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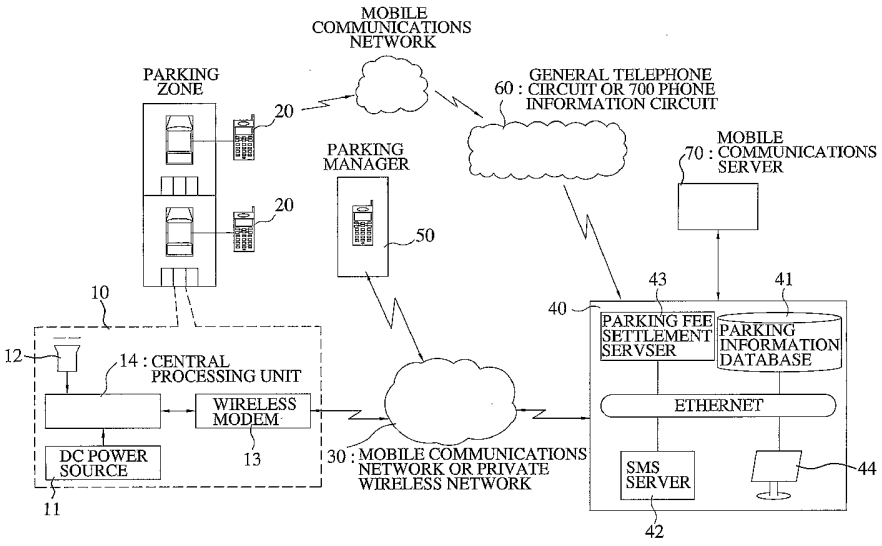


(57) Abstract: A parking control system using a mobile phone and a method applied thereto, is provided, in which information on entry and exit of vehicles which park in a parking zone is automatically managed on an online basis, and a parking fee can be paid for as charges of a mobile phone or a settlement system using a mobile phone. The parking control system includes a mobile phone (20, 110), a parking information generator (10, 90) and a parking control server (40, 120) which ascertains the parking information generated from the parking information generator (10, 90) and the time when the parking person accesses the parking control server via the mobile phone in order to request for exit of the vehicle, and calculates and settles a parking fee.

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# PARKING CONTROL SYSTEM USING MOBILE PHONE AND METHOD APPLIED THERETO

## Technical Field

The present invention relates to a parking control system using a mobile phone and a method applied thereto, and more particularly to, a parking control system using a mobile phone and a method applied thereto, in which information on entry and exit of vehicles which park in a parking zone is automatically managed on an online basis, and a parking fee can be paid for as charges of a mobile phone or a settlement system using a mobile phone.

## Background Art

In a general open type parking zone, for example, in a residence-priority parking zone, a residence parks his or her vehicle chiefly from coming home from work to leaving home to the office. Thus, in the morning and afternoon when the residence does not park his or her vehicle, the residence-priority parking zone is almost empty. However, in the case that a non-resident person intends to park his or her vehicle in the residence-priority parking zone, he or she should read the neighbor's situation, and may feel discomfortable until he or she exits from the residence-priority parking zone. Also, it is the case in an apartment house, a small-scale office building, or a small-scale paid parking lot.

Also, in the case of an opening-and-closing type parking zone, a parking ticket is issued from a parking ticket issuing machine on a one-touch basis in order to charge a parking fee for a parking vehicle, and then a parking manager receives the parking ticket during exit of the vehicle and reads the parking ticket via a parking fee control machine to thereby calculate a final parking fee and receive the calculated parking fee in cash. As an example, when a parking person presses a parking ticket issuing machine in an entry control unit during entry for parking, a parking ticket on which an entry time is recorded is issued, and then enters into the

parking zone after an opening and closing bar is opened. Meanwhile, when the parking ticket is presented to a parking manager in front of an exit control unit during exit from parking, the parking manager inserts the parking ticket into a parking fee control machine and informs the parking person of an amount of a parking fee calculated in the parking fee control machine verbally, to thereby receive the parking fee from the parking person in cash and settle of accounts to then operate the exit control unit so that the parking person can exit from the parking zone with his or her vehicle.

However, since a parking fee is received from a parking manager in such a conventional parking fee levying method, a labor cost of the parking manager is caused and also a parking fee collection may be bad for various reasons. Also, parking persons may wait for payment of parking fees for a long time due to a long parking fee payment time, which causes the parking persons to feel inconveniences and an efficiency of the parking zone to be lowered.

Also, in the case of using a prepaid parking fee control machine, a parking person should find out a place where the prepaid parking fee control machine is installed and wait for on a parking entry line as well as prepare cash.

## Disclosure of Invention

To solve the above problems, it is an object of the present invention to provide a parking control system using a mobile phone and a method applied thereto, which can utilize and manage an empty parking lot efficiently in which an open type parking zone is used with fee to thereby automatically control parking management, so that the other persons who are not resident in a residence-priority parking zone can pay for parking fees in the parking control system and park their vehicles in due course, during the time when a residence does not park.

It is another object of the present invention to provide a parking control system using a mobile phone and a method applied thereto, which can solve inconveniences and waiting times which occur due to payment in cash by parking

persons, and save a labor cost for parking control, in which a parking person receives a parking ticket on a one-touch basis during entry of a vehicle, in which a telephone number of a mobile phone is connected to a settlement server and thus the telephone number and an inherent number are recorded on the parking ticket, and the mobile phone is connected to the settlement server at a parked state and a parking fee is settled during exit of the vehicle.

To accomplish the above object of the present invention, according to the present invention, there is provided a parking control system using a mobile phone, the parking control system comprising: a mobile phone of a parking person for settlement of a parking fee; a parking information generator generating parking information of a vehicle which comes into a parking zone; and a parking control server which ascertains the parking information generated from the parking information generator and the time when the parking person accesses the parking control server via the mobile phone in order to request for exit of the vehicle, and calculates and settles a parking fee.

There is also provided a parking control method using a mobile phone, the parking control method comprising the steps of: (a) notifying a parking control server of a parking start time of a vehicle which enters into a parking zone; (b) accessing the parking control server via a mobile phone and notifying the parking control server of a parking termination time; (c) ascertaining the parking start time and the parking termination time and calculating a parking fee via the parking control server; and (d) settling the parking fee to allow the vehicle to exit from the parking zone.

