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⑤④ **A battery charger and method for a portable wireless telephone set having means for tricklingly charging the battery with an increased current during a stand-by period of the telephone set**

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⑤⑥ References cited :  
**EP-A- 0 303 067**  
**WO-A-84/00614**  
**WO-A-87/07106**  
**DE-A- 3 620 857**

**EP 0 406 858 B1**

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## Description

The present invention relates to a battery charger and a method of charging the battery for a portable wireless telephone set and, in particular, to such a battery charger having a function for tricklingly charging the battery after the battery is charged to its normal voltage.

A portable wireless telephone set has a battery with a normal voltage as a power source for a transmitter and a receiver of the telephone set. The battery energy is consumed when the telephone set is used for telephone communication. Therefore, it is necessary that the battery is charged when the telephone set is not used for the telephone communication.

To this end, a battery charger is usually provided for the portable wireless telephone set so as to charge the battery.

A known battery charger for use in a portable wireless telephone set comprises a rapidly charging circuit and a tricklingly charging circuit which are selectively operated under control of a charge controller.

At a start of the battery charge, the rapidly charging circuit generates a high level DC current for rapidly charging the battery. Once the battery is charged to the normal voltage, the rapidly charging circuit is stopped by the charge controller and the trickling charging circuit then generates a considerably low level current for tricklingly charging the battery.

The battery charger has a charge detecting circuit for detecting whether or not the battery is charged to the normal voltage. When the charge detecting circuit detects that the battery is charged to the normal voltage, the charge detecting circuit produces a detected signal which is delivered to the charge controller. Then, the charge controller stops the rapidly charging circuit and makes the tricklingly charging circuit operate to produce the low level DC current. Accordingly, the battery is tricklingly charged by the low level DC current.

When the battery is being charged, it is provided that a power switch of the telephone set should be turned off. Therefore, the trickling charging circuit is designed to produce such a low level DC current that the battery is not excessively charged.

On the other hand, when the power switch is turned on for a stand-by or a call waiting condition, the battery energy is also consumed but at a rate lower than a condition for the telephone communication. Therefore, when the power switch of the telephone set is left in an on condition, the battery is charged to the normal voltage by the rapidly charging circuit of the battery charger but the battery energy is consumed after the battery charging operation is turned from the rapidly charging circuit to the trickling charging circuit, so that the battery is insufficiently charged. This results into a fact that the next tele-

phone communication is impossible or limited to a reduced communication time duration by use of the telephone set.

WO-A-84/00614 discloses a method and device for monitoring the each time-charged capacity of accumulators comprised of cadmium-nickel cells, during a rapid charge in a plurality of phases, from an unknown charge status. During the first charge phase, a charge current which is multiple of the charge current given by the manufacturer is supplied until a preset switching voltage is obtained. At the switching, a second charge phase follows with a much weaker charge current during a given period of time at the end of which the charge process is stopped if it has not been stopped before because a certain limit voltage or a predetermined temperature has been exceeded. The two charge phases may be followed by a third one at a trickle current level.

DE-A-3620857 relates to a battery charger for a portable wireless telephone set comprising first and second charging means and ON/OFF detecting means.

Accordingly, it is an object of the present invention to provide a battery charger for a portable wireless telephone set having a battery with a normal voltage which enables to maintain the normal voltage of the battery without any excessive charge after rapidly charging the battery to the normal voltage even when a power switch of the telephone set is left in an on condition.

According to the present invention, a battery charger for a portable wireless telephone set comprises the features of claim 1. A method according to the invention is defined by the features of claim 4.

When the battery has a capacity  $C$ , the second level of the second DC current preferably is determined to be a value of  $C/25$  to  $C/15$ .

The battery supplies a stand-by current during a stand-by condition of the telephone set when the telephone set is powered on. Then, the third level of the third DC current is determined to be a sum of the value of the second level and a level of the stand-by current.

The invention will be described in detail in connection with the drawings in which

Fig. 1 is a view illustrating a block diagram of a known battery charger together with a portable wireless telephone set;

Fig. 2 is a view illustrating a block diagram of a battery charger according to an embodiment of the present invention together with a portable wireless telephone set;

Fig. 3 is a flow chart illustrating operation of a charge controller in Fig. 2;

Fig. 4 is a circuit diagram view of a charging circuit used for the first through third charging circuits in Fig. 2; and

Fig. 5 is a circuit diagram view of a charge detect-

ing circuit in Fig. 2.

Prior to description of embodiments of the present invention, a known battery charger for a portable wireless telephone set will be described so as to help the better understanding of the present invention.

Referring to Fig. 1, a portable wireless telephone set 10 comprises a battery or a chargeable electric cell 11 such as a Ni-Cd cell, a wireless transmitter/receiver 12 and a transmitter/receiver controller 13. The battery 11 is a power source for the transmitter/receiver 12 and the transmitter/receiver controller 13 and has a normal voltage sufficient to drive them.

In order to charge the battery 11 so as to compensate consumption of the battery energy, the telephone set 10 is provided with a battery charger 14 which is connectable to the telephone set 10.

The battery charger 14 comprises an output port 15 to be connected to the battery 11 for delivering a charging current to the battery 11, and a DC power source for providing the charging current.

