the charging condition during the charging of a secondary cell, thereby contributing to the improvement of an understanding of the charging processing.

In the case in which the PC used in the present invention is a portable PC, it is desirable that, as shown in Fig. 11, a charger 1 formed by an IC card 50 or the like be inserted into a prescribed slot 52 of the portable PC, or be installed into an externally connected apparatus 53, and a connection be made to the internal power supply circuit 20 of the PC, the signal output terminals of the portable PC 10 and the control signal input terminals of the battery holding means 3 or 6 being connected via an appropriate cable 22, and the battery holding means 3 or 6 being connected to an external power supply via an appropriate adaptor 51.

It is desirable to adopt a configuration in the present invention having a notification means 28 which, after a prescribed charging processing operation is started under condition selected for a selected secondary cell 2 requiring charging processing, in the case which the charging operation

is completed, notifies the user of this result, and also possible have a configuration in which the notification means 28 has the same configuration as the above-noted alarms means 27.

5           It is desirable that the charging processing operation program in the present invention have charging processing conditions set separately for all secondary cells 2 currently existing that are to be subjected to charging processing.

10           That is, because an object of the present invention is to enable anyone, anywhere to easily perform a charging processing operation for any secondary cell 2 used at present anywhere in the world, for each of the secondary cells manufactured and sold by secondary cell manufacturers  
15 domestically and overseas, information such as the type, model, rating, capacity, output voltage, charging characteristics, and discharging characteristics and the like are identified, a battery list is generated, and this list is stored in a prescribed database, an ideal charging  
20 processing operation program for each of the secondary cells being established, and these programs being stored in the database, with a correspondence established between the programs and each of the secondary cells.

          It can be envisioned that the type of secondary cell  
25 in the present invention is, for example, lead battery, a nickel-hydrogen battery, a nicad battery, or a lithium ion battery or the like, and the form of the battery in the present invention can be classified in terms of whether it is a single battery or packaged, or whether it is a SUM-1, SUM-2, SUM-3

(ANSI type AA), or SUM-4 form of battery.

In the present invention a suitable charging processing operation program suitable to a new secondary cell type must be created each time a new secondary cell is placed  
5 on the market, and it is further necessary to perform updating processing to add this newly created program to existing charging processing operation programs.

Therefore, the provider 90 of the charging processing operation program must at all times continue the task of  
10 performing updating of the above-noted database so that it includes the latest information at all times, based on information with regard to newly market secondary cells and discontinued secondary cells.

The information with regard to new secondary cells  
15 must be configured so that it is provided to the user at a charge, or at no charge at all times.

That is, in the present invention a floppy disk, a CD-ROM, or an IC card that includes an updated charging processing operation program is distributed to users by a  
20 transport means such as a door-to-door delivery service, postal mail, or the like, either at a charge or free of charge, the user being then able to update the charging processing operation program stored in his or her PC with the newly provided charging processing operation program.

25 An alternative method that can be used is that of the charger 1, that is, the charging processing operation program being distributed to users via a communication system such as the Internet.

In the present invention, in the case in which network

distribution is done, a user, in accordance with a priorly established method, pays a fee for the charging processing operation program, after which he or she downloads the charging processing operation program via the Internet, enabling the updating of the charging processing operation program stored in an IC chip, or on a floppy disk of the PC with the downloaded charging processing operation program.

As described above, a charging system according to the present invention is formed by a PC 10 having an internal power supply circuit 20, a charger 1, which includes a charging processing operation program 24 which uses the internal power supply circuit of the PC as a power supply for a charging operation, a display means 25 connected to the PC 10, an input means 26 connected to the PC 10, a controller 55 for driving the PC 10, and an external power supply means 60 for driving the PC 10.

The above-noted charging system of course has all of the above-noted elements.

Fig. 3 shows an example in which a charging system according to the present invention is implemented via the Internet.

Specifically, in a charging system according to the present invention, the updated charging processing operation program is distributed to a user via a communication system 70, such as the Internet, and the user, in accordance with a priorly established billing means 71, makes a payment of a fee for a new charging processing operation program or a charging processing operation program to be used for updating, after which the charging processing operation

program is downloaded via the Internet, enabling the user to update the charging processing operation program stored in the user's PC with the new charging processing operation program.

5           In the charging apparatus 100 and the charging system according to the present invention, in the case in which an expansion board of the PC is used, as shown in Fig. 4, an IC chip 43 having stored in it a charging processing operation program called for by the present invention is installed as  
10   the charger 1 onto a standard type of expansion board 42 that is commercially available, and peripheral circuitry that drives and controls the IC chip 43 is also installed by performing a interconnection operation.

          After the above is done, the expansion board 42 is  
15   inserted into a prescribed expansion board slot 47 provided at the rear of the PC, thereby making electrical connection to the internal power supply circuit 45 provided within the PC 10.

          After the expansion board 42 is inserted into the  
20   prescribed PC location, a connection is made between the signal output terminals 21 of the expansion board 42 and a connector 23 of the holder part 3 or the stand part 6, by means of a cable 22 having an appropriate connector 15.

          Although there is no restriction imposed on the  
25   construction of the holder part 3, the construction thereof is such that, as shown by the example of Fig. 4, it is possible to make a serial connection between one or a plurality of secondary cells 2 and electrodes of the holder part 3.

          The construction of the holder part 3 is one whereby

the holder part 3 can simultaneously accept four secondary cells 2 inserted therein, so that, for example, if it is desired to charge only one or two secondary cells, it is desirable to insert dummy batteries in the remaining  
5 insertion locations of the holder part 3.

By installing an IC memory having sufficient memory capacity for each of the secondary cells 2 used in the present invention, because the charging history of each of the secondary cells is stored, by accessing these charging  
10 histories at a later time, it is possible to obtain information with regard to the current condition of each individual secondary cell, and information with regard to about the future charging processing method and the life of each secondary cell.

15 In a charging system according to the present invention, in the case in which a user wishes to perform a charging operation on a secondary cell 2 of a prescribed type from a specific manufacturer, the user operates the input means 26 of the PC so as to input information with regard to  
20 the secondary cell 2 the user wishes to perform a charging operation on, thereby causing display of charging processing data with regard to this secondary cell 2 on the display means 25, whereupon the user either selects information and processing conditions for the secondary cell to be charged  
25 or directly inputs information and conditions required for a charging processing operation on the secondary cell to be charged, so that these are caused to be displayed on the display means 25, as shown by example in Fig. 9, and in the case in which the PC has not output an alarm with regard to



the execution of charging processing under the selected conditions, the start key is pressed to start the charging processing with respect to the secondary cell.

An example of the contents displayed by the display means 25 of the PC during the charging processing are shown in Fig. 8.

Fig. 8 shows an example of the display at an intermediate stage in the charging processing of the secondary cell 2, the graph showing the current charging condition up to an intermediate point in the charging processing.

As is clear from the above description, a method of charging a secondary cell according to the present invention has a charger formed by a holder part configured so as to separately accept and perform a charging processing operation on one or a plurality of secondary cells of various sizes requiring charging processing or a stand part configured so as to accept and perform a charging processing operation on a plurality of secondary cells of one and the same size requiring charging processing, which are either packed in a prescribed container, forming a battery package, or to directly accept a cellular telephone apparatus within which this battery package is housed, this charger being connected to a PC, an internal power supply circuit of the PC being used as the power supply for performing a charging operation.

The PC in the present invention has built into to a charging processing operation program for charging the secondary cell.

That is, in a method for charging a secondary cell

according to the present invention, the PC is configured so as to perform control of the charging current from the internal power supply circuit within the PC in accordance with the charging processing operation program, so as to  
5 execute charging processing with respect to a secondary cell requiring charging processing.

Furthermore, because it is desirable that the charging processing operation program of the present invention execute high-speed charging processing, it is  
10 preferable that the high-speed charging processing be executed at a current to achieve a charging rate of at least 2C.

In a method for charging a secondary cell according to the present invention, the charging processing operation  
15 program is either built into the PC by inserting a floppy disk, a CD-ROM, or an IC card containing the charging processing operation program into a prescribed location of the PC, or by installing an expansion board onto which an IC chip containing the charging processing operation program into an  
20 expansion slot of the PC.

Additionally, in a method for charging a secondary cell according to the present invention, as noted above, the charging processing operation program minimally has settings for mutually different charging conditions for at least one  
25 factor, such as type, model, construction, quantity, battery capacity, and the like for each secondary cell to be subjected to charging processing, and the charging processing operation program further has a function that distinguishes at least part of the factors such as secondary cell type, model,

construction, quantity, and amount of battery capacity and the like of the secondary cells requiring charging processing inserted in the holder part or the stand part, and further is capable of displaying this information.

5           In the same manner, in a method for charging a secondary cell according to the present invention, the configuration can be such that a user can operate an appropriate input means associated with the PC so as to input information with regard to a secondary cell requiring  
10 charging processing that is inserted into either the holder part or the stand part, and cause display of this information on a display means of the PC, and further the configuration can also be such that a user can make selection from information with regard to a secondary cell requiring  
15 charging processing various conditions required for charging of the secondary cell, this being selected from many alternatives on the display screen of the PC.

          In desirable example of a method of charging a secondary cell according to the present invention, a graph  
20 of the predicted charging characteristics with regard to the charging operation conditions for a selected secondary cell requiring charging processing, and in a preferred example of a method of charging a secondary cell according to the present invention, this predicted charging characteristics graph  
25 shows the relationship of the battery voltage to the charging time, or the relationship of the battery temperature to the charging time.

          Additionally, it is preferable that in a method for charging a secondary cell according to the present invention,

the display means of the PC displays performs a display with regard to charging operation conditions for a selected secondary cell requiring a charging operation, such as battery model, battery capacity, charging rate, charging power supply, and the like, and a display indicating whether charging is started or in progress, and that during the charging operation of the secondary cell the display means can display the battery voltage and battery temperature of the secondary cell, which change with the elapse of charging time, or a graph showing the relationship between the battery voltage and the charging time or the battery temperature and the charging time.

Additionally, it is preferable that in the method for charging a secondary cell according to the present invention the configuration can be such that a charging processing operation program suitable charging processing of a new secondary cell is created each time a new secondary cell is introduced to the market, and that updating processing is performed to add the newly added processing to the existing charging processing operation program, for example, by distributing to a user at a fee or free of charge a floppy disk, a CD-ROM, or an IC card containing the newly updated charging processing operation program, or a expansion board onto which a chip is mounted that containing the newly updated charging processing operation program, the user being then able to update the charging processing operation program stored in his or her PC with the newly provided charging processing operation program, and an alternative method that can be used to update the charging processing operation

program is that of distribution of the updated charging processing operation program to the user via a communication system such as the Internet.

Another embodiment of the present invention will be explained, hereunder.

In the above-mentioned embodiment of the present invention, although it is mainly explained that the charger, that is, a board on which a IC including a chip into which the charging process operation program is installed is mounted, is inserted into a board insertion slit and the holder portion or the battery holder means is connected to the charger through the board, the present invention is not restricted only to this embodiment.