## Brief Description of Drawings

The above and other objects and advantages of the present invention will become more apparent by describing the preferred embodiment thereof in detail with reference to the accompanying drawings in which:

FIG. 1 is a block diagram showing a configuration of a parking control

system using a mobile phone in an open type parking zone according to an embodiment of the present invention;

FIGs. 2 and 3 are flowchart views for explaining a parking control method using a mobile phone in an open type parking zone according to an embodiment of the present invention;

FIG. 4 is a block diagram showing a configuration of a parking control system using a mobile phone in an opening-and-closing type parking zone according to an embodiment of the present invention;

FIG. 5 shows an example of a parking ticket which is issued from an entrance control unit of FIG. 4; and

FIG. 6 is a flowchart view for explaining a parking control method using a mobile phone in an opening-and-closing type parking zone according to an embodiment of the present invention.

**Best Mode for Carrying out the Invention**

Hereinbelow, a parking control system and a parking control method applied thereto according to the present invention will be described with reference to the accompanying drawings.

As shown in FIG. 1, a parking control system using a mobile phone in an open type parking zone according to an embodiment of the present invention includes a parking control communications module 10 which is installed in each parking section in a parking zone, a mobile phone 20 of the owner of a vehicle for settling a parking fee, a parking control central server 40 which receives parking information transmitted from a number of the parking control communications module 10 via a mobile communications network or a private wireless network (hereinafter referred to as a wireless network) 30, manages a parking control operation integrally, and settles a parking fee, a mobile communications server 70 which verifies a residence number and approves settlement of the parking fee, a mobile phone or other communication device 50 of a parking manager (hereinafter

referred to as a communication device) which receives a short message transmitted from the parking control central server 40, and a telephone circuit 60 such as a general circuit (for example, 1588-7474) or a 700 telephone information circuit (for example, 060-700-7474) which is connected to the parking control central server 40 from the mobile phone of the owner of a vehicle.

Also, the parking control communications module 10 includes a direct-current (DC) power source 11 which supplies power for itself, a vehicle detection sensor 12 which detects a vehicle which enters into or exits from the parking section, a wireless modem 13 which communicates with the parking control central server 40 wirelessly, and a central processing unit 14. Each parking control communications module 10 having the above-described configuration has an inherent serial number.

Also, the parking control central server 40 includes a parking information database 41 which stores parking information transmitted via a wireless network 30 from the parking control communications module 10, a short message service (SMS) server (hereinafter referred to as a SMS server) 42 which transmits and receives a short message to and from the communications device 50 of the parking manager or the mobile phone 20 of the owner of the vehicle, a parking fee settlement server 43 which calculates a parking fee and approves settlement of the parking fee by using the parking information database 41, and a monitoring computer 44 which is connected to the parking information database 41, the SMS server 42 and the parking fee settlement server 43, and monitors all parking-related information.

The operation of the parking control system according to the present invention having the above-described configuration will be described in more detail.

If a vehicle which enters into a corresponding parking section is detected by the vehicle detection sensor 12, the vehicle detection signal is transferred to the central processing unit 14. Accordingly, the central processing unit 14 controls

the vehicle detection signal input from the vehicle detection sensor 12 to be transferred to the parking control central server 40 via the wireless modem (communications device) 13 and the wireless network 30.

Accordingly, the parking control central server 40 confirms the inherent serial number of the parking control communications module 10 from which the vehicle detection signal is transmitted, and manages parking information in a corresponding parking section.

Also, notice boards are installed in every parking section of the parking zone, in which each notice board contains the following contents "Here is a toll parking zone. A parking fee can be settled by using a mobile phone. Thus, please call up by the following telephone number, for example, the parking control central server's phone number is 1588-7474 or the 700 telephone information settlement server's phone number is 060-700-7474. Also, please call up by the same phone numbers during exit of the vehicle, so that a parking fee can be accurately calculated and settled. Please note that a parking fee is continuously counted unless a phone call exists during exit of the vehicle." Thus, parking persons can see that a parking fee can be settled by using a mobile phone. However, in the case that a parking person intends to exit from the parking section without calling up by the appropriate phone number, a parking fee is calculated by a detected vehicle exit signal and then notifies the parking person of the parking fee.

Thus, parking persons who intend to park in the parking section read the notice board, and calls up by a corresponding phone number, to thereby make a parking request. That is, the parking person makes a parking request toward the parking control central server 40. Here, the parking person who makes a parking request inputs a parking position serial number indicative of a parking section position where his or her vehicle parks and his or her own residence number. Here, the input of the residence number can be omitted because such an input of the residence number is only to confirm the owner of the mobile phone.

Accordingly, the parking control central server 40 verifies whether or not

the parking person's residence number is identical to the residence number of the owner of the phone corresponding to the caller's phone number which is indicated in the parking control central server 40 via the mobile communications server 70. Then, if matched, a parking start time is recorded and then notifies the parking person of the parking start time.

Thereafter, the parking person has made his or her business and then come back to the parking section in the parking zone where his or her vehicle is parked. Then, if he or she accesses the parking control central server 40 by using a mobile phone in order to settle a parking fee, the parking control central server 40 confirms whether or not the parking person made a parking request during parking, and thus if it is confirmed that the parking request was made, a parking position is confirmed via the caller's phone number and the calculated parking fee is approved from the mobile communications server 70. The approved parking fee is notified to the parking person. The settled parking fee is settled at the same time of settling the mobile phone charges of the parking person.

If settlement of the parking fee is completed as described above, the parking person drives out from the parking zone. The vehicle exit signal is detected by the vehicle detection sensor 12 installed in the parking control communications module 10, to then be transmitted to the parking control central server 40. Accordingly, a monitoring personnel working in a parking control center can grasp a parking situation in the parking zone via a monitoring computer 44 at a look.

However, in the case that the parking person did not make a parking request after parking due to an emergency situation or other reasons, the parking control central server 40 transmits a short message which locks the vehicle parked in the parking section to the parking manager's communications device 50 via the SMS server 42.

Accordingly, the parking manager receives the short message and locks the corresponding vehicle. Here, the parking manager is a moving security company

or a parking management center (for example, a security company, a traction company, and a management office) which circulates or resides in the parking zone.