In the shown embodiment, the DC power source is an AC/DC converter 16 which is connected to an AC power source 17. The AC/DC converter 16 converts an AC power from the AC power source 17 to a DC power with a DC voltage as a converted DC power.

The battery charger 14 further comprises a rapidly charging circuit 18, a tricklingly charging circuit 19, charge detecting circuit 20, and a charge controller 21.

The rapidly charging circuit 18 is connected to the AC/DC converter 16 and the output port 15 and produces a first DC current from the converted DC power when receiving a first control signal from the charge controller 21. The first DC current is delivered to the output port 15 as the charging current and has a first DC level which is sufficient to rapidly charge the battery 11.

The tricklingly charging circuit 19 is also connected to the AC/DC converter 16 and the output port 15 and produces a second DC current from the converted DC power when receiving a second control signal from the charge controller 21. The second DC current is delivered to the output port 15 as the charging current and has a second DC level which is considerably low to tricklingly charge the battery 11 after the battery 11 is charged to the normal voltage.

The charge detecting circuit 20 is connected to the output port 15 and detects a charged voltage of the battery 11 connected to the output port 15. When the charge detecting circuit 20 detects that the battery 11 is charged to the normal voltage, the charge detecting circuit 20 produces a detected signal.

The charge controller 21 is coupled to the charge detecting circuit 20 and produces the first control signal when the charge detecting circuit 20 does not produce the detected signal. Therefore, the battery 11 is supplied with the first DC current as the charging current and is rapidly charged to the normal voltage.

When the charge detecting circuit 20 produces the detected signal, the charge controller 21 receives the detected signal and stops the first control signal but produces the second control signal. Accordingly, the rapidly charging circuit 18 is stopped but the tricklingly charging circuit 19 is driven in response to the second control signal. Thus, the battery 11 is supplied with the second DC current as the charging current through the output port 15 and is tricklingly charged.

The tricklingly charging circuit 19 is usually designed that the second DC current has a current level of a value determined by  $C/15$  through  $C/25$ , where  $C$  is a capacity of the battery 11. When  $C=1000$  mAh, the second DC current is 50 mA.

When a power switch (not shown) of the telephone set 10 is turned on and the portable wireless telephone set 10 is in a stand-by or a waiting condition for a telephone call, the battery energy is also consumed. In known portable wireless telephone sets, the battery 11 usually supplies a stand-by current of about 50-100 mA to the wireless transmitter/receiver 12 and the transmitter/receiver controller 13.

Therefore, when the power switch is left on, the battery 11 is insufficiently charged as described in the preamble of the present description.

Referring to Fig. 2, an embodiment of the present invention shown therein is similar to the known one shown in Fig. 1 except several differences. The similar parts are represented by the same reference numerals as in Fig. 1.

In the portable wireless telephone set 10, a transmitter/receiver controller 22 is different from the transmitter/receiver controller 13 in Fig. 1 in a fact that the transmitter/receiver 22 produces a power-on signal c5 when the power switch of the telephone set 10 is left on. The power-on signal is supplied to the battery charger 14.

The battery charger 14 comprises an output port 15, an AC/DC converter 16 connected to an AC power source 17, and a charge detecting circuit 20 which are similar to those shown at the same reference numerals in Fig. 1.

The battery charger 14 further comprises a first charging circuit 18, a second charging circuit 19, a third charging circuit 23, and a charge controller 24. The first charging circuit is corresponding to the rapidly charging circuit 18 in Fig. 1 and is represented by the same reference numeral 18. The second charging circuit 19 is also corresponding to the tricklingly charging circuit 19 in Fig. 1 and is, therefore, represented by the same reference numeral 19.

The third charging circuit 23 is coupled to the AC/DC converter 16 and the output port 15 and generates a third DC current from the converted DC power from the AC/DC converter 16 when receiving a third control signal. The third charging circuit 23 is designed that the third DC current has a level lower than

the first DC current but relatively higher than the second DC current. The third DC current is also supplied to the battery 11 as the charging current through the output port 15.

When the second DC current is determined at  $C/20$ , for example, 50 mA for  $C=1,000$  mAh, the third DC current is determined  $(C/20 + \alpha)$ , for example,  $(50+70)$  mA for  $C=1,000$  mAh, where  $\alpha$  represents the stand-by current which is consumed by the telephone set in the stand-by condition and is exemplarily 70 mA.

The battery charger 14 further comprises an input terminal 25 to be connected to the transmitter/receiver controller 22 for receiving the power-on signal.

The charge controller 24 is coupled to the charge detecting circuit 20 and the input terminal 25 and controls the first, the second and the third charging circuits 18, 19 and 23.

The charge controller 24 selectively produces the first, the second, and the third control signals  $c_1$ ,  $c_2$ , and  $c_3$  in dependent on presence and absence of the detected signal as a fourth control signal  $c_4$  from the charge detecting circuit 20 and the power-on signal as a fifth control signal  $c_5$  through the input terminal 25.

Referring to Fig. 3, the charge controller 24 produces the first control signal  $c_1$  of a high level signal and sets the second and the third control signals  $c_2$  and  $c_3$  at a low level at a start of charging operation, as shown at a step S1. Therefore, the first charging circuit 18 produces the first DC current and the battery 11 is rapidly charged by the first DC current.