Therefore, it is also preferable that the charger of the present invention, can be connected detachably to any one of output terminals of the internal power supply circuit of the PC, and also can be further connected either directly or indirectly, by an appropriate connector and/or cable to the battery holding apparatus.

Further, it is also preferable that the charger of the present invention, can be connected to a power supply circuit of the PC through an internationally standardized interface such as a PCI or a USB of the PC.

More over, in the present invention, in a case in which the charger is provided outside of the PC, the charger is connected to the internal power supply circuit of the PC through the board inserted into the board insertion slit or through the USB connector provided with the PC.

Note that, as shown in Fig. 12, the above-mentioned

charging process can be realized by inserting the USB interface 31 provided at one end of a suitable cable 22 which is connected to a battery holder 3 in that a charging controller portion 30 including the charger 24 therein is  
5 integrally established, is inserted into a USB terminal 32 provided on a side surface of the PC.

In this embodiment, the charger can be preferably used for a secondary cell battery having a relatively small performance thereof.

10 On the other hand, in the present invention, by using the application software which the PC has therein, any kind of processing about this charging the battery such as the charging operation, the charging control, the identification about the secondary battery to be charged, the selection of  
15 the most suitable charging process controlling program for the identified secondary cell battery to be charged or the like, can be displayed on the display means connected to the PC with utilizing an inputting means such as a mouse or a keyboard connected to the PC.

20 And thus, even a person who is not so familiar with a principle of the charging processing operation, can easily understand the principle thereof and the charging operation thereof simultaneously with being educated about the charging process technology.

25 Therefore, an effective utilization of the secondary cell batteries is advanced so that the number of the secondary cell batteries would be thrown away will be reduced.

In the present invention, in order to install the charging operation program into the PC so as to make the display of

the charging operation and the charging situation of the battery, for example, it is necessary to set several factors such as a setting for number of cell batteries to be charged, a setting of the charging rate, a setting of type of the cell  
 5 battery to be charged (for example, NIMH, NICAD, or the like), a setting of name of manufacturer of the battery, a setting of battery capacitance or the like, as setting operation, and for doing these setting operation, some application software should be required.

10 In addition to this, as the operation, another application software for controlling the start of the charging operation, the stop of the charging operation or the like, is also required.

On the other hand, regarding the display operation,  
 15 a separate application software is required which enables to display the charging amount, charging time, charging curve, charging history, temperature of the battery on the display means, for example.

Note that, in the present invention, 93, it is also  
 20 preferable that the charger selected from a group consisting of an international PCI (PC interface) standard selecting from either one of a PCI board or PCI card each including the charging processing operation program therein ,an IC chip mounted on an expansion board or the like, a CD-ROM, a floppy  
 25 disk, an IC card each including the charging processing operation program therein and a PC hard disk (HD) onto which the charging processing operation program has been installed, is formed a kit with a predetermined battery holder means and a predetermined operation manual of the charger so as to be

sold publicly.

And further, in the present invention, the kit is individually formed based upon an application to which the secondary cell battery to be charged being used, the type of the battery, the construction thereof, model thereof,  
5 respectively.

In the present invention, another aspect of the present invention can be defined as business model invention and in that, for example, the secondary cell charging system  
10 which comprising the steps of, creating a charging processing operation program used for each one of various kinds of secondary cell batteries to be charged, respectively by an business entity, storing the charging processing operation program created for each one of various kinds of secondary  
15 cell batteries to be charged, respectively, into a predetermined memory medium, opening the charging processing operation program to the public through an communication net works or by printing out same on a hard storing medium, preparing the charging processing operation program suitable  
20 for an user's intention, when the user having a PC had accessed to this system, asking the user to pay a predetermined necessary expenses through a predetermined payment system by a business entity providing the system to the public, providing the charging processing operation program to the  
25 user by distributing system or through the communication net works, when the business entity had confirmed that the user had the predetermined expenses through the predetermined payment system, installing or down loading the charging processing operation program by the user into a PC owned by



the user, performing charging processing operation for a predetermined secondary cell battery by the user utilizing the charging processing operation program, and updating the charging processing operation program by the user with a new  
 5 version of the charging processing operation program which would arbitrarily be down-loaded by the user.

An example of a method for charging a secondary cell according to the present invention is described in detail below, with reference made to the flowchart of Fig. 10.

10 Specifically, after starting, at step S1, after starting the PC, control proceeds to step S2, at which the charging software, including the charging processing operation program, is started.

15 After the above is done, in the case in which the secondary cell requiring charging processing is a classical type, or in the case in which the user is not particularly knowledgeable about secondary cell charging processing, control proceeds to step S3, at which the user inputs only the name of the manufacturer and the model of the secondary  
 20 cell, after which at step S4 all battery data required for charging processing is display on the display means 25.

If the user is somewhat familiar with secondary cell charging processing operation, however, at step S5 a battery list is read from a database with regard to secondary cells,  
 25 and caused to be displayed on the display means 25, whereupon the user selects a prescribed charging processing operation program from this list, after which control proceeds to step S4.

If the user is thoroughly familiar with secondary cell

charging processing operation, the input means is used at step S6 to select and input the type of battery, for example, this being a nickel-hydrogen battery, a nicad battery, or a lithium ion battery or the like.

5           After the above, control proceeds to step S7, at which input is made of the battery voltage of the secondary cell, after which control proceeds to step S8, at which information is input with regard to the battery capacity.

10           After the above, control proceeds to step S9, at which the charging rate (C rate) used in the charging processing of the secondary cell is input, after which at step S10, a charging graph based on the various input results is displayed, after which return is made to step S4.

15           Next, the number of batteries is entered at step S11 for all the above-noted cases.

          At step S12, the charging processing operation is started.

20           During the charging process, as indicated at step S13, a lamp or the like indicating that charging is in progress is lighted, and at step S14 the charging processing is executed.

          In particular when using the routine of step S6 to step S10 in the present invention, at step S17 a graph is made that shows the charging condition of a secondary cell being currently charged, and if necessary prescribed data can be added to the charging graph.

25

          After the above, control proceeds to step S15, at which if the charging operation has been completed, either a display means indicating that the charging is completed is

caused to appear, or a light via some form of display means.

After the above-noted operation, control proceeds to step S16, at which notification is made that the charging processing operation is completed, at which point processing  
5 reaching its end.

One example of the above-noted method for charging a secondary cell according to the present invention is a method for charging a secondary cell in a charging system having a PC with an internal power supply circuit, a charger,  
10 including a charging processing operation program using the internal power supply circuit of the PC as a power supply in performing a charging operation, a display means connected to the PC, an input means connected to the PC, a controller for causing the PC including the charger, to drive, an  
15 external power supply means for driving the PC, and a battery holding apparatus connected to the charger for holding a secondary cell, this secondary cell charging method having  
a battery list generation step of analyzing the battery type, model, ratings, capacity, output voltage, and  
20 charging/discharging characteristics of all currently existing chargeable secondary cells, establishing the optimum charging processing operation conditions for each individual secondary cell, and generating a list thereof,  
a step of storing the battery list into a  
25 prescribed storage means of the PC,  
a step of starting software, including the charging processing operation program,  
a step of inserting a secondary cell requiring charging processing into the charger,

a step of the charging processing operation program distinguishing information with regard to the secondary cell requiring a charging operation inserted in the charger, selecting from the battery list a charging  
 5 processing operation program suitable for a charging operation of the secondary cell, and of displaying the selected charging processing operation program on the display means, together with a charging graph or other battery information,

10 a step of displaying a charging graph,  
 a step of inputting the number of secondary cells to be charged simultaneously,

a step of verifying charging conditions on a screen of the display means, and then starting a charging  
 15 operation,

a step during the charging processing operation of either causing drive of an alarm means, which makes notification that a charging processing operation is in progress, or causing a dynamic display of a charging graph  
 20 on the display means, and

a step in the case in which the charging processing operation on the secondary cell is completed of performing a display indicating that the charging processing operation has been completed.

25 Another example of a method for charging according to the present invention is a method for charging a secondary cell in a charging system having a PC with an internal power supply circuit, a charger, including a charging processing operation program using the internal power supply circuit of

the PC as a power supply in performing a charging operation, a display means connected to the PC, an input means connected to the PC, a controller 55 for causing the PC to drive, an external power supply means for driving the PC, and a battery

5 holding apparatus connected to the charger for holding a secondary cell, this secondary cell charging method having

a battery list generation step of analyzing the battery type, model, ratings, capacity, output voltage, and charging/discharging characteristics of all currently

10 existing chargeable secondary cells, establishing the optimum charging processing operation conditions for each individual secondary cell, and generating a list thereof,

a step of storing the battery list into a prescribed storage means of the PC,

15 a step of starting software, including the charging processing operation program,

a step of inserting a secondary cell requiring charging processing into the charger,

a step of, in accordance with information with

20 regard to a secondary cell requiring charging processing, the user selecting a charging processing operation program suitable for a secondary cell requiring a charging processing operation from the battery list

a step of displaying a charging graph,

25 a step of inputting the number of secondary cells to be charged simultaneously,

a step of verifying charging conditions on a screen of the display means, and then starting a charging operation,

a step during the charging processing operation of either causing drive of an alarm means, which makes notification that a charging processing operation is in progress, or causing a dynamic display of a charging graph  
5 on the display means, and

a step in the case in which the charging processing operation on the secondary cell is completed of performing a display indicating that the charging processing operation has been completed.

10 Yet another example of a method for charging a secondary cell according to the present invention is a secondary cell charging method in a charging system having a PC with an internal power supply circuit, a charger, including a charging processing operation program using the  
15 internal power supply circuit of the PC as a power supply in performing a charging operation, a display means connected to the PC, an input means connected to the PC, a controller 55 for causing the PC to drive, and an external power supply means for driving the PC, this secondary cell charging method  
20 having

a battery list generation step of analyzing the battery type, model, ratings, capacity, output voltage, and charging/discharging characteristics of all currently existing chargeable secondary cells, establishing the  
25 optimum charging processing operation conditions for each individual secondary cell, and generating a list thereof,

a step of storing the battery list into a prescribed storage means of the PC,

a step of starting software, including the

charging processing operation program,

a step of inserting a secondary cell requiring charging processing into the charger,

a step of the user using the input means to input  
 5 separately to the PC, a battery type, battery voltage, battery capacity, and charging rate for a secondary cell requiring charging processing,

a step of the PC selecting from the battery list, based on the input information, a charging processing  
 10 operation program suitable for the secondary cell requiring a charging processing operation,

a step of displaying a charging graph,

a step of inputting the number of secondary cells to be charged simultaneously,

15 a step of verifying charging conditions on a screen of the display means, and then starting a charging operation,

a step during the charging processing operation of either causing drive of an alarm means, which makes  
 20 notification that a charging processing operation is in progress, or causing a dynamic display of a charging graph on the display means, and

a step in the case in which the charging processing operation on the secondary cell is completed of  
 25 performing a display indicating that the charging processing operation has been completed.