Thereafter, the parking person completes his or her business, and then comes back to the parking section in the parking zone where his or her vehicle has been parked. Then, in the case that the parking person accesses the parking control central server 40 in order to request for a release of the locking device and settle the parking fee, the parking control central server 40 transmits a guidance message to the parking person in order to guide the parking person to input a serial number indicative of a position of the parking section where the corresponding vehicle is parked, and then the parking person inputs a serial number inherent to the parking section where the vehicle is parked.

Accordingly, the parking control central server 40 confirms the parking position serial number input by the parking person, and calculates a parking fee adjusted from the vehicle entry time received from the parking control communications module 10 to the vehicle exit time, obtains an approval of the parking fee from the mobile communications server 70, and guides the parking person, to thereby automatically have the locking device released. Here, the parking fee is settled at the same time of settling the mobile phone charges of the parking person.

Also, in the case that the vehicle entry was normally made, but the parking person exits the vehicle without making a vehicle exit during exit of the vehicle, the vehicle exit signal is detected by the vehicle detection sensor 12. In this case, the parking control central server 40 can see via a wireless modem 13 and a wireless network 30 that the vehicle is driven out. Accordingly, the parking control central server 40 calculates a parking fee by information stored in the parking information database 41 and then notifies the parking person of the parking fee via the SMS server 42, to then have the parking fee settled at the same time of settling the mobile phone charges of the parking person.

FIGs. 2 and 3 are flowchart views for explaining a parking control method

using a mobile phone in an open type parking zone according to an embodiment of the present invention.

As shown in FIGs. 2 and 3, the vehicle detection sensor 12 detects whether there is a vehicle which enters into a corresponding parking section (S10). When a vehicle which enters into the parking section is detected by the vehicle detection sensor 12, parking information which is the vehicle detection signal of the detected vehicle is transmitted to the parking control central server 40 under the control of the central processing unit 14 (S20). Accordingly, the parking control central server 40 confirms the inherent serial number of the parking control communications module 10 from which the vehicle detection signal is transmitted, and manages parking information in the corresponding parking section.

Then, the parking control central server 40 verifies whether or not the parking person made a parking request (S30), and thus receives a parking position serial number and a residence number which are input by the parking person via his or her mobile phone, if it is confirmed that the parking request was made (S40).

Also, the parking control central server 40 verifies whether or not the parking person's residence number is identical to the residence number of the owner of the phone corresponding to the caller's phone number which is indicated in the parking control central server 40 via the mobile communications server 70 (S50). Then, if matched, a parking start time is recorded (S60) and then notifies the parking person of the parking start time.

However, in the case that the parking person did not make a parking request after parking due to an emergency situation or other reasons in step 30, the parking control central server 40 transmits a short message which indicates vehicle information and position information of the parking person's vehicle to a communications device 50 of a parking manager in a moving security company or a parking management center (for example, a security company, a traction company, and a management office) which circulates or resides in the parking zone (S160). Accordingly, the parking manager confirms the vehicle information transmitted

from the parking control central server 40 via his or her communications device 50 and then moves to the corresponding parking section to operate a vehicle locking device (not shown) (S170).

Accordingly, the vehicle locking device normally locks the vehicle, and then a driving signal of the vehicle locking device is transmitted to the parking control central server 40 (S180). Then, the parking control central server 40 records a parking start time at a point in time when the vehicle locking device normally locks the vehicle.

Then, the parking control central server 40 confirms whether or not the vehicle exit signal is detected by the vehicle detection sensor 12, and input thereto (S70). Here, If a vehicle exit signal is input, the parking control central server 40 recognizes that a vehicle is driven out without making a vehicle exit request, calculates a parking fee in a corresponding parking section (S190), obtains an approval of settlement by a mobile phone number registered at the time of making a parking request of the parking person (S200), and notifies the mobile phone of the parking person of the calculated parking fee via the SMS server 42 (S210). Accordingly, the parking person settles the parking fee at the same time of settling the mobile phone charge.

Meanwhile, the parking control central server 40 confirms whether a vehicle exit request is made from the parking person (S80). If a vehicle exit request is made, the parking control central server 40 confirms whether the parking request of the parking person was made (S90). If it is confirmed that the parking request was made, a parking position of the parking person's vehicle is confirmed via the caller's mobile phone number transmitted from the parking person (S100). However, if it is confirmed that no parking request was made, the parking control central server 40 guides the parking person to input a serial number of the parking section (S220), so that the parking position can be identified by the input serial number.

Then, the parking control central server 40 notifies the parking person of

the calculated parking fee when the parking position of the parking person's vehicle is identified (S110), and obtains an approval of settlement from the mobile communications server 70 (S120). Accordingly, the settled parking fee is settled at the same time of settling the parking person's mobile phone charges.

Then, after settlement of the parking fee is completed, the parking control central server 40 confirms whether the locking device locks the vehicle for exit (S130). If it is confirmed that the locking device locks the vehicle, the locking device is made to unlock (S230), so that the vehicle can be driven out from the parking zone. However, in the case that the vehicle can be driven out from the parking zone (S140), after settlement of the parking fee since the locking device does not lock the vehicle, the vehicle detection sensor 12 installed in the parking control communications module 10 detects that the vehicle is driven out from the parking zone, and then transmits a vehicle exit signal to the parking control central server 40 (S150). Accordingly, a monitoring personnel working in the parking control center can grasp a parking situation in the parking zone via the monitoring computer 44 at a look.

FIG. 4 is a block diagram showing a configuration of a parking control system using a mobile phone in an opening-and-closing type parking zone according to an embodiment of the present invention, and FIG. 5 shows an example of a parking ticket which is issued from an entrance control unit of FIG. 4.

As shown in FIG. 4, the parking control system according to the present invention includes an entrance control unit 90 which controls an entry of a vehicle 80, an opening and closing unit 100 for vehicle entry so that the vehicle 80 can be allowed or rejected to enter into a parking zone, a mobile phone 110 which is used for settling a parking fee of the parking person, a settlement server 120 for settlement of the parking fee of the parking person by using a caller's phone number (CID) indicated in a receiver's mobile phone, an exit control unit 130 which controls an exit of the vehicle 80, and an opening and closing unit 140 for vehicle exit so that the vehicle 80 can be allowed or rejected to exit out from the parking

zone.