Thereafter, when the charge detecting circuit 20 detects that the battery 11 is charged to its normal voltage, the charge detecting circuit 20 detects the detected signal as the fourth control signal  $c_4$  of a high level signal. When the charge controller 24 receives the fourth control signal  $c_4$  as shown at a step S2, the charge controller 24 changes the first control signal  $c_1$  to a low level signal and produces the second control signal  $c_2$  of a high level at a step of S4 when the fifth control signal  $c_5$  of a high level is not supplied to the charge controller 24 as shown at a step S3. Thus, the second charging circuit 19 operates and the battery 11 is tricklingly charged.

While, when the control signal  $c_5$  of a high level is supplied to the charge controller 24 at the step S3, the charge controller 24 changes the first control signal  $c_1$  to a low level signal and produces the third control signal  $c_3$  of a high level at a step S5. Therefore, the third charging circuit 23 operates to produce the third DC current. Thus, the battery is sufficiently charged when the power switch of the telephone set 10 is turned on.

Now, referring to Fig. 4, an example of a circuit is described which is used for each of the first, the second, and third charging circuits 18, 19, and 23.

The circuit shown therein comprises a PNP transistor 26. An emitter of the transistor 26 is connected

to an input terminal 27 through a resistor 28 of a resistance of  $R_1$ . A collector of the transistor 26 is connected to an output terminal 29. A base of the transistor 26 is connected to a control terminal 30 through a base resistor 31 of a resistance of  $R_2$  and an inverter circuit 32. A Zener diode 33 is connected between the base and the emitter. When a DC power is supplied to the input terminal 27 and a high level signal is applied to the control terminal 30, the circuit produces a constant DC current at the output terminal 29. A value or level of the constant DC current is adjusted by selecting the resistance  $R_1$  of the resistor 28. When the resistance  $R_1$  is selected small, the constant DC current has a high level. On the other hand, when the resistance  $R_1$  is selected large, the constant DC current has a low level.

When a low level signal is applied to the control terminal 30, the circuit is stopped to produce the DC current.

Therefore, the circuit of Fig. 4 can be used for each of the first, the second, and the third charging circuits 15, 19, and 23 by selecting the resistance  $R_1$  of the resistor 28.

Referring to Fig. 5, an example of the charge detecting circuit 20 will now be described. The circuit shown therein comprises an input terminal 34 which is to be connected to the output port 15 in Fig. 2, a voltage divider of resistors 35 and 36, and a comparator 37 having an inverting input terminal (-), a non-inverting input terminal (+), and an output terminal 38. The inverting input terminal (-) is connected to a common connecting point of the resistors 35 and 36 and is supplied with a voltage divided by the divider. The common connection point is also connected to the non-inverting input terminal (+) through a diode 39. The non-inverting input terminal (+) is grounded through a capacitor 40. Therefore, the divided voltage is applied across a series circuit of the diode 39 and the capacitor 40.

During the charging operation for the battery 11 in Fig. 2, the peak charged voltage of the battery 11 is divided by the voltage divider (35-36) and then held at the capacitor 40 through the diode. The held voltage is applied to the non-inverting input terminal (+) of the comparator 37 as a reference voltage level. Just after the battery 11 is fully charged, the charged voltage drops by some extent. As a result, the divided voltage at the inverting input terminal (-) falls below the reference voltage at the non-inverting input terminal (+), so that a high level signal is produced at the output terminal 38 as the detected signal. Thus, the detected signal indicates that the battery 11 is fully charged. The detected signal is applied to the charge controller 24 as the fourth control signal  $c_4$ .

## Claims

1. A battery charger for a portable wireless telephone set (10) including a battery (11) with a normal battery voltage as an electric power source for the telephone set (10) and power-on signal generating means (22) for generating a power-on signal when the telephone set (10) is powered on by said battery (11), which comprises:
- an output port (15) to be connected to said battery (11) for delivering a charging current to said battery (11); DC power source (16) for generating a DC power; first charging means (18) coupled to said DC power source (16) and said output port (15) responsive to a first control signal for generating from said DC power a first DC current with a first level sufficient to rapidly charge said battery (11), said first DC current being delivered to said output port (15) as said charging current; second charging means (19) coupled to said DC power source (16) and said output port (15) responsive to a second control signal for generating from said DC power a second DC current with a second level considerably lower than said first DC current to tricklingly charge said battery (11), said second DC current being delivered to said output port (15) as said charging current; charge detecting means (20) coupled to said output port (15) for detecting a voltage charged in said battery (11) connected to said output port (15) to produce a full charge detect signal when said charged voltage reaches said normal battery voltage; and charge controlling means (21, 24) coupled to said charge detecting means (20) for generating said first control signal when said full charge detect signal is absent from said charge detecting means (20), said charge controlling means (21, 24) generating said second control signal in place of said first control signal in response to said full charge detect signal, third charging means (23) coupled to said DC power source (16) and said output port (15) responsive to a third control signal for generating from said DC power a third DC current which has a third level lower than said first DC current level but relatively higher than said second DC current, said third DC current being delivered to said output port (15) as said charging current characterized in that an input terminal (25) is provided to be coupled with said power-on signal generating means (22), said input terminal being connected to said charge controlling means (24) for delivering said power-on signal to said charge controlling means (24); said charge controlling means (24) being coupled to said third charging means (23) for generating said third control signal in response to said full charge detect signal when receiving said power-on signal, and said charge

controlling means (24) also generating said second control signal in response to said full charge detect signal when not receiving said power-on signal.