Yet another method for charging a secondary cell according to the present invention, is a charging method wherein a provider 90 of a charging processing operation

program discloses optimum charging processing conditions or a charging processing operation program for a prescribed secondary cell on a web page via the Internet, so that any user can access the provider 90 of the charging processing operation program and receive distribution of the charging processing operation program via the Internet. It is desirable that the provider of a charging processing operation program discloses optimum charging processing conditions or a charging processing operation program for a prescribed secondary cell on a web page via the Internet, and that a user executes placement of an order and remittance of payment therefor via the Internet, whereupon a floppy disk, CD-ROM, IC card, or expansion board onto which is installed an IC chip containing the charging processing operation program required for execution thereof is sent to the user.

Still another method for charging a secondary cell is a charging method wherein a provider 90 of a charging processing operation program discloses optimum charging processing conditions or a charging processing operation program for a prescribed secondary cell on a web page via the Internet that are at all times the latest optimum charging processing conditions or the latest charging processing operation program, so that a user can execute placement of an order and remittance of payment therefor via the Internet, enabling the user to download the latest charging processing conditions or the latest charging processing operation program to his or her PC, thereby maintaining the latest charging processing operation environment on his or her PC.

Another example of the present invention is a storage



medium onto which a program has been stored for the purpose of causing a computer to execute the various charging methods described above.

By adopting the above-described technical  
5 constitution, a charging apparatus and charging method, and other forms of the present invention provide a charging apparatus and charging method capable of reliably achieving full charging of a prescribed secondary cell using a simple apparatus and requiring only a short period of time.  
10 Additionally, by extending the life of a secondary cell, the present invention provides a charging apparatus and charging method that solve both environment and resource problems, and provide a charging apparatus and charging method that enable easy use of a home-type PC in an interactive manner to execute  
15 charging processing of a secondary cell.

Additionally, the present invention not has objects not only the enlightenment of consumers via the Internet with regard to a variety of problems that have existed from the past, but also the solution of these problems using the PC,  
20 which is at present highly available to the consumer, and the provision of an ideal charging method, thereby bringing to the consumer a great social advance.

What is claimed is:

1. A secondary cell charging apparatus which uses a computer apparatus as a part of construction elements of said charging apparatus.
- 5 2. A secondary cell charging apparatus according to claim 1, wherein said apparatus comprising a charger for a secondary cell using an internal power supply circuit of a PC as a power supply required for a charging operation.
3. A secondary cell charging apparatus according to  
10 claim 1 or 2, wherein said PC is selected from a group of a general-purpose PC including a desktop PC, a laptop PC, a mobile type PC, a dedicated game-use PC, and a TV PC with a bi-directional communication capability.
4. A secondary cell charging apparatus according to any  
15 one of claims 1 to 3, wherein said charger is either a charging processing operation program required for a charging operation on a secondary cell or is an apparatus into which a charging processing operation program required for a charging operation to a secondary cell is built.
- 20 5. A secondary cell charging apparatus according to any one of claim 1 to claim 4, wherein said charger is provided within said PC or provided external thereto.
6. A secondary cell charging apparatus according to any one of claim 1 to claim 5, wherein said charger is connected  
25 to a battery holding apparatus, which holds at least a secondary cell requiring charging processing.
7. A secondary cell charging apparatus according to any one of claim 1 to claim 5, wherein said PC is provided with a driving controlling program for driving a charging

controlling program installed in said charger.

8. A secondary cell charging apparatus according to any one of claim 1 to claim 7, wherein said apparatus configured so that by operating a controlling-condition-inputting means consisting of either a key-board or a mouse of a PC, at least one of information selected from a group of charging processing information, charging processing condition, information of a battery to be charged, situation of charging process proceeding, charging history or the like is selected so as to make a control based upon the selected information and the result thereof being displayed on said display means of said PC.

9. A secondary cell charging apparatus according to any one of claim 1 to claim 8 wherein said charging processing operation program is made separately based upon kinds of batteries, models thereof or applications thereof, respectively

10. A secondary cell charging apparatus according to any one of claim 1 to claim 9, wherein an apparatus that forms the charger which is selected from a group consisting of an international PCI (PC interface) standard selecting from either one of a PCI board or PCI card each including said charging processing operation program therein, an IC chip mounted on an expansion board or the like, a CD-ROM, a floppy disk, an IC card each including said charging processing operation program therein and a PC hard disk (HD) onto which said charging processing operation program has been installed.

11. A secondary cell charging apparatus according to any

one of claim 1 to claim 10, wherein said charger is connected detachably to any one of output terminals of said internal power supply circuit of said PC, and is further connected either directly or indirectly, by an appropriate connector and/or cable to said battery holding apparatus.

12. A secondary cell charging apparatus according to any one of claim 1 to claim 11, wherein said charger is connected to said power supply circuit of said PC through an internationally standardized interface such as a PCI or a USB of said PC.

13. A secondary cell charging apparatus according to any one of claim 1 to claim 12, wherein said battery holding apparatus is connected to said charger provided with a chip into which said charging processing operation program being installed therein and mounted on a board which is inserted into a board insertion slit of said PC, through an appropriate connector and/or cable.

14. A secondary cell charging apparatus according to any one of claim 1 to claim 13, wherein in a case in which said charger is provided within said PC, said charger is connected to said internal power supply circuit of said PC, and is connected to said battery holding apparatus either directly via a signal output of said PC, or indirectly connected thereto, via a signal output of said PC, utilizing an appropriate connector and/or cable.

15. A secondary cell charging apparatus according to any one of claim 1 to claim 13, wherein in a case in which said charger is provided outside of said PC, said charger is connected to said internal power supply circuit of said PC

through said board inserted into said board insertion slit or through said USB connector provided with said PC.

16 A secondary cell charging apparatus according to any one of claim 1 to claim 15, wherein said international PCI  
5 (PC interface) standard selecting from either one of a PCI board or PCI card, each including said charging processing operation program therein, an IC chip mounted on an expansion board or the like, a CD-ROM, a floppy disk, an IC card each including said charging processing operation program therein  
10 or a PC hard disk (HD) onto which said charging processing operation program has been installed, is individually produced based upon kinds of batteries, model thereof, applications therefor, or the like, respectively.

17. A secondary cell charging apparatus according to any  
15 one of claim 1 to claim 16, wherein, said battery holding apparatus includes a holder part configured so as to enable acceptance and a charging processing operation separately on one or a plurality of secondary cell of various sizes requiring charging processing.

20 18. A secondary cell charging apparatus according to any one of claim 1 to claim 17, wherein said battery holding apparatus includes a stand part configured so as to enable acceptance and a charging processing operation of a cell package in which a plurality of secondary cell of the same  
25 size being packaged therewithin, or directly of a cellular telephone with said pack built thereinto, directly.

19. A secondary cell charging apparatus according to claim 17 or claim 18, wherein said secondary cell holder part or stand part thereof is formed so as to match the dimensions

or shape of each individual secondary cell.

20. A secondary cell charging apparatus according to claim 18 or claim 19, wherein said secondary cell holder part or stand part is formed so as to match the dimensions or shape  
5 of all said secondary cells.

21. A secondary cell charging apparatus according to any one of claim 1 to claim 20, wherein said secondary cell charging processing operation program executes high-speed charging processing.

10 22. A secondary cell charging apparatus according claim 21, wherein said secondary cell charging processing operation program executes charging with a charging current of at least 2C.

23. A secondary cell charging apparatus according to  
15 claim 10, wherein said charging processing operation program included in said charger is either built into said PC by inserting a floppy disk, a CD-ROM, or an IC card containing said charging processing operation program into a prescribed location of said PC, or by inserting a PCI board  
20 onto which an IC chip containing said charging processing operation program has been mounted into an expansion slot of said PC.

24. A secondary cell charging apparatus according to any one of claim 1 to claim 23, wherein wherein each of said  
25 charging processing operation program is created so as to have a respective charging process operation condition of a secondary cell to be subjected to charging processing, being different from each other based upon at least one factor among a secondary cell manufacturer name, secondary cell type,

model, construction, quantity, battery capacity, and internal resistance and the like .

25. A secondary cell charging apparatus according to any one of claim 1 to claim 24, wherein said charging processing  
5 operation program has a function to distinguish at least one information selected from a group of information consisting a manufacturer name, secondary cell type, model, construction, quantity, battery capacity, and internal resistance and the like of a secondary cell requiring charging processing  
10 inserted in said battery holding apparatus.

26. A secondary cell charging apparatus according to claim 25, wherein said charger automatically selects a charging processing operation program having the most suitable charging processing condition to said secondary cell  
15 battery to be charged, among a plurality of charging processing operation program stored in said charger utilizing information about the secondary cell battery to be charged and distinguished by said PC, its-self or separate information about the secondary cell battery to be charged  
20 which is input into said PC by a user utilizing said inputting means.

27. A secondary cell charging apparatus according to any one of claim 1 to claim 26, wherein information regarding a secondary cell requiring charging processing and inserted  
25 into said battery holding apparatus is displayed on a display means of said PC.

28. A secondary cell charging apparatus according to any one of claim 1 to claim 27, wherein a user uses an appropriate input means associated with said PC to input information

regarding a secondary cell requiring charging processing inserted in said battery holding apparatus, said information being displayed on a display means of said PC.

29. A secondary cell charging apparatus according to any  
5 one of claim 1 to claim 28, wherein when a user uses an appropriate input means associated with said PC to input information regarding a secondary cell requiring charging processing inserted in said battery holding apparatus and display said information on said display means of said PC in  
10 a case in which at least one information being different from information regarding a secondary cell requiring charging processing inserted in said battery holding apparatus is input, an alarm means is driven.

30. A secondary cell charging apparatus according to any  
15 one of claim 1 to claim 29, wherein a user, based on information regarding a secondary cell requiring charging processing, sets various conditions necessary to be required for charging said secondary cell by selecting same from a large number of alternatives displayed on a display screen  
20 of said PC.

31. A secondary cell charging apparatus according to any one of claim 1 to claim 30, wherein a predicted charging characteristics graph with regard to charging operation conditions for said selected secondary cell requiring  
25 charging processing can be displayed on said display means of said PC.

32. A secondary cell charging apparatus according to any one of claim 1 to claim 31, wherein said predicted charging characteristics graph indicates a relationship between a



battery voltage and a charging time or a relationship between a battery temperature and a charging time.

33. A secondary cell charging apparatus according to any one of claim 1 to claim 32, wherein a display means of said  
5 PC displays at least one information selected from a manufacturer name, a battery type, battery capacity, charging rate, and internal resistance and the like with regard to charging operation conditions for said selected secondary cell requiring charging processing, and displays  
10 information in that whether it distinguishes the start of charging or charging in progress.

34. A secondary cell charging apparatus according to any one of claim 1 to claim 33, wherein a display means of said  
PC displays at least one information selected from a  
15 manufacturer name, a battery type, battery capacity, charging rate, and internal resistance and the like with regard to charging operation conditions for said selected secondary cell requiring charging processing, and separately displays either one of the start of charging or charging in progress  
20 and wherein said display means displays either a separate display of a battery voltage and battery temperature, which vary with the elapse of processing time, or a graph indicating a relationship between a battery voltage and a charging time or a relationship between a battery temperature  
25 and a charging time.