In the case that a parking person intends to park his or her vehicle 80, he or she drives the vehicle 80 to the entrance control unit 90, and presses a parking ticket issuance button of the entrance control unit 90. In this case, the entrance control unit 90 issues a parking ticket where an inherent number, a vehicle entry time, and a phone number which is to be connected with a settlement server are recorded, via a parking ticket exit, as shown in FIG. 5, and opens the vehicle entry opening and closing unit 100 to allow the vehicle entry and transmit the inherent number and the vehicle entry time to the settlement server 120.

Meanwhile, in the case that the parking person intends to exit the vehicle, he or she calls up a settlement server phone number (for example, 700-7777) recorded on the parking ticket before the vehicle 80 is driven out from the parking section. Then, the settlement server 120 requests for inputting an inherent number by an automatic response system (ARS), receives the input inherent number, calculates a parking fee in comparison with the inherent number and the vehicle entry time input from the entrance control unit 90, notifies the parking person of the parking fee, settles the parking fee by means of one of various settlement methods by using a mobile phone 110, such as a telephone information settlement, a transfer of a bank account, a mobile phone credit card settlement, a credit card settlement, an ARS settlement, and a point settlement, by using a caller's phone number called a caller's identity (CID) indicated on the settlement server 120, and transfers the settled inherent number to the exit control unit 130 to notify that the settlement is completed. Here, as an example of the settlement means using the caller's phone number (CID), a settlement method using a telephone information settlement number such as 700-7777 is adopted in a telephone information settlement server, to thereby charge a parking fee by claiming charges using telephone information.

As another example, a telephone number is made 1588-7777, and then one of a mobile phone settlement, a transfer of a bank account, a mobile phone credit card settlement, a credit card settlement, an ARS settlement, and a point settlement

is selected by a parking person by using an ARS function. Then, corresponding information is received and the selected settlement method is approved, to thereby charge a parking fee through the approved settlement method.

Meanwhile, when the parking person intends to exit his or her vehicle, he or she drives the vehicle to the exit control unit 130 and inserts the parking ticket into an insertion hole of the exit control unit 130. Then, the exit control unit 130 confirms the inherent number of the inserted parking ticket and checks whether the confirmed inherent number is identified with the inherent number settled from the settlement server 120, to thereby have the vehicle exit opening and closing unit 140 operate so that the parking person can exit the vehicle.

Since a parking fee is charged by using a mobile phone settlement method as described above, the parking person can exit the vehicle by only a call-up of a mobile phone and an insertion of a parking ticket into an exit control unit during exit of the vehicle, and can trust a calculated parking fee. Also, the parking manager can save a labor cost through an unattended control system and prevent poor collection of parking fees.

Also, in the case that a receipt issuance switch and a receipt issuance printer are provided in the exit control unit 130, a parking person who wishes to receive a receipt can manipulate the receipt issuance switch to receive a receipt.

Also, in the case that an advance payment settlement machine is provided in a parking section, a parking person who wishes to pay for a parking fee in cash can settles the parking fee in cash. In this case, the advance payment settlement machine accesses the settlement server 120 by wire or wirelessly, and transmits a signal which indicates that a settlement with respect to a corresponding inherent number of a parking section is completed, to the exit control unit 130 to thereby enable the parking person to drive out from the parking zone.

Also, in the case that an inherent number is assigned to a commutation parking ticket and an parking ticket insertion hole is additionally provided in the entrance control unit 90, a parking person who wishes to park regularly can drive

out from the parking zone by inserting the parking ticket into the insertion hole and then receiving the discharged parking ticket from the insertion hole during vehicle entry and exit.

Also, in order to enable a visitor to park freely, a phone number of a residence person who can allow the visitor to park freely is registered in the settlement server 120. If the visitor accesses the settlement server 120 by the registered phone number, the settlement server 120 judges whether a caller's phone number (CID) is the registered phone number. Then, if matched, the settlement server 120 receives a corresponding inherent number of the parking ticket via a keypad and transmits a signal which indicates that a settlement for the corresponding inherent number is exempted, to an exit control unit 130, to thereby enable the visitor to drive out from the parking zone. In this case, the total time or the number of times for allowed free parking is cumulatively calculated for the registered phone numbers to thereby charge the residences for parking fees.

As described above, a parking ticket is issued during vehicle entry in which a phone number by which a parking person can access a settlement server 120 and an inherent number of a parking section are recorded on the parking ticket. During vehicle exit, a mobile phone of the parking person can access the settlement server 120 by the phone number on the parking ticket at the state where the vehicle is parked. The settlement sever 120 receives the inherent number and a settlement signal from the mobile phone of the parking person and settles the parking fee, to then transmit a signal which indicates that a settlement for the parking fee is completed to the exit control unit 130, to thereby enable the parking person to drive out from the parking zone. When the parking ticket is inserted into the exit control unit 130, and if a settlement for the parking fee is completed, the parking person can drive out immediately from the parking zone. Also, a waiting time for payment of parking fees in cash can be saved and thus a labor cost for paring management can be saved.

FIG. 6 is a flowchart view for explaining a parking control method using a

mobile phone in an opening-and-closing type parking zone according to an embodiment of the present invention.

As shown in FIG. 6, in the case that a parking person intends to park his or her vehicle 80, he or she drives the vehicle 80 to the entrance control unit 90, and presses a parking ticket issuance button of the entrance control unit 90 (S1). In this case, the entrance control unit 90 issues a parking ticket where an inherent number, a vehicle entry time, and a phone number which is to be connected with a settlement server are recorded, via a parking ticket exit, as shown in FIG. 5, (S2) transmits information on the inherent number and the vehicle entry time to the settlement server 120 (S3), and opens the vehicle entry opening and closing unit 100 (S4) to allow the vehicle entry.