2. A battery charger as claimed in Claim 1, wherein the battery (11) has a capacity C and said second level of said second DC current is determined to be a value of  $C/25$  to  $C/15$ .
3. A battery charger as claimed in Claim 1, the battery supplying a stand-by current during a stand-by condition of the telephone set (10) when said telephone set (10) is powered on, wherein said third level of the third DC current is determined to be a sum of the value of the second level and a level of said stand-by current.
4. A method of charging a battery (11) for supplying power to a communication device (10) which consumes battery energy when its power switch is turned on, by detecting (20) the fully charged condition of said battery (11) to produce a full charge detect signal, charging (18) said battery (11) at a first charging current in the absence of said full charge detect signal, charging (19) said battery (11) at a second charging current in the presence of said full charge detect signal, said second charging current being lower than said first charging current, which is characterized by:
- detecting (22, 24, 25) the ON/OFF state of said communication device (10) to produce an on-state signal when said communication device (10) is in an on-state and an off-state signal when said communication device (10) is in an off-state; and
- charging (23) said battery (11) at a third charging current in the presence of said full charge detect signal and said on-state signal, said third charging current being lower than said first charging current but higher than said second charging current; and
- charging (19) said battery (11) at said second charging current in the presence of said full charge detect signal and said off-state signal.
5. A method as claimed in Claim 4, wherein said third charging current is substantially equal to a current which is consumed by said communication device (10) in its stand-by condition.

## Patentansprüche

1. Batterieladegerät für einen tragbaren schnurlosen Fernsprechapparat (10) mit einer Batterie (11) mit einer normalen Batteriespannung als elektrische Stromquelle für den Fernsprechapparat

parat (10) und einer Einschalt-signalerzeugungseinrichtung (22) zum Erzeugen eines Einschalt-signals, wenn der Fernsprechapparat (10) von der Batterie (11) mit Leistung versorgt wird, mit:

einem Ausgangsanschluß (15), der mit der Batterie (11) zum Liefern eines Ladestroms an die Batterie (11) zu verbinden ist; einer Gleichstromquelle (16) zum Erzeugen eines Gleichstroms; einer ersten Ladeeinrichtung (18), die mit der Gleichstromquelle (16) und dem Ausgangsanschluß (15) gekoppelt ist und die auf ein erstes Steuersignal anspricht, um aus der Gleichstromleistung einen ersten Gleichstrom mit einem ersten Pegel zu erzeugen, der ausreicht, um die Batterie (11) schnell zu laden, wobei der erste Gleichstrom als der Ladestrom an den Ausgangsanschluß (15) geliefert wird; einer zweiten Ladeeinrichtung (19), die mit der Gleichstromquelle (16) und dem Ausgangsanschluß (15) gekoppelt ist und die auf ein zweites Steuersignal anspricht um aus der Gleichstromleistung einen zweiten Gleichstrom mit einem zweiten Pegel zu erzeugen, der beachtlich niedriger ist als der erste Gleichstrom, um eine Erhaltungsladung der Batterie (11) durchzuführen, wobei der zweite Gleichstrom als der Ladestrom an den Ausgangsanschluß (15) geliefert wird; einer Ladungsermittlungseinrichtung (20), die mit dem Ausgangsanschluß (15) gekoppelt ist, zum Ermitteln einer Spannung, die in der Batterie (11), die mit dem Ausgangsanschluß (15) gekoppelt ist, durch Laden entstanden ist, um ein Volladungsermittlungssignal zu erzeugen, wenn die durch Laden entstandene Spannung die normale Batteriespannung erreicht; und einer Ladungssteuereinrichtung (21, 24), die mit der Ladungsermittlungseinrichtung (20) verbunden ist, zum Erzeugen des ersten Steuersignals, wenn das Volladungsermittlungssignal von der Ladungsermittlungseinrichtung (20) ausbleibt, wobei die Ladungssteuereinrichtung (21, 24) das zweite Steuersignal anstelle des ersten Steuersignals als Antwort auf das Volladungsermittlungssignal erzeugt, einer dritten Ladeeinrichtung (23), die mit der Gleichstromquelle (16) und dem Ausgangsanschluß (15) verbunden ist und die auf ein drittes Steuersignal anspricht, um aus der Gleichstromleistung einen dritten Gleichstrom zu erzeugen, der einen dritten Pegel hat, der niedriger ist als der erste Gleichstrompegel, aber relativ höher als der zweite Gleichstrom, wobei der dritte Gleichstrom als der Ladestrom an den Ausgangsanschluß (15) geliefert wird, dadurch gekennzeichnet, daß ein Eingangsanschluß (25) vorhanden ist, der mit der Einschalt-signalerzeugungseinrichtung (22) zu koppeln ist, wobei der Eingangsanschluß mit der Ladungssteuereinrichtung (24) zum Liefern des Einschalt-signals an die

Ladungssteuereinrichtung (24) verbunden ist; wobei die Ladungssteuereinrichtung (24) mit der dritten Ladeeinrichtung (23) zum Erzeugen des dritten Steuersignals als Antwort auf das Volladungsermittlungssignal verbunden ist, wenn das Einschalt-signal empfangen wird, und die Ladungssteuereinrichtung (24) außerdem das zweite Steuersignal als Antwort auf das Volladungsermittlungssignal erzeugt, wenn das Einschalt-signal nicht empfangen wird.