35. A secondary cell charging apparatus according to any one of claim 1 to claim 34, wherein a notification means is provided which, after a start of a prescribed charging processing operation under selected charging conditions with

respect to a selected secondary cell requiring charging processing, in a case in which said charging operation is completed, makes notification to a user of said completion.

36. A secondary cell charging apparatus according to any  
5 one of claim 1 to claim 35, wherein said charging processing operation program has separate settings of charging processing conditions for all secondary cell currently existing to be subjected to charging processing, respectively.

10 37. A secondary cell charging apparatus according to any one of claim 1 to claim 36, wherein said charging processing operation program is created that is suitable for charging processing of a new secondary cell each time a new secondary cell is marketed, said program being added to an existing  
15 charging processing operation program by updating processing.

38. A secondary cell charging apparatus according to any one of claim 1 to claim 37, wherein any one of a PCI board or PCI card each forming said PCI interface, a floppy  
20 disk, a CD-ROM, or an IC card each of which containing said updated charging processing operation program is distributed to a user for a fee or free-of-charge, said user updating said charging processing operation program in his or her PC with said new charging processing operation program.

25 39. A secondary cell charging apparatus according to any one of claim 1 to claim 38, wherein said updated charging processing operation program is distributed to a user via a communication system including such as the Internet.

40. A secondary cell charging apparatus according to

claim 39, wherein after a user, by means of a pre-established method, made a payment for said charging processing operation program for updating, said user downloads said charging processing operation program via the Internet, and updates  
5 said charging processing operation program in his or her PC with said new charging processing operation program.

41. A charging system comprising:

a PC comprising an internal power supply circuit;  
a charger with a built-in charging processing  
10 operation program using said internal power supply circuit of said PC as a power supply in a charging operation;  
a display means connected to said PC;  
an input means connected to said PC;  
a controller for causing said PC to drive; and  
15 an external power supply means for driving said PC.

42. A charging system according to claim 41, further comprising a battery holding apparatus connected directly or indirectly to said charger, said battery holding apparatus includes either a holder part configured so as to enable  
20 acceptance and a charging processing operation separately on one or a plurality of secondary cell of various sizes requiring charging processing, or a stand part configured so as to enable acceptance and a charging processing operation of a plurality of secondary cell to be charged of the same  
25 size packaged within a prescribed pack, or directly of a cellular telephone with said pack built thereinto.

43. A charging system according to claim 42, wherein a charging processing operation program either built into said PC or stored in said charger externally connected to PC

performs high-speed charging processing.

44. A charging system according to claim 43, wherein said secondary cell charging processing operation program executes charging with a charging current of at least 2C.

5 45. A charging system according to any one of claim 41 to claim 43, wherein said charging processing operation program is built into said PC by inserting a floppy disk, a CD-ROM, or an IC card each containing said charging processing operation program therein, into a prescribed  
10 location of said PC, or by inserting a PCI board onto which an IC chip or PCI card each containing said charging processing operation program has been mounted into an expansion slot of said PC.

46. A charging system according to any one of claim 41 to  
15 claim 45, wherein said charger is connected detachably to any one of output terminals of said internal power supply circuit of said PC, and is further connected either directly or indirectly, by an appropriate connector and/or cable to said battery holding apparatus.

20 updated charging processing operation program is distributed

47. A charging system according to any one of claim 41 to claim 46, wherein said charger is connected to said power supply circuit of said PC through an internationally standardized interface such as a PCI or a USB of said PC.

25 48. A charging system according to claim 45, wherein each of said charging processing operation program has mutually different charging processing conditions from each other as set for at least one factor among a secondary cell manufacturer name, secondary cell type, model, construction,

quantity, battery capacity, and internal resistance and the like of a secondary cell to be subjected to charging processing.

49. A charging system according to any one of claim 41  
5 to claim 48, wherein said charging processing operation  
program has a function to distinguish at least one information  
selected from a group of information consisting of  
a manufacturer name, secondary cell type, model, construction,  
quantity, battery capacity, and internal resistance and the  
10 like of a secondary cell requiring charging processing  
inserted in said battery holding apparatus, and further  
wherein said program having a function in that said  
distinguished information about said secondary cell  
battery is displayed on said display means.

15 50. A charging system according to any one of claim 41  
to claim 49, wherein said input means is used to display on  
said display means information regarding a secondary cell  
requiring charging processing inserted into said battery  
holding apparatus.

20 51. A charging system according to any one of claim 41  
to claim 50, wherein a user, based on information regarding  
a secondary cell requiring charging processing, sets  
various conditions necessary to be required for charging  
said secondary cell by selecting same from a large number  
25 of alternatives displayed on a display screen of said PC.

52. A charging system according to any one of claim 41  
to claim 51, wherein, from information regarding said  
secondary cell requiring charging processing recognized by  
said PC, or from information regarding said secondary cell

requiring charging processing input by a user via said input means, a charging processing operation program having charging processing conditions most suited for said secondary cell required charging processing is selected from a plurality of charging processing operation programs stored within said charger.

53. A charging system according to any one of claim 41 to claim 52, wherein either various information regarding optimum charging operation conditions for a selected secondary cell requiring charging processing or a predicted charging characteristics graph with regard to charging operation conditions for said selected secondary cell requiring charging processing can be displayed on said display means of said PC.

54. A charging system according to claim 53, wherein said predicted charging characteristics graph indicates a relationship between a battery voltage and a charging time or a relationship between a battery temperature and a charging time.

55. A charging system according to any one of claim 41 to claim 54, wherein a display means of said PC displays a battery type, battery capacity, charging rate, and internal resistance and the like with regard to charging operation conditions for said selected secondary cell requiring charging processing, and displays whether it distinguishes the start of charging or charging in progress, and further displays during said charging operation on said secondary cell either a separate display of a battery voltage and battery temperature, which vary with the elapse of processing

time, or a graph indicating a relationship between a battery voltage and a charging time or a relationship between a battery temperature and a charging time.

56. A charging system according to any one of claim 41  
5 to claim 55, wherein a notification means is provided which, after a start of a prescribed charging processing operation under selected charging conditions with respect to a selected secondary cell requiring charging processing, in a case in which said charging operation is completed, makes  
10 notification to a user of said completion.

57. A charging system according to any one of claim 41  
to claim 56, wherein said charging processing operation program has a separate settings of charging processing conditions for all secondary cell currently existing to be  
15 subjected to charging processing ,respectively.

58. A charging system according to any one of claim 41  
to claim 57, wherein said charging processing operation program is created that is suitable for charging processing of a new secondary cell each time a new secondary cell is  
20 marketed, said program being added to an existing charging processing operation program by updating processing.

59. A charging system according to any one of claim 41  
to claim 58, wherein any one of a PCI board or PCI card each forming said PCI interface, a floppy disk, a CD-ROM, or an  
25 IC card each of which containing said updated charging processing operation program is distributed to a user for a fee or free-of-charge, said user updating said charging processing operation program in his or her PC with said new charging processing operation program.

60. A charging system according to any one of claim 41 to claim 59, wherein said updated charging processing operation program is distributed to a user via a communication system such as the Internet.

5 61. A charging system according to any one of claim 60, wherein after a user, by means of a pre-established method, made a payment for said charging processing operation program for updating, said user downloads said charging processing operation program via the Internet, and updates said charging  
10 processing operation program in his or her PC with said new charging processing operation program.

62. A secondary cell charging method wherein a charger to which is connected either a holder part configured so as to enable acceptance and a charging processing operation  
15 separately on one or a plurality of secondary cells of various sizes requiring charging processing, or a stand part configured so as to enable acceptance and a charging processing operation of a cell package in that a plurality of secondary cell of the same size packaged within  
20 a prescribed pack, or directly of a cellular telephone with said pack built thereinto, is either built into a PC or connected externally thereto, whereby an internal power supply circuit of the PC is used as a power supply in a charging operation.

25 63. A secondary cell charging method according to claim 62, wherein said charger connected to said internal power supply circuit of said PC is connected to a signal output terminal of said PC or is connected to said signal output terminal being either directly or indirectly, via an



appropriate connector and/or cable, so that a charging processing operation on a secondary cell is performed.

64. A secondary cell charging method according to claim 62 or claim 63, wherein either the secondary cell holder part  
5 or stand part is formed so as to match the dimensions or shape of each individual secondary cell.

65. A secondary cell charging method according to any one of claim 62 to claim 64, wherein said charger connected to said PC has built into it a charging processing operation  
10 program required for charging of said secondary cell.

66. A secondary cell charging method according to any one of claim 62 to claim 65, wherein said charger performs control of current from an internal power supply circuit of said PC in accordance with said charging processing operation program,  
15 so as to execute charging processing with respect to a secondary cell requiring charging processing.

67. A secondary cell charging method according to any one of claim 62 to claim 66, wherein said secondary cell charging processing operation program executes high-speed charging processing.  
20

68. A secondary cell charging method according to claim 67, wherein said high-speed charging processing is executed with a charging current of at least 2C.

69. A secondary cell charging method according to any one  
25 of claim 62 to claim 68, wherein said charging processing operation program included in said charger is either built into said PC by inserting a floppy disk, a CD-ROM, or an IC card containing said charging processing operation program into a prescribed location of said PC, or by inserting a PCI

board or expansion board including an IC chip and PCI card therein each of which containing said charging processing operation program therein has been mounted into an expansion slot of said PC.

5 70. A secondary cell charging method according to any one of claim 53 to claim 60, wherein said charging processing operation program has mutually different charging processing conditions from each other as set for at least one factor among a secondary cell manufacturer name, secondary cell type,  
10 model, construction, quantity, battery capacity, and internal resistance and the like of a secondary cell to be subjected to charging processing.

71. A secondary cell charging method according to any one of claim 62 to claim 70, wherein said charging processing  
15 operation program distinguishes at least one part of a manufacturer name, secondary cell type, model, construction, quantity, battery capacity, and internal resistance and the like of a secondary cell requiring charging processing and also displays said information on a display means of said PC.

20 72. A secondary cell charging method according to any one of claim 62 to claim 71, wherein user uses an appropriate input means associated with said PC to input information regarding a secondary cell requiring charging processing and inserted in said holder part or said stand, said information being  
25 displayed on a display means of said PC.

73. A secondary cell charging method according to any one of claim 62 to claim 72, wherein a user, based on information regarding a secondary cell requiring charging processing sets various conditions necessary to be required for

charging said secondary cell by selecting same from a large number of alternatives displayed on a display screen of said PC.

74. A secondary cell charging method according to any one  
5 of claim 62 to claim 73, wherein in said PC, from information regarding said secondary cell requiring charging processing recognized by said PC, or from information regarding said secondary cell requiring charging processing input by a user via said input means, a charging processing operation program  
10 having charging processing conditions most suited for said secondary cell required charging processing is selected from a plurality of charging processing operation programs stored within said charger, and displayed on said display means.

75. A secondary cell charging method according to any one  
15 of claim 62 to claim 74, wherein a predicted charging characteristics graph with regard to charging operation conditions for said selected secondary cell requiring charging processing is displayed on said display means of said PC.