Meanwhile, in the case that the parking person intends to exit the vehicle, he or she calls up a settlement server phone number (for example, 700-7777) recorded on the parking ticket before the vehicle 80 is driven out from the parking section (S5). Then, the settlement server 120 requests for inputting an inherent number by an automatic response system (ARS), receives the input inherent number (S6), calculates a parking fee in comparison with the inherent number and the vehicle entry time input from the entrance control unit 90, notifies the parking person of the parking fee (S7), settles the parking fee (S8) by means of one of various settlement methods by using a mobile phone 110, such as a telephone information settlement, a transfer of a bank account, a mobile phone credit card settlement, a credit card settlement, an ARS settlement, and a point settlement, by using a caller's phone number called a caller's identity (CID) indicated on the settlement server 120, and transfers the settled inherent number to the exit control unit 130 to notify that the settlement is completed (S9).

Then, when the parking person intends to exit his or her vehicle, he or she drives the vehicle to the exit control unit 130 and inserts the parking ticket into an insertion hole of the exit control unit 130 (S10). Then, the exit control unit 130 confirms the inherent number of the inserted parking ticket and checks whether the

confirmed inherent number is identified with the inherent number settled from the settlement server 120, and confirms whether the confirmed inherent number is the inherent number whose settlement is completed in the settlement server 120 (S11). If the confirmed inherent number is the inherent number whose settlement is completed, to thereby have the vehicle exit opening and closing unit 140 operate (S12) so that the parking person can exit the vehicle. However, if it is confirmed that the inherent number on the inserted parking ticket is an inherent number whose settlement is not completed yet, the exit control unit 130 requests for the parking person (S13) to access the settlement server 120 to settle the parking fee so that the parking person to settle the parking fee and to drive out from the parking zone.

**Industrial Applicability**

As described above, the parking control system using a mobile phone and a method applied thereto, can utilize and manage an empty parking lot efficiently in which an open type parking zone such as an apartment house, a small-scale office building without employing security personnel, or a small-scale paid parking lot, is used with fee to thereby automatically control parking management, so that the other persons who are not resident in a residence-priority parking zone can pay for parking fees in the parking control system and park their vehicles in due course, during the time when a residence does not park.

Also, information on vehicle entry and exit of vehicles which park in a parking zone is automatically managed on an online basis and by wire or wireless network, and parking fees can be settled irrespective of time and place, by using a settlement method using mobile phone's charges of the parking person or a mobile phone of the parking person. As a result, inconveniences having occurred at the time of using a conventional parking fees inserter can be solved to thereby provide the parking person with conveniences.

Also, the parking control system using a mobile phone and a method applied thereto, in an open type parking area according to the present invention can

solve inconveniences and waiting times which occur due to payment in cash by parking persons, save a labor cost for parking control, and prevent poor collection of parking fees in which a parking person receives a parking ticket on a one-touch basis during entry of a vehicle, in which a telephone number of a mobile phone is connected to a settlement server and thus the telephone number and an inherent number are recorded on the parking ticket, and the mobile phone is connected to the settlement server at a parked state and a parking fee is settled during exit of the vehicle.

## CLAIMS

1. A parking control system using a mobile phone, the parking control system comprising:

a mobile phone (20, 110) of a parking person for settlement of a parking fee;

a parking information generator (10, 90) generating parking information of a vehicle which comes into a parking zone; and

a parking control server (40, 120) which ascertains the parking information generated from the parking information generator (10, 90) and the time when the parking person accesses the parking control server via the mobile phone in order to request for exit of the vehicle, and calculates and settles a parking fee.

2. The parking control system using a mobile phone of claim 1, wherein in the case that the parking control system is an open type parking zone, the parking information generator (10, 90) is a parking control communications module (10) which is installed in each parking section within the parking zone to thereby recognize a corresponding inherent number for the parking section where the vehicle is parked and transfer the recognized inherent number to the parking control server (40).

3. The parking control system using a mobile phone of claim 2, wherein the parking control communications module (10) includes a direct-current (DC) power source (11) which supplies power for itself, a vehicle detection sensor (12) which detects a vehicle which enters into or exits from the parking section, a wireless modem (13) which communicates with the parking fee settlement server wirelessly, and a central processing unit (14) which controls transmission and reception of data with respect to the parking control server (40).

4. The parking control system using a mobile phone of claim 1, wherein in the case that the parking control system is an opening and closing type parking zone, the parking information generator (10, 90) is a vehicle entry control unit (90) which is installed in each parking section within the parking zone to thereby issue a parking ticket where an inherent number and a vehicle entry time of the vehicle which enters into the parking zone and simultaneously transfer the information recorded on the parking ticket to the parking control server (120).

5. The parking control system using a mobile phone of claim 4, further comprising a vehicle exit control unit (130) which confirms whether a settlement of a parking fee is completed according to parking information transmitted from the parking control server (120), and controls vehicle exit of the vehicle which entered into the parking zone.

6. The parking control system using a mobile phone of claim 1, further comprising a mobile communications server (70) which approves a settlement of the parking fee calculated by the parking control server by a mobile phone number of the parking person provided from the parking control server (120).

7. A parking control method comprising the steps of:

(a) notifying a parking control server (40, 120) of a parking start time of a vehicle which enters into a parking zone;

(b) accessing the parking control server (40, 120) via a mobile phone (20, 110) and notifying the parking control server (40, 120) of a parking termination time;

(c) ascertaining the parking start time and the parking termination time and calculating a parking fee via the parking control server (40, 120); and

(d) settling the parking fee to allow the vehicle to exit from the parking zone.

8. The parking control method of claim 7, wherein, in the case that the parking person intends to park his or her vehicle in an open type parking zone in step (a), the parking person accesses the parking control server (40) by using his or her mobile phone (20) and inputs a parking section inherent number, so that the inherent number of the parking section and the parking start time are stored by indexing the mobile phone number of the parking person as an identification.

9. The parking control method of claim 8, wherein, in the case that the parking person accesses the parking control server (40) in step (b), the parking start time is automatically searched as the mobile phone number of the parking person.

10. The parking control method of claim 8, wherein, in step (d), the detection device (12) installed in the parking section confirms whether the vehicle can exit from the parking zone.

11. The parking control method of claim 7, wherein, in the case that the parking person intends to park his or her vehicle in an opening and closing type parking zone in step (a), a parking ticket where an inherent number is recorded is issued to the parking person so that the parking start time is stored by indexing the inherent number of the parking ticket as an identification.