2. Batterieladegerät nach Anspruch 1, wobei die Batterie (11) eine Kapazität C hat und festgelegt ist, daß der zweite Pegel des zweiten Gleichstroms einen Wert  $C/25$  bis  $C/15$  hat.
3. Batterieladegerät nach Anspruch 1, wobei die Batterie während eines Bereitschaftszustands des Fernsprechapparats (10) einen Bereitschaftszustandsstrom liefert, wenn der Fernsprechapparat (10) eingeschaltet ist, wobei festgelegt ist, daß der dritte Pegel des dritten Gleichstroms eine Summe des Wertes des zweiten Pegels und eines Pegels des Bereitschaftszustandsstroms ist.
4. Verfahren zum Laden einer Batterie (11) zum Liefern von Leistung an eine Übertragungsvorrichtung (10), die Batterieleistung verbraucht, wenn ihr Netzschalter eingeschaltet ist, indem der vollständig geladene Zustand der Batterie (11) ermittelt wird (20), um ein Volladungsermittlungssignal zu erzeugen, Laden (18) der Batterie (11) mit einem ersten Ladestrom bei Abwesenheit des Volladungsermittlungssignals, Laden (19) der Batterie (11) mit einem zweiten Ladestrom bei Vorhandensein des Volladungsermittlungssignals, wobei der zweite Ladestrom niedriger ist als der erste Ladestrom, gekennzeichnet durch:
  - Ermitteln (22, 24, 25) des Ein/Aus-Zustands der Übertragungsvorrichtung (10), um ein Ein-Zustandssignal zu erzeugen, wenn die Übertragungsvorrichtung (10) in einem eingeschalteten Zustand ist, und ein Aus-Zustandssignal zu erzeugen, wenn die Übertragungsvorrichtung (10) in einem ausgeschalteten Zustand ist; und
  - Laden (23) der Batterie (11) mit einem dritten Ladestrom bei Vorhandensein des Volladungsermittlungssignals und des Ein-Zustandssignals, wobei der dritte Ladestrom niedriger als der erste Ladestrom, aber höher als der zweite Ladestrom ist; und
  - Laden (19) der Batterie (11) mit dem zweiten Ladestrom bei Vorhandensein des Volladungsermittlungssignals und des Aus-Zustandssignals.
5. Verfahren nach Anspruch 4, wobei der dritte La-

destrom im wesentlichen gleich dem Strom ist, der von der Übertragungsvorrichtung (10) in ihrem Bereitschaftszustand verbraucht wird.

## Revendications

1. Chargeur de batterie pour un poste téléphonique sans fil portable (10) comprenant une batterie (11) ayant une tension de batterie normale en tant que source d'énergie électrique pour le poste téléphonique (10) et des moyens générateurs de signal de mise sous tension (22) pour générer un signal de mise sous tension lorsque le poste téléphonique (10) est alimenté par ladite batterie (11), comprenant :

un port de sortie (15) devant être connecté à ladite batterie (11) pour délivrer un courant de charge à ladite batterie (11) ; une source d'énergie CC (16) pour générer une énergie CC ; des premiers moyens de chargement (18) couplés à ladite source d'énergie CC (16) et audit port de sortie (15), sensibles à un premier signal de commande pour générer à partir de ladite énergie CC un premier courant continu ayant un premier niveau suffisant pour charger rapidement ladite batterie (11), ledit premier courant continu étant délivré audit port de sortie (15) en tant que courant de charge ; des seconds moyens de chargement (19) couplés à ladite source d'énergie CC (16) et audit port de sortie (15), sensibles à un second signal de commande pour générer à partir de ladite énergie CC un second courant continu ayant un second niveau considérablement plus faible que ledit premier courant continu afin de charger lentement ladite batterie (11), ledit second courant continu étant délivré audit port de sortie (15) en tant que courant de charge ; des moyens de détection de charge (20) couplés audit port de sortie (15) pour détecter une tension chargée dans ladite batterie (11) connectée audit port de sortie (15) pour produire un signal de détection de pleine charge lorsque ladite tension chargée atteint ladite tension normale de batterie ; et des moyens de commande de charge (21, 24) couplés auxdits moyens de détection de charge (20) pour générer ledit premier signal de commande lorsque ledit signal de détection de pleine charge est absent en provenance desdits moyens de détection de charge (20), lesdits moyens de commande de charge (21, 24) générant ledit second signal de commande à la place dudit premier signal de commande en réponse audit signal de détection de pleine charge, des troisièmes moyens de chargement (23) couplés à ladite source d'énergie CC (16) et audit port de sortie (15), sensibles à un troisième signal de commande pour générer à partir de ladite énergie

CC un troisième courant continu ayant un troisième niveau inférieur audit niveau du premier courant continu mais relativement supérieur audit second courant continu, ledit troisième courant continu étant délivré audit port de sortie (15) en tant que courant de charge,

caractérisé en ce qu'une borne d'entrée (25) est prévue pour être couplée auxdits moyens générateurs de signal de mise sous tension (22), ladite borne d'entrée étant connectée auxdits moyens de commande de charge (24) pour délivrer ledit signal de mise sous tension auxdits moyens de commande de charge (24) ; lesdits moyens de commande de charge (24) étant couplés auxdits troisièmes moyens de chargement (23) pour générer ledit troisième signal de commande en réponse audit signal de détection de pleine charge à la réception dudit signal de mise sous tension, et lesdits moyens de commande de charge (24) générant également ledit second signal de commande en réponse audit signal de détection de pleine charge lorsque ledit signal de mise sous tension n'est pas reçu.