20 76. A secondary cell charging method according to any one of claim 62 to claim 75, wherein said predicted charging characteristics graph indicates a relationship between a battery voltage and a charging time or a relationship between a battery temperature and a charging time.

25 77. A secondary cell charging method according to any one of claim 62 to claim 76, wherein a display means of said PC displays at least one of a name of a battery manufacturer, a kind of battery, a battery type, battery capacity, quantity thereof, a capacitance thereof, charging

rate, a charging power supply and internal resistance and the like with regard to charging operation conditions for said selected secondary cell requiring charging processing, and a display that distinguishes between the start of charging  
5 and charging in progress, and further displays during said charging operation on said secondary cell either a separate display of a battery voltage and battery temperature, which vary with the elapse of processing time, or displays a graph indicating a relationship between a battery voltage and a  
10 charging time or a relationship between a battery temperature and a charging time.

78. A secondary cell charging method according to any one of claim 62 to claim 77, wherein a notification means is provided which, after a start of a prescribed charging  
15 processing operation under selected charging conditions with respect to a selected secondary cell requiring charging processing, in a case in which said charging operation is completed, makes notification to a user of said completion.

79. A secondary cell charging method according to any one  
20 of claim 62 to claim 78, wherein said charging processing operation program has a separate settings of charging processing conditions for all secondary cell currently existing to be subjected to charging processing, respectively.

80. A secondary cell charging method according to any one  
25 of claim 62 to claim 79, wherein said charging processing operation program is created that is suitable for charging processing of a new secondary cell each time a new secondary cell is marketed, said program being added to an existing

charging processing operation program by updating processing.

81. A secondary cell charging method according to any one of claim 62 to claim 80, wherein any one of a PCI board or  
5 PCI card each forming said PCI interface, a floppy disk, a CD-ROM, or an IC card each of which containing said updated charging processing operation program is distributed to a user for a fee or free-of-charge, said user updating said charging processing operation program in his or her PC with  
10 said new charging processing operation program.

82. A secondary cell charging method according to any one of claim 62 to claim 81, wherein said updated charging processing operation program is distributed to a user via a communication system such as the Internet.

15 83. A secondary cell charging method according to claim 82, wherein after a user, by means of a pre-established method, makes a payment for said charging processing operation program for updating, said user downloads said charging processing operation program via the Internet, and updates  
20 said charging processing operation program in his or her PC with said new charging processing operation program.

84. A secondary cell charging method according to any one of claim 62 to claim 83, wherein past charging processing information with respect to each individual secondary cell  
25 is stored as historical information.

85. A secondary cell charging method according to claim 84, wherein a storage means is provided for each individual secondary cell, and wherein past charging processing information for each individual secondary cell is stored in

said storage means as historical information.

86. A method for charging a secondary cell in a charging system comprising a PC with an internal power supply circuit, a charger, including a charging processing operation program  
5 using said internal power supply circuit of said PC as a power supply in performing a charging operation, a display means connected to said PC, an input means connected to said PC, an input means connected to said PC, a controller for causing said PC including said charger, to drive, an external  
10 power supply means for driving said PC, and a battery holding apparatus connected to said charger for holding a secondary cell, said secondary cell charging method comprising:

a battery list generation step of analyzing at least a part of a name of battery manufacturer, a kind of  
15 a battery, a battery type, model, ratings, capacity, output voltage, charging/discharging characteristics, and internal resistance and the like of all currently existing chargeable secondary cells, establishing optimum charging processing operation conditions for each said individual secondary cell,  
20 and generating a list thereof;

a step of storing said battery list into a prescribed storage means of said PC;

a step of starting software, including said charging processing operation program;

25 a step of inserting a secondary cell requiring charging processing into a holding means of said charger;

a step of said charging processing operation program distinguishing information with regard to said secondary cell requiring a charging operation inserted in

said charger, selecting from said battery list a charging processing operation program suitable for a charging operation of said secondary cell, and of displaying said selected charging processing operation program on said display means, together with a charging graph or other battery information;

a step of inputting a number of secondary cells to be charged simultaneously;

a step of verifying charging conditions on a screen of said display means, and then starting a charging operation;

a step during a charging processing operation of either causing drive of an alarm means, which makes notification that a charging processing operation is in progress, or causing a dynamic display of a charging graph on said display means; and

a step, in a case in which said charging processing operation on said secondary cell is completed, of performing a display indicating that said charging processing operation has been completed.

87. A method for charging a secondary cell in a charging system comprising a PC with an internal power supply circuit, a charger, including a charging processing operation program using said internal power supply circuit of said PC as a power supply in performing a charging operation, a display means connected to said PC, an input means connected to said PC, a controller for causing said PC to drive, an external power supply means for driving said PC, and a battery holding apparatus connected to said charger for holding a secondary

cell, said secondary cell charging method comprising:

a battery list generation step of analyzing at least a part of a battery manufacturer, a battery type, model, ratings, capacity, output voltage, charging/discharging characteristics, and internal resistance and the like of all  
 5 currently existing chargeable secondary cells, respectively, establishing optimum charging processing operation conditions for each individual secondary cell, respectively, and generating a list thereof;

10 a step of storing said battery list into a prescribed storage means of said PC;

a step of starting software, including said charging processing operation program;

a step of inserting a secondary cell requiring  
 15 charging processing into said holding apparatus connected to said charger;

a step of, in accordance with information with regard to a secondary cell requiring charging processing, selecting a charging processing operation program suitable  
 20 for a secondary cell requiring a charging processing operation from said battery list;

a step of displaying a charging graph;

a step of inputting a number of secondary cells to be charged simultaneously;

25 a step of verifying charging conditions on a screen of the display means, and then starting a charging operation;

a step during a charging processing operation of either causing drive of an alarm means, which makes



notification that a charging processing operation is in progress, or causing a dynamic display of a charging graph on said display means; and

5 a step in a case in which said charging processing operation on said secondary cell is completed of performing a display indicating that said charging processing operation has been completed.

88. A secondary cell charging method in a charging system comprising a PC with an internal power supply circuit, a  
 10 charger, including a charging processing operation program using said internal power supply circuit of said PC as a power supply in performing a charging operation, a display means connected to said PC, an input means connected to said PC, a controller for causing said PC to drive, and an external  
 15 power supply means for driving said PC, said secondary cell charging method comprising:

a battery list generation step of analyzing at least one of a battery manufacturer name, battery type, model, ratings, capacity, output voltage, charging/discharging  
 20 characteristics, and internal resistance and the like of each one of all currently existing chargeable secondary cells, establishing optimum charging processing operation conditions for each individual secondary cell, respectively, and generating a list thereof;

25 a step of storing said battery list into a prescribed storage means of said PC;

a step of starting software, including said charging processing operation program;

a step of inserting a secondary cell requiring

charging processing into said a holding apparatus of said charger;

a step of a user using said input means to input separately to said PC at least a part of a battery manufacturer  
 5 name, battery type, battery voltage, battery capacity, charging rate, and internal resistance and the like for a secondary cell requiring charging processing;

a step of said PC selecting from said battery list, based on said input information, a charging processing  
 10 operation program suitable for said secondary cell requiring a charging processing operation;

a step of displaying a charging graph;

a step of inputting a number of secondary cells to be charged simultaneously;

15 a step of verifying charging conditions on a screen of said display means, and then starting a charging operation;

a step during a charging processing operation of either causing drive of an alarm means, which makes  
 20 notification that a charging processing operation is in progress, or causing a dynamic display of a charging graph on said display means; and

a step in a case in which said charging processing operation on said secondary cell is completed of  
 25 performing a display indicating that said charging processing operation has been completed.

89. A charging method according to any one of claim 62 to claim 88, wherein a provider of said charging processing operation program discloses optimum charging processing

conditions or a charging processing operation program for a prescribed secondary cell on a web page via the Internet, so that any user can access said provider of said charging processing operation program and receive distribution of said charging processing operation program via said Internet.

90. A method for charging according to any one of claim 62 to claim 89, wherein a provider of said charging processing operation program discloses optimum charging processing conditions or a charging processing operation program for a prescribed secondary cell on a web page via the Internet, and wherein a user executes placement of an order and remittance of payment therefor via said Internet, whereupon a floppy disk, CD-ROM, IC card, or expansion board onto which is installed an IC chip containing said charging processing operation program required for execution thereof is sent to said user.

91. A charging method according to any one of claim 62 to claim 90, wherein a provider of said charging processing operation program discloses optimum charging processing conditions or a charging processing operation program for a prescribed secondary cell on a web page via the Internet that is at all times the latest optimum charging processing conditions or the latest charging processing operation program, so that a user can execute placement of an order and remittance of payment therefor via the Internet, enabling said user to download said latest charging processing conditions or said latest charging processing operation program to his or her PC, thereby maintaining a latest charging processing operation environment on his or her PC.

92. A storage medium onto which is stored a program for

the purpose of causing a computer to execute a charging method recited in any one of claim 86 to claim 91.

93. A secondary cell charging apparatus according to any one of claim 1 to claim 92, wherein said charger selected from  
 5 a group consisting of an international PCI (PC interface) standard selecting from either one of a PCI board or PCI card each including said charging processing operation program therein ,an IC chip mounted on an expansion board or the like, a CD-ROM, a floppy disk, an IC card each including said  
 10 charging processing operation program therein and a PC hard disk (HD) onto which said charging processing operation program has been installed, is formed a kit with a predetermined battery holder means and a predetermined operation manual of said charger so as to be sold publicly.

15 94. A secondary cell charging apparatus according to claim 93, wherein said kit is individually formed based upon an application to which said secondary cell battery to be charged being used, respectively.

20 95. A secondary cell charging system which comprising the steps of;

creating a charging processing operation program used for each one of various kinds of secondary cell batteries to be charged, respectively;

25 storing said charging processing operation program created for each one of various kinds of secondary cell batteries to be charged, respectively, into a predetermined memory medium;

opening said charging processing operation program to the public through an communication net works or by printing out same on a hard storing medium;

preparing said charging processing operation program suitable for an user's intention, when said user having a PC had accessed to this system;

asking said user to pay a predetermined necessary expenses  
5 through a predetermined payment system by a business entity providing said system to the public; providing said charging processing operation program to said user by distributing system or through said communication net works, when said business entity had confirmed that said user had  
10 said predetermined expenses through said predetermined payment system;

installing or down loading said charging processing operation program by said user into a PC owned by said user;

performing charging processing operation for a  
15 predetermined secondary cell battery by said user utilizing said charging processing operation program; and

updating said charging processing operation program by said user with a new version of said charging processing operation program which would arbitrarily be down-loaded by  
20 said user.