12. The parking control method of claim 11, wherein, in the case that the parking person accesses the parking control server (120) and inputs the inherent number recorded on the parking ticket in step (b), the parking start time is searched as the inherent number identification which has been already stored.

13. The parking control method of claim 11, wherein, in the case that the parking person inserts the parking ticket into the exit control unit at the exit in step

(d), it is confirmed whether the vehicle is allowed to exit.

14. The parking control method of claim 7, wherein, in the case that the parking fee is settled in step (c), the parking fee is settled by using the mobile phone as a settlement means after the parking fee is calculated by the parking control server (40, 120).

15. The parking control method of claim 14, wherein the settlement means using the mobile phone is a telephone information settlement means.

16. The parking control method of claim 14, wherein the settlement means using the mobile phone is a bank account transfer settlement means.

17. The parking control method of claim 14, wherein the settlement means using the mobile phone is a mobile phone credit card settlement means.

18. The parking control method of claim 14, wherein the settlement means using the mobile phone is a credit card automatic response system settlement means.

19. The parking control method of claim 14, wherein the settlement means using the mobile phone is a point settlement means.

20. The parking control method of claim 7, wherein, in the case that the mobile phone caller's phone number accessed to the parking control server (40, 120) is the caller's phone number of the free-of-cost parking person who has been registered in advance in step (b), the parking control server (40, 120) controls the vehicle to be driven out from the parking zone without settling the parking fee.

FIG. 1

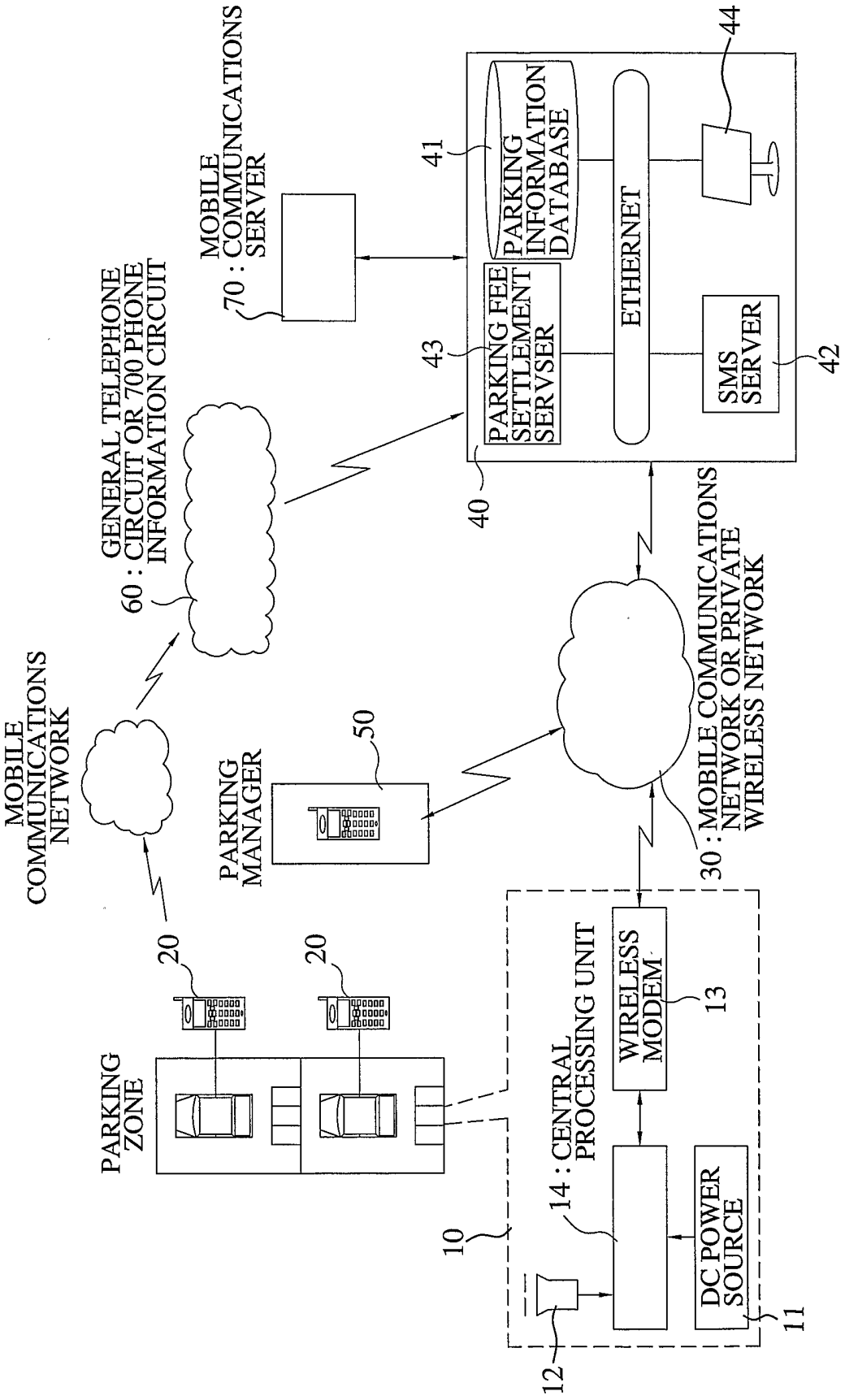

MOBILE COMMUNICATIONS NETWORK
GENERAL TELEPHONE 60 : CIRCUIT OR 700 PHONE INFORMATION CIRCUIT
MOBILE COMMUNICATIONS 70 : SERVER
PARKING INFORMATION DATABASE
41
44
ETHERNET
PARKING FEE SETTLEMENT SERVSER
43
SMS SERVER
42
40
30 : MOBILE COMMUNICATIONS NETWORK OR PRIVATE WIRELESS NETWORK
PARKING MANAGER
50
20
20
PARKING ZONE
14 : CENTRAL PROCESSING UNIT
WIRELESS MODEM
13
DC POWER SOURCE
10
11
12