2. Chargeur de batterie selon la revendication 1, dans lequel la batterie (11) a une capacité C et ledit second niveau dudit second courant continu est déterminé pour être une valeur comprise entre C/25 et C/15.
3. Chargeur de batterie selon la revendication 1, la batterie délivrant un courant de réserve pendant un état d'attente du poste téléphonique (10) lorsque ledit poste téléphonique (10) est mis sous tension, dans lequel ledit troisième niveau du troisième courant continu est déterminé pour être une somme de la valeur du second niveau et du niveau dudit courant de réserve.
4. Procédé pour charger une batterie (11) destinée à alimenter en énergie un dispositif de communication (10) consommant l'énergie d'une batterie lorsque son interrupteur d'alimentation est enclenché, par détection (20) de l'état de pleine charge de ladite batterie (11) pour produire un signal de détection de pleine charge, par chargement (18) de ladite batterie (11) à un premier courant de charge en l'absence dudit signal de détection de pleine charge, par chargement (19) de ladite batterie (11) à un second courant de charge en présence dudit signal de détection de pleine charge, ledit second courant de charge étant inférieur audit premier courant de charge, caractérisé par :

la détection (22, 24, 25) de l'état allumé/éteint dudit dispositif de communication (10) pour produire un signal d'état allumé lorsque ledit dispositif de communication (10) est à l'état allumé et

un signal d'état éteint lorsque ledit dispositif de communication (10) est à l'état éteint ; et

le chargement (23) de ladite batterie (11) à un troisième courant de charge en présence dudit signal de détection de pleine charge et dudit signal d'état allumé, ledit troisième courant de charge étant inférieur audit premier courant de charge mais supérieur audit second courant de charge ; et

le chargement (19) de ladite batterie (11) à un second courant de charge en présence dudit signal de détection de pleine charge et dudit signal d'état éteint.

5. Procédé selon la revendication 4, dans lequel ledit troisième courant de charge est sensiblement égal à un courant qui est consommé par ledit dispositif de communication (10) en son état d'attente.

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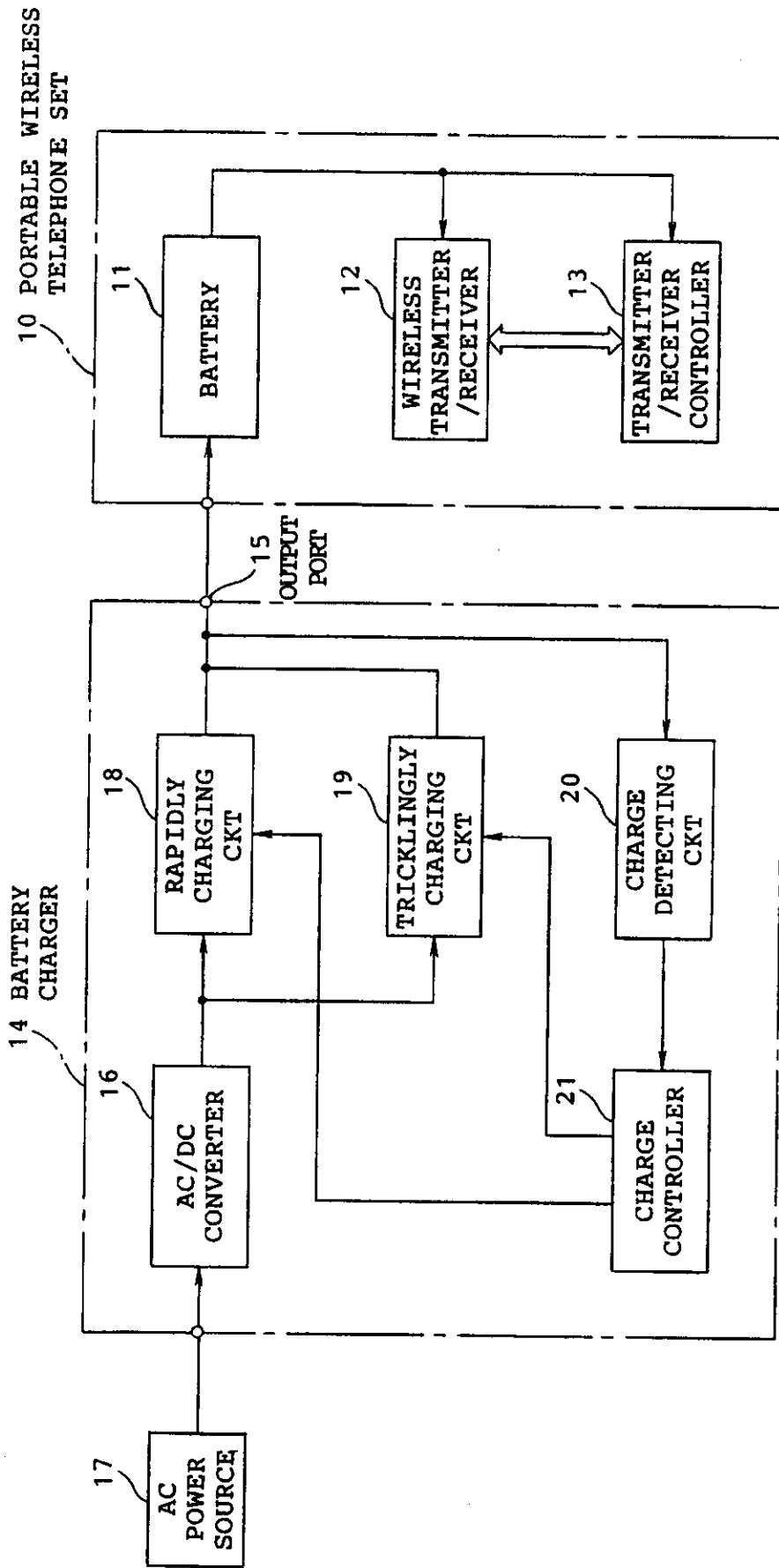