**Fig. 1**

100

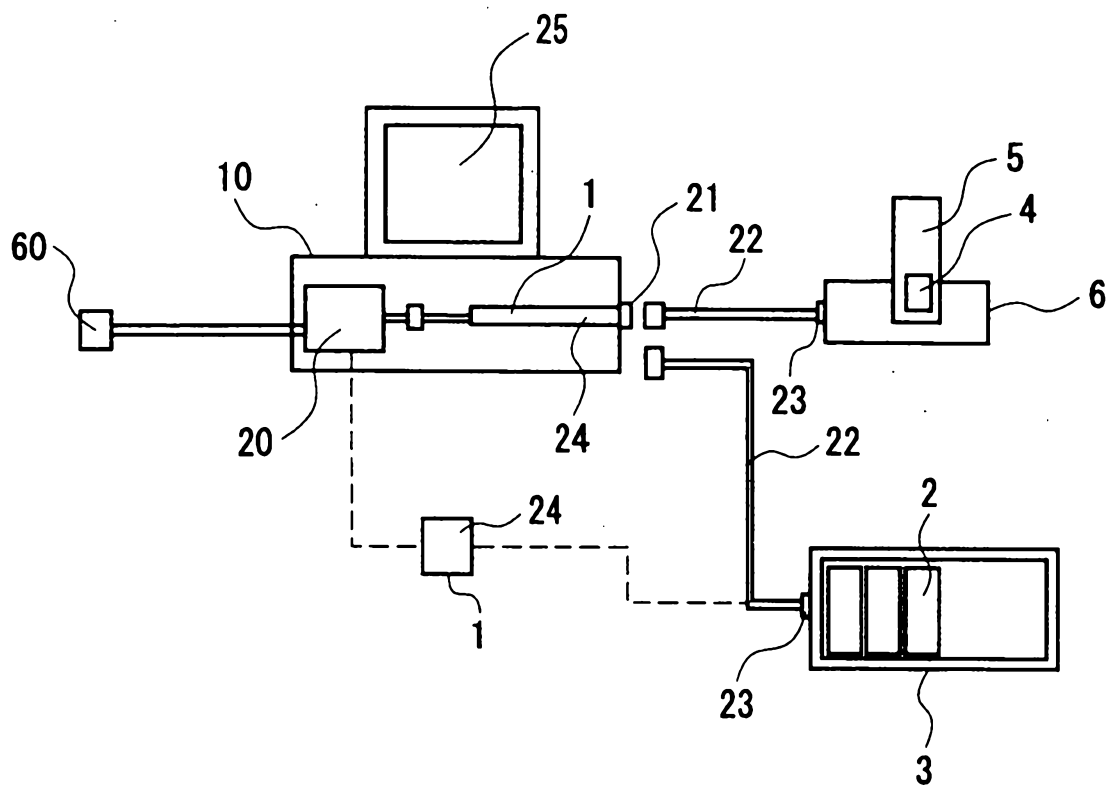


Fig. 2

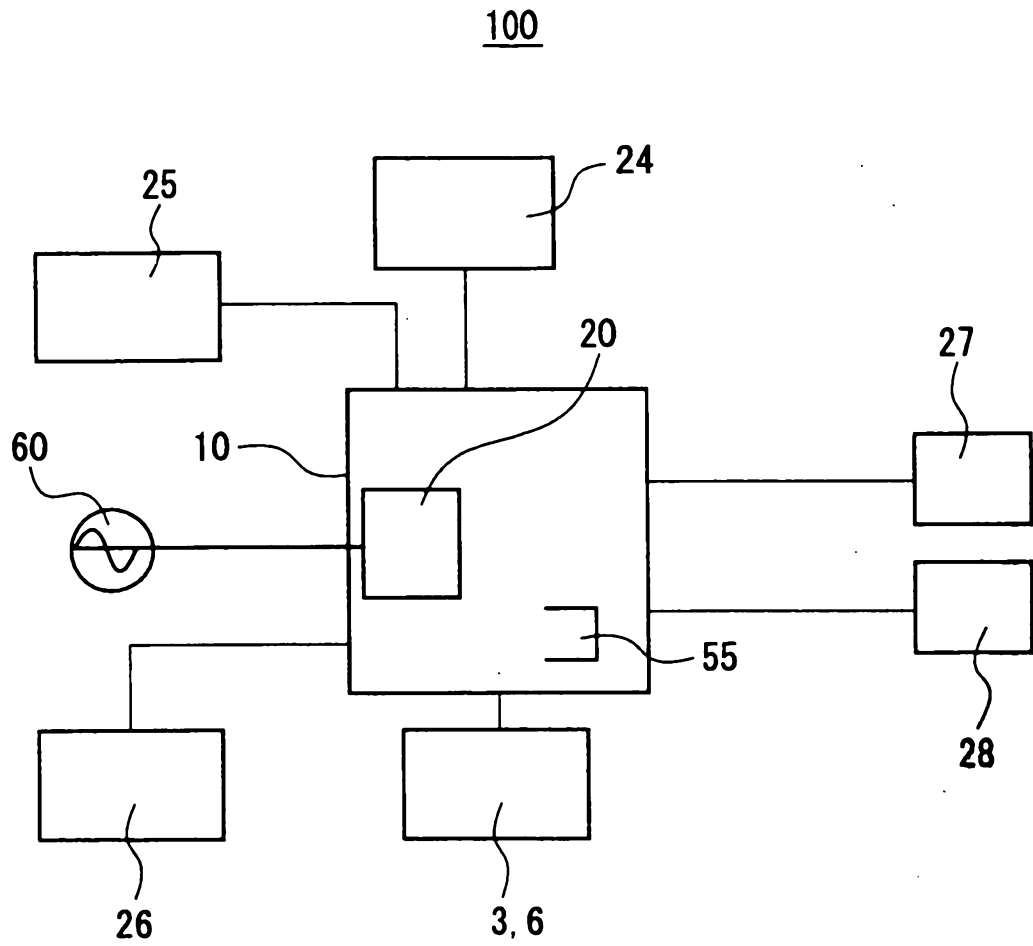


Fig. 3

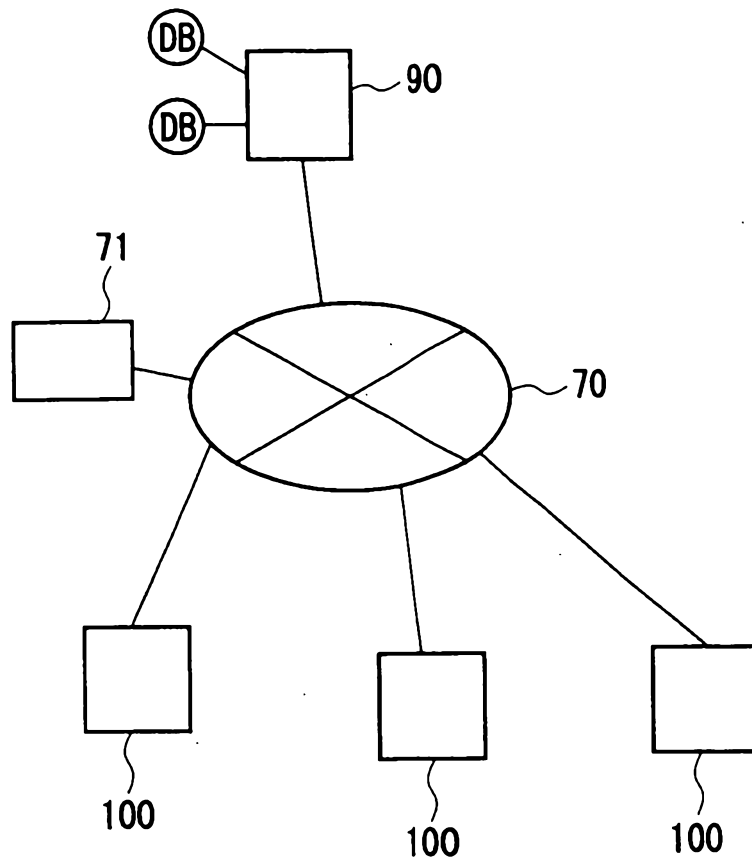




Fig. 4

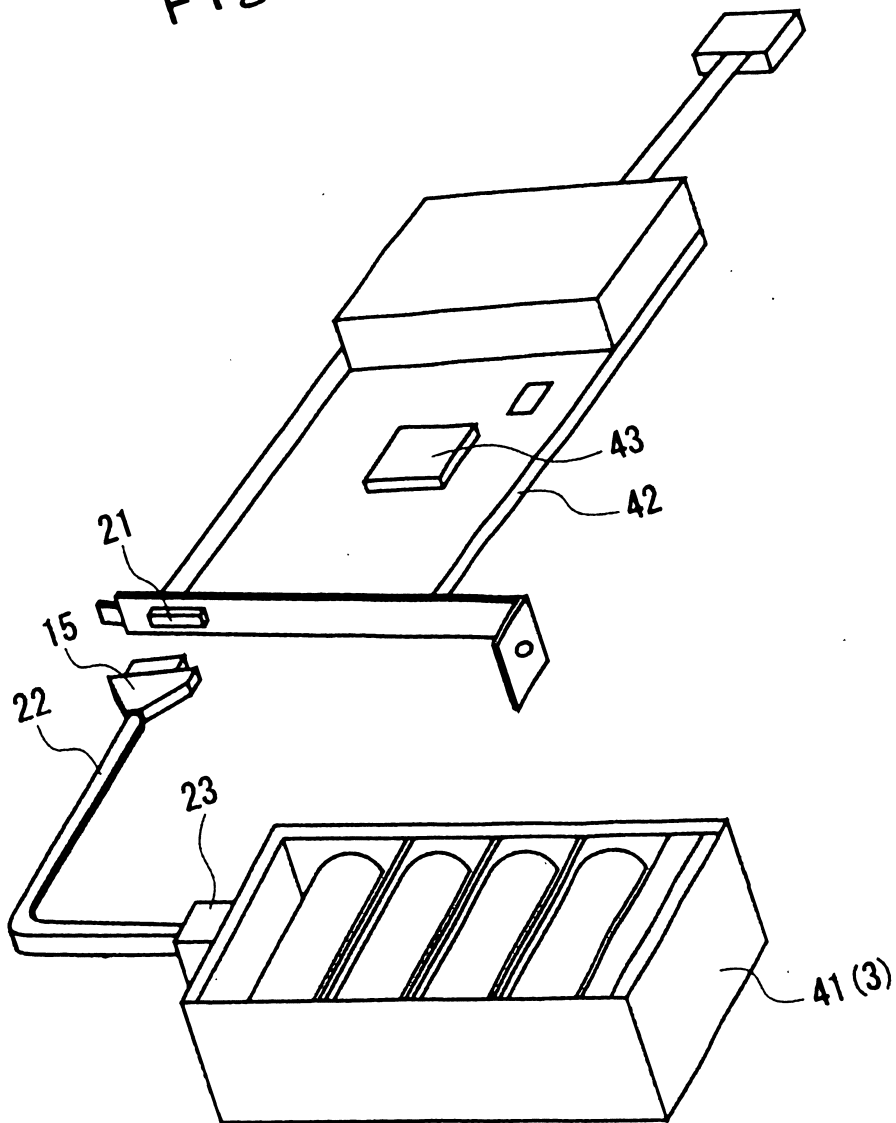
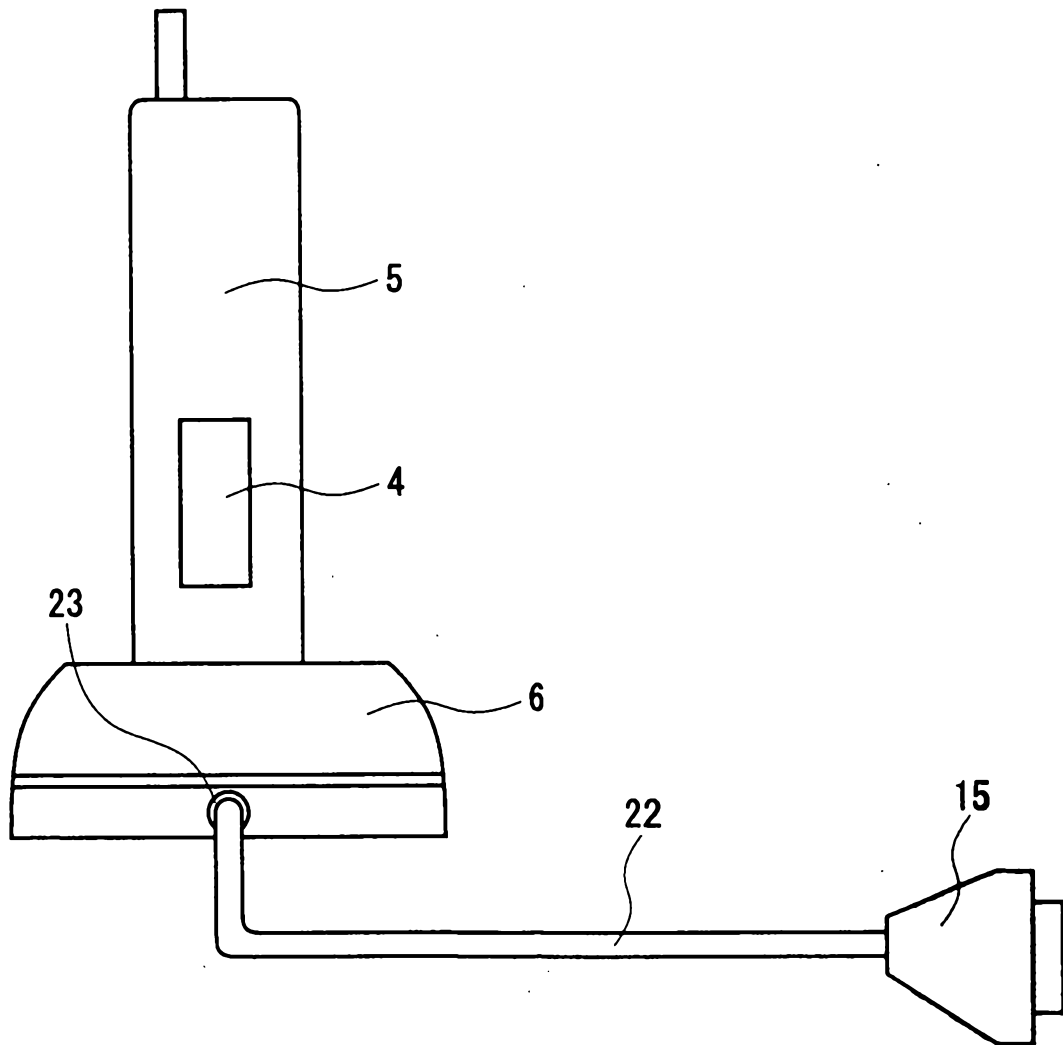