FIG. 2

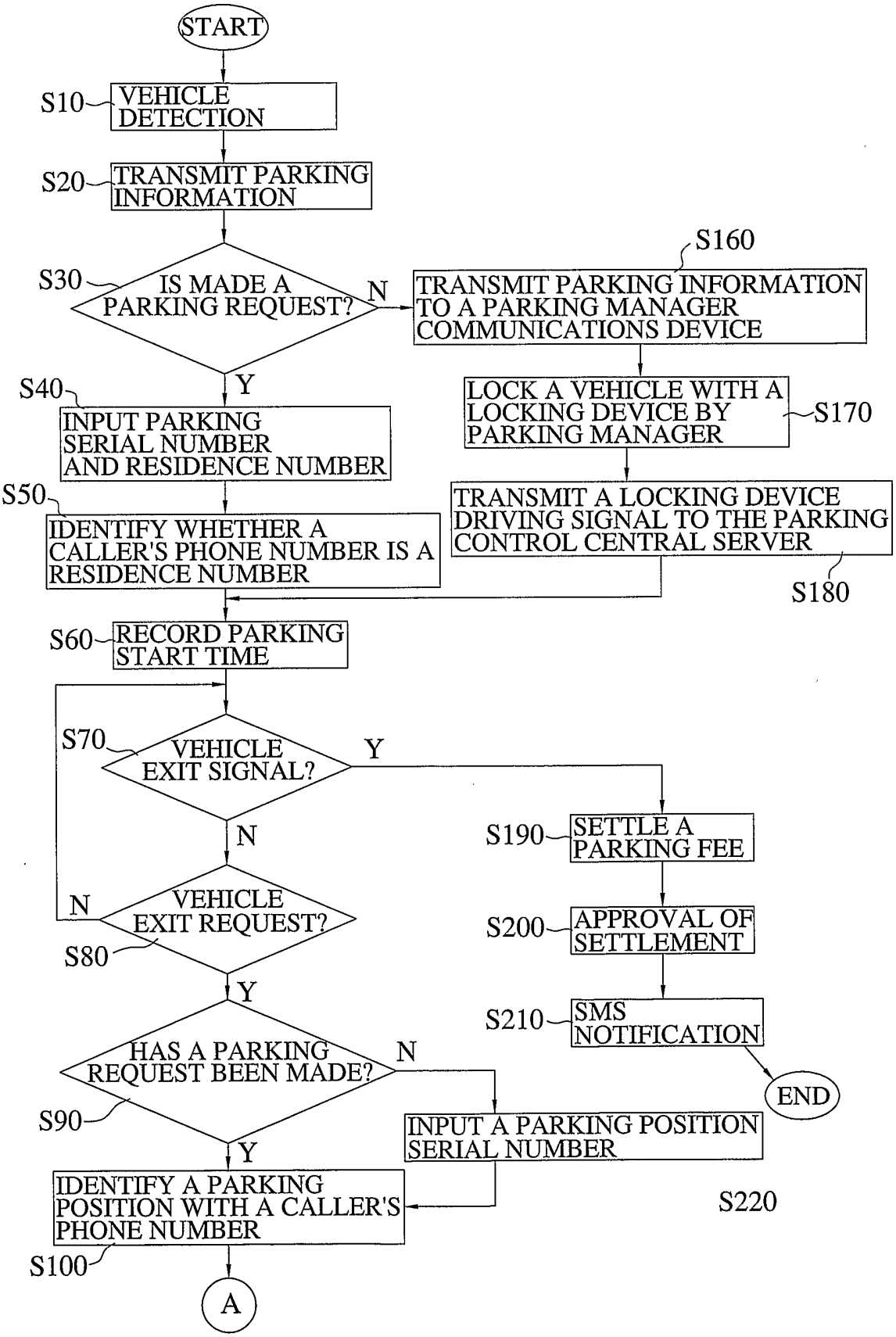

START
S10
VEHICLE DETECTION
S20
TRANSMIT PARKING INFORMATION
S30
IS MADE A PARKING REQUEST?
N
Y
S160
TRANSMIT PARKING INFORMATION TO A PARKING MANAGER COMMUNICATIONS DEVICE
LOCK A VEHICLE WITH A LOCKING DEVICE BY PARKING MANAGER
S170
TRANSMIT A LOCKING DEVICE DRIVING SIGNAL TO THE PARKING CONTROL CENTRAL SERVER
S180
S40
INPUT PARKING SERIAL NUMBER AND RESIDENCE NUMBER
S50
IDENTIFY WHETHER A CALLER'S PHONE NUMBER IS A RESIDENCE NUMBER
S60
RECORD PARKING START TIME
S70
VEHICLE EXIT SIGNAL?
Y
N
S190
SETTLE A PARKING FEE
S200
APPROVAL OF SETTLEMENT
S210
SMS NOTIFICATION
END
N
VEHICLE EXIT REQUEST?
S80
Y
HAS A PARKING REQUEST BEEN MADE?
N
S90
Y
INPUT A PARKING POSITION SERIAL NUMBER
S220
IDENTIFY A PARKING POSITION WITH A CALLER'S PHONE NUMBER
S100
A