FIG. 1 PRIOR ART

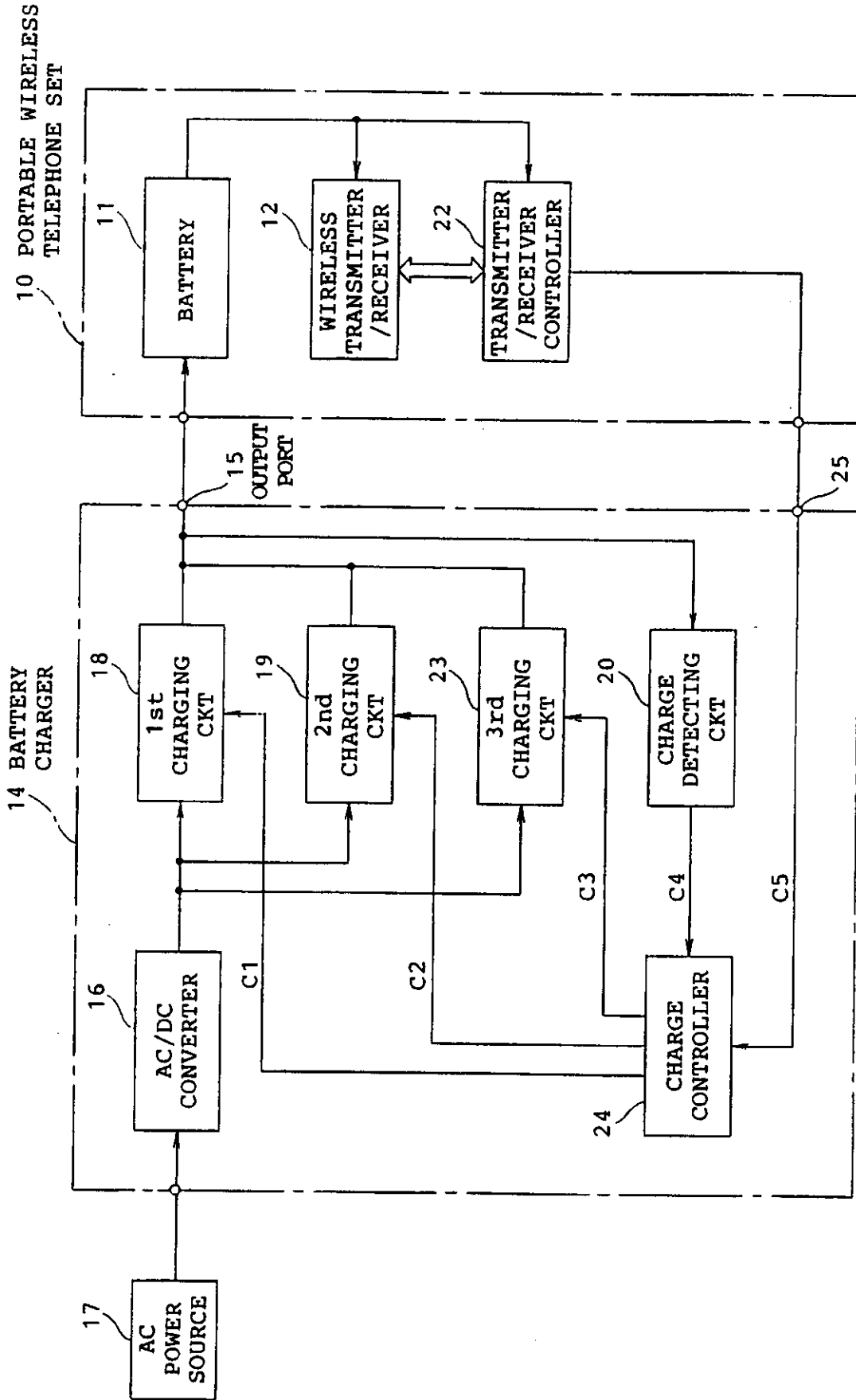


FIG.2

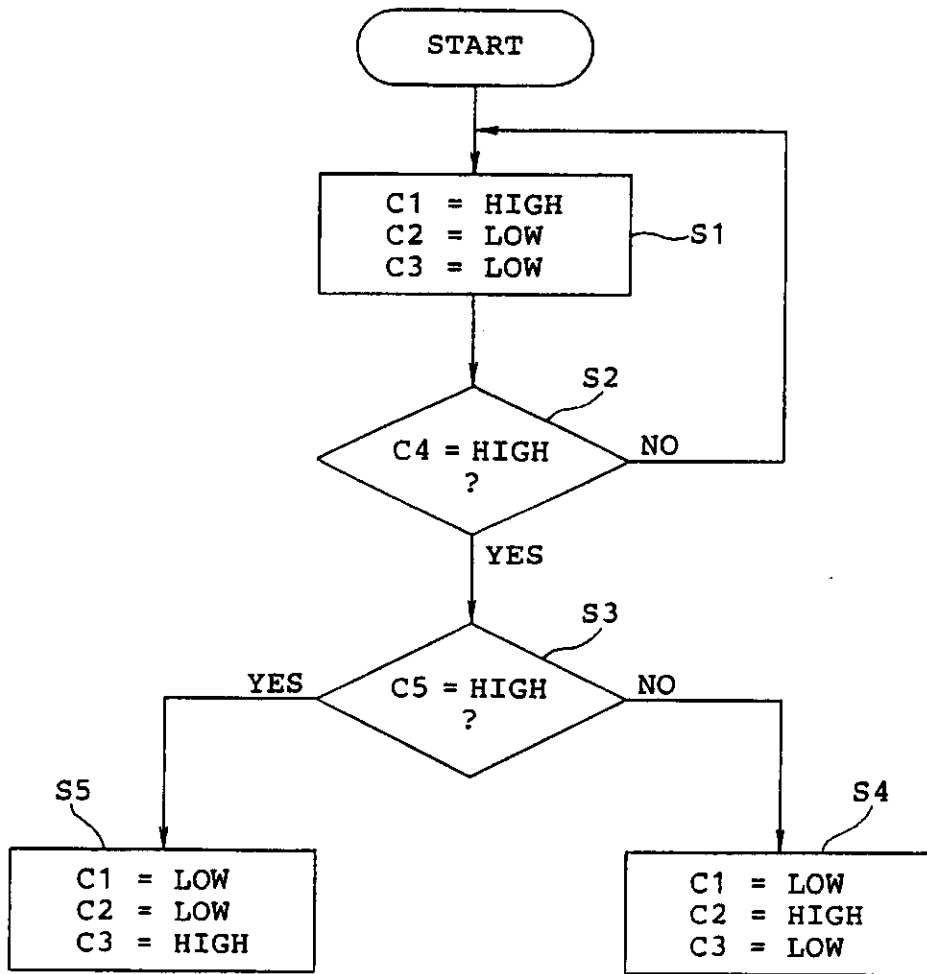


FIG.3

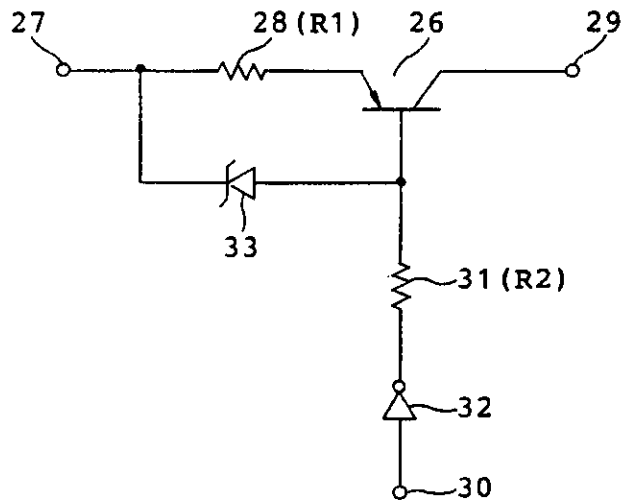


FIG. 4

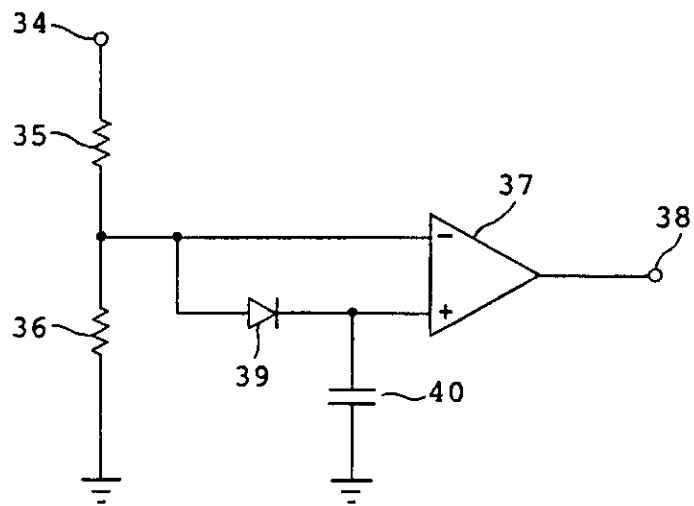


FIG. 5

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10.12.1990 Title truncated for publication date 09.01.1991 by UK Patent Office. See below for full title. A battery charger for a portable wireless telephone set having means for tricklingly charging the battery with an increased current during a stand-by period of the telephone set.

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