Fig. 5



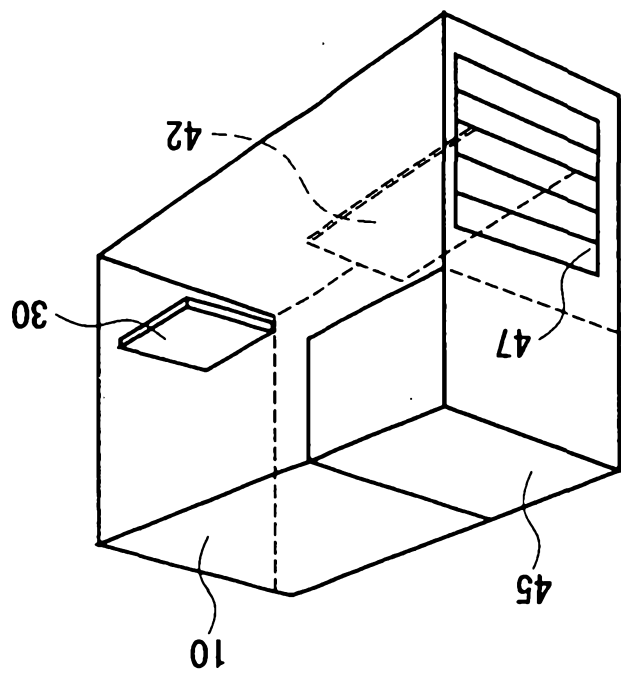
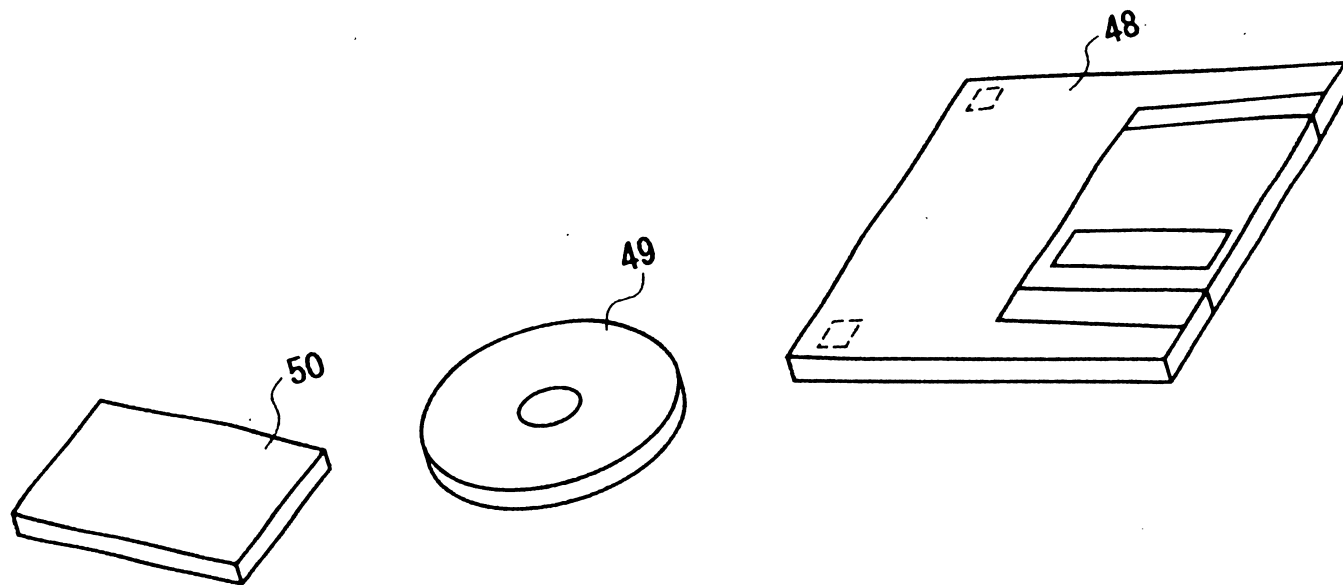