FIG. 3

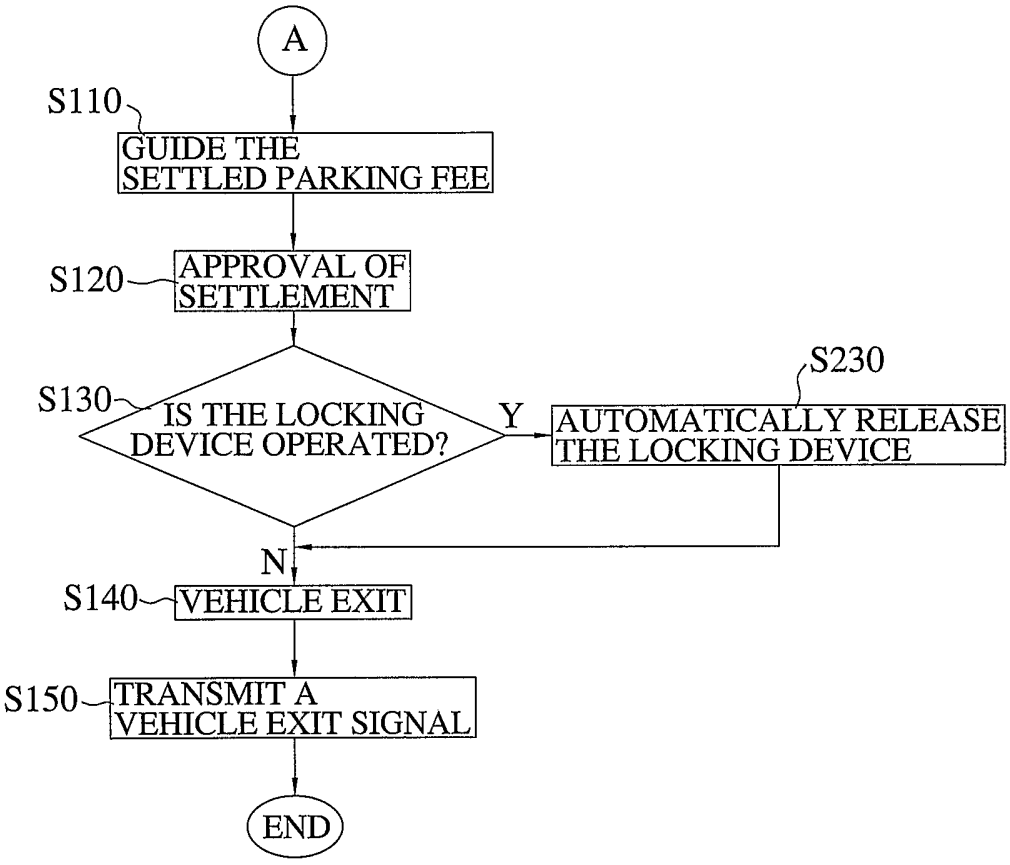

A
S110
GUIDE THE SETTLED PARKING FEE
S120
APPROVAL OF SETTLEMENT
S130
IS THE LOCKING DEVICE OPERATED?
Y
S230
AUTOMATICALLY RELEASE THE LOCKING DEVICE
N
S140
VEHICLE EXIT
S150
TRANSMIT A VEHICLE EXIT SIGNAL
END

FIG. 4

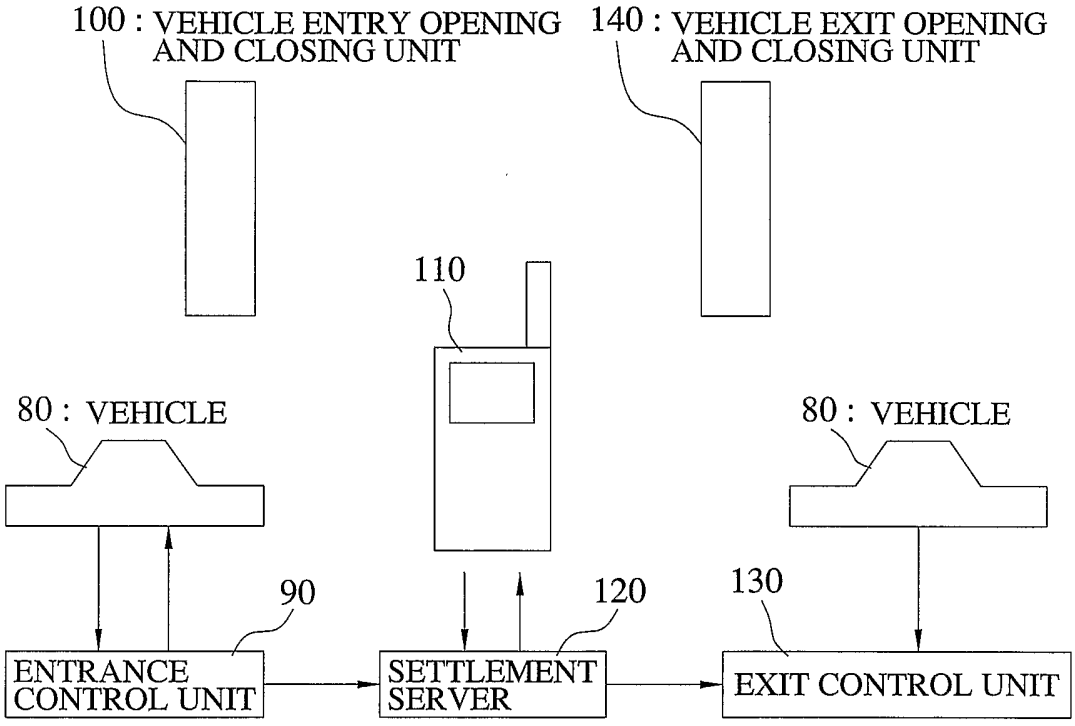

100 : VEHICLE ENTRY OPENING AND CLOSING UNIT
140 : VEHICLE EXIT OPENING AND CLOSING UNIT
110
80 : VEHICLE
80 : VEHICLE
90
120
130
ENTRANCE CONTROL UNIT
SETTLEMENT SERVER
EXIT CONTROL UNIT

FIG. 5

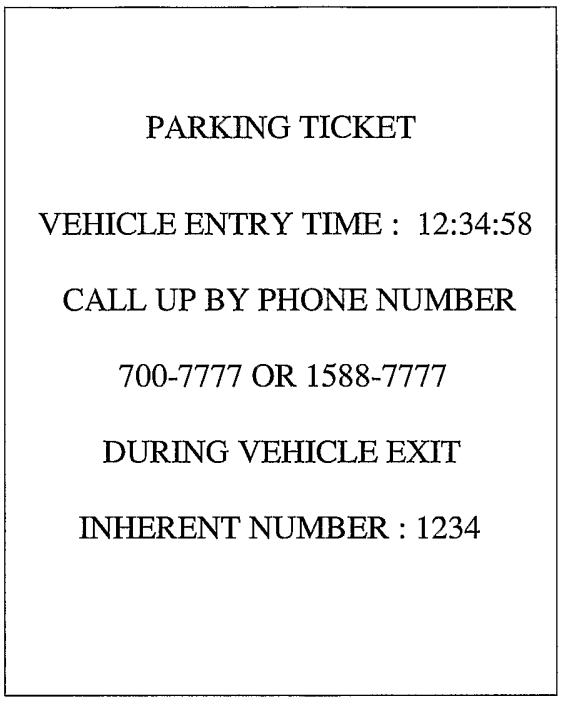