Fig. 6

12 04 01 3511

Fig.7



12 04 01 35:17

Fig.8

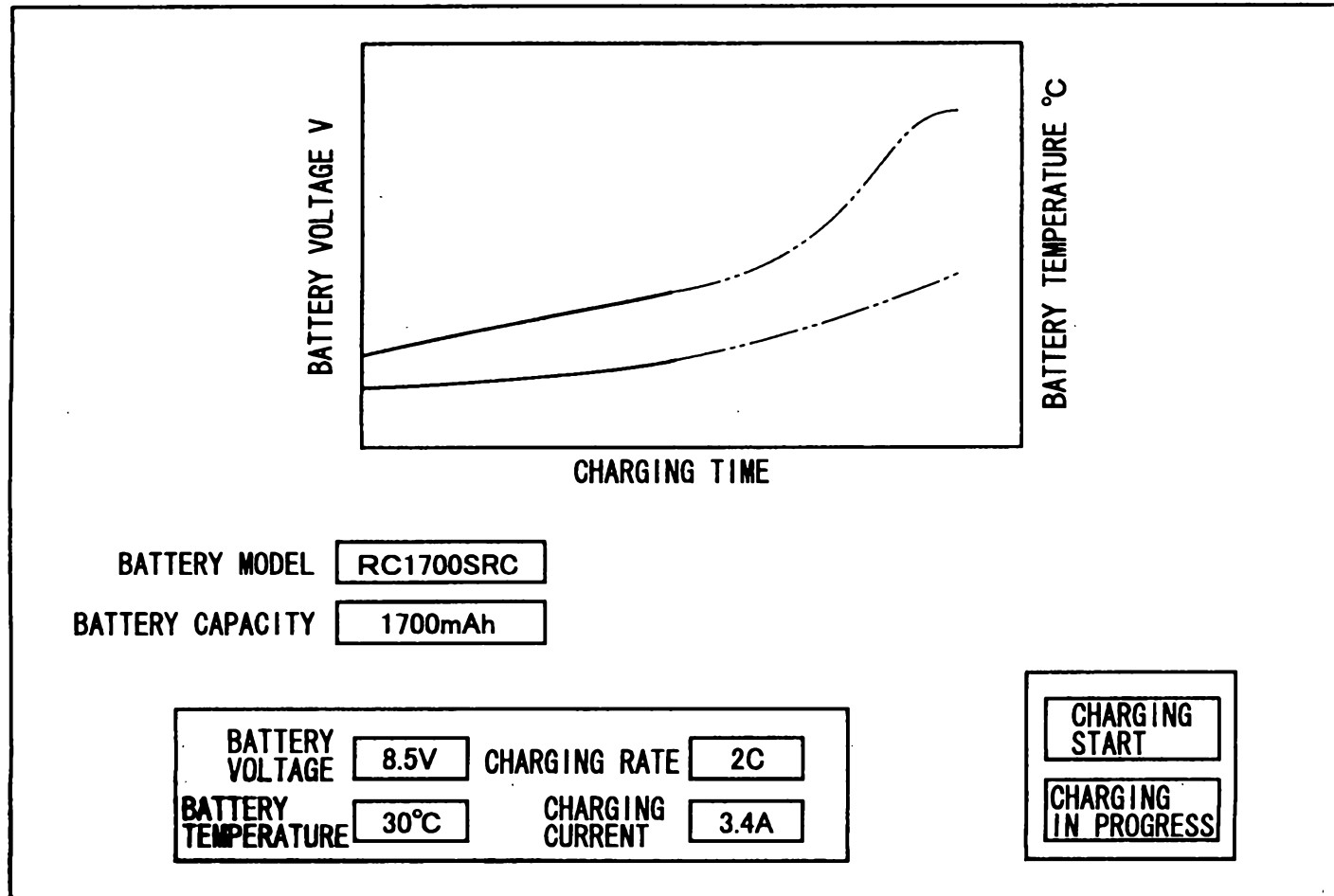


Fig.9

## CHARGING SCREEN

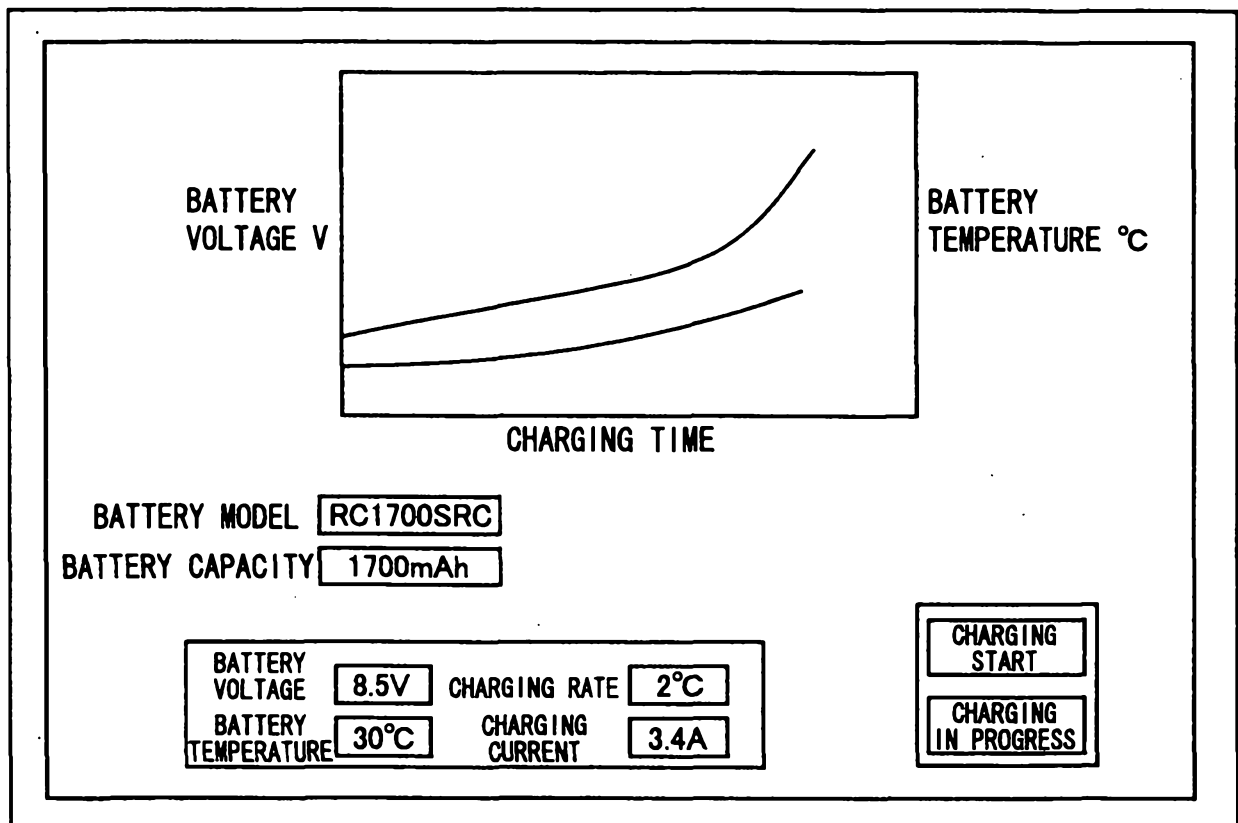


Fig. 10

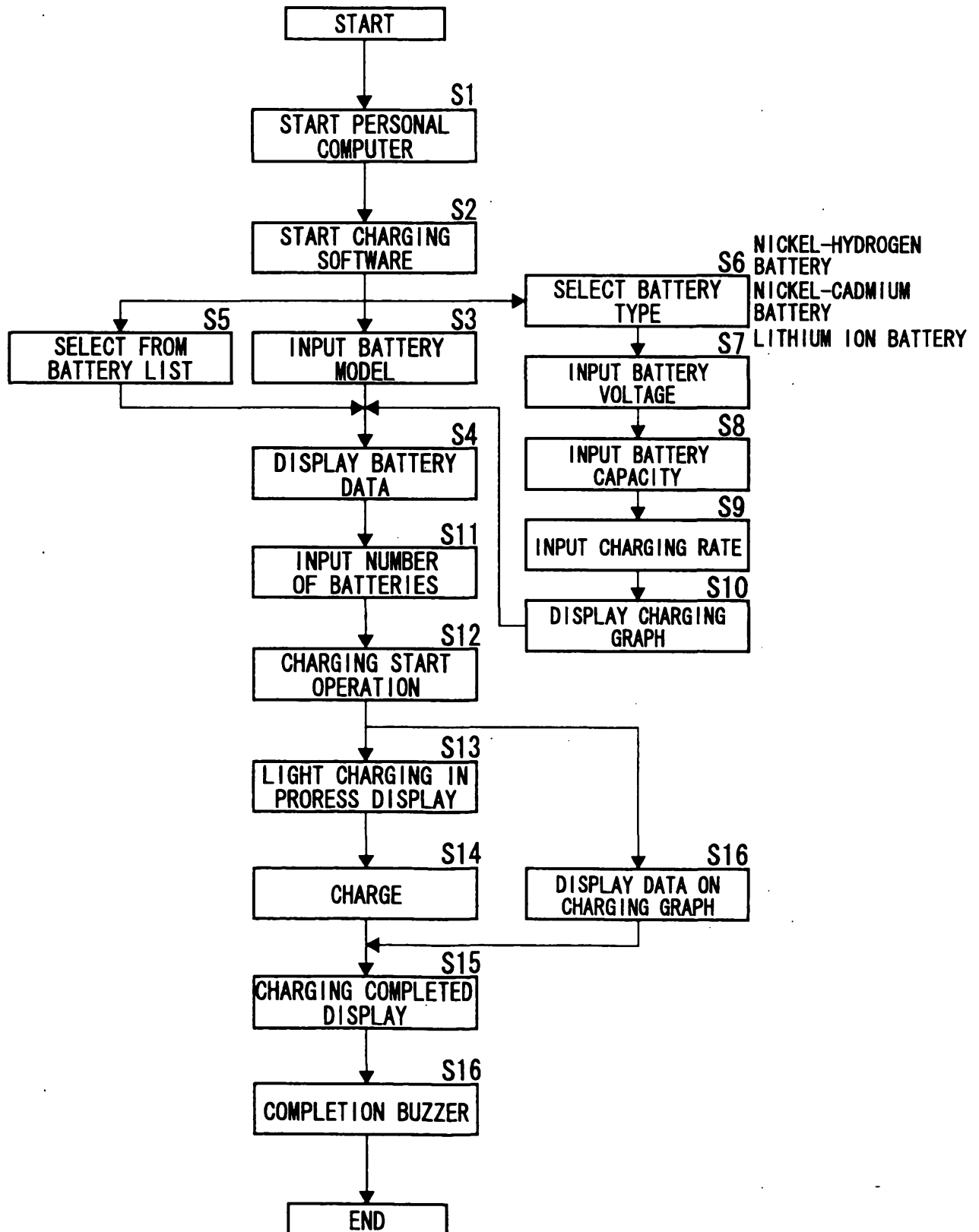


Fig.11

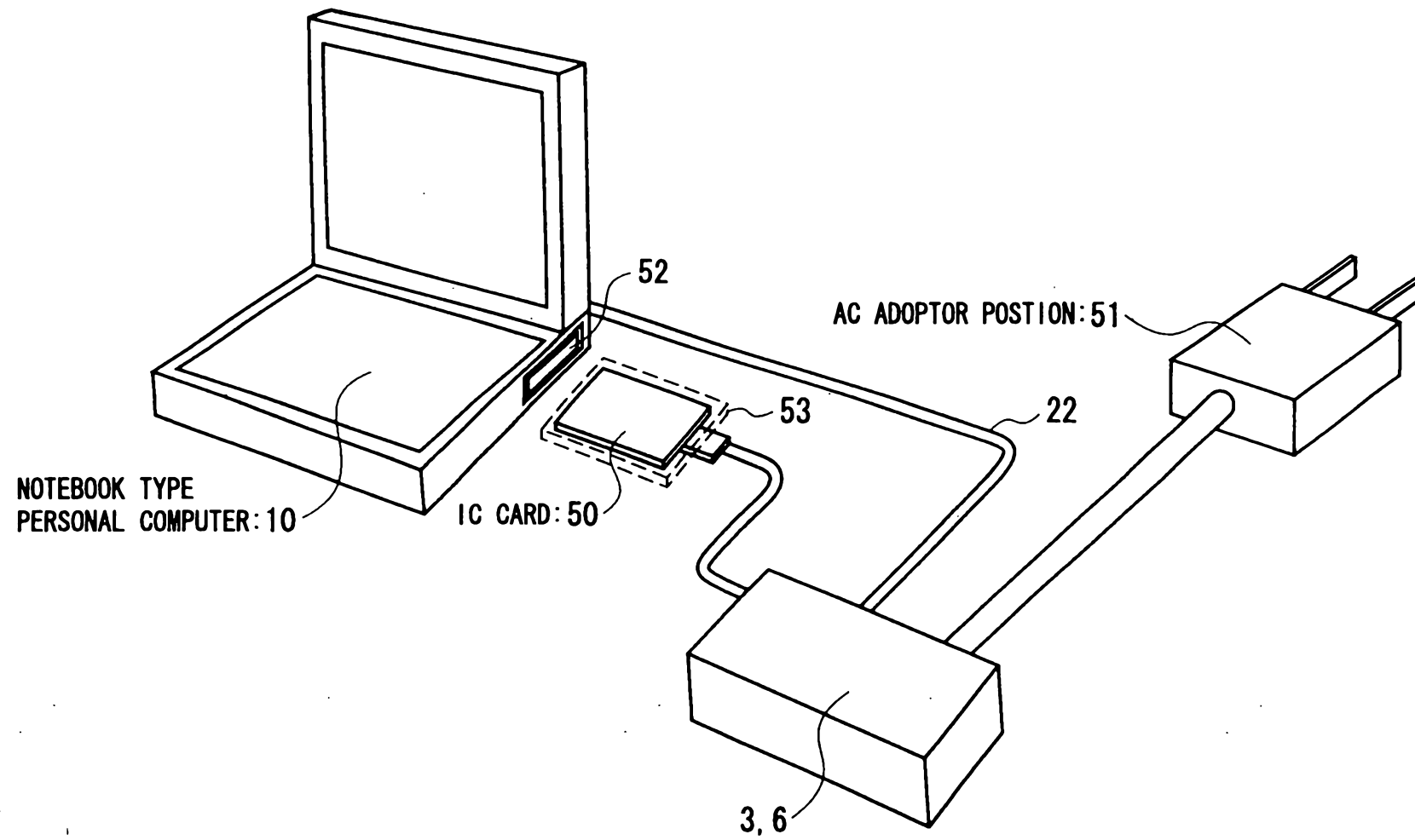




Fig.12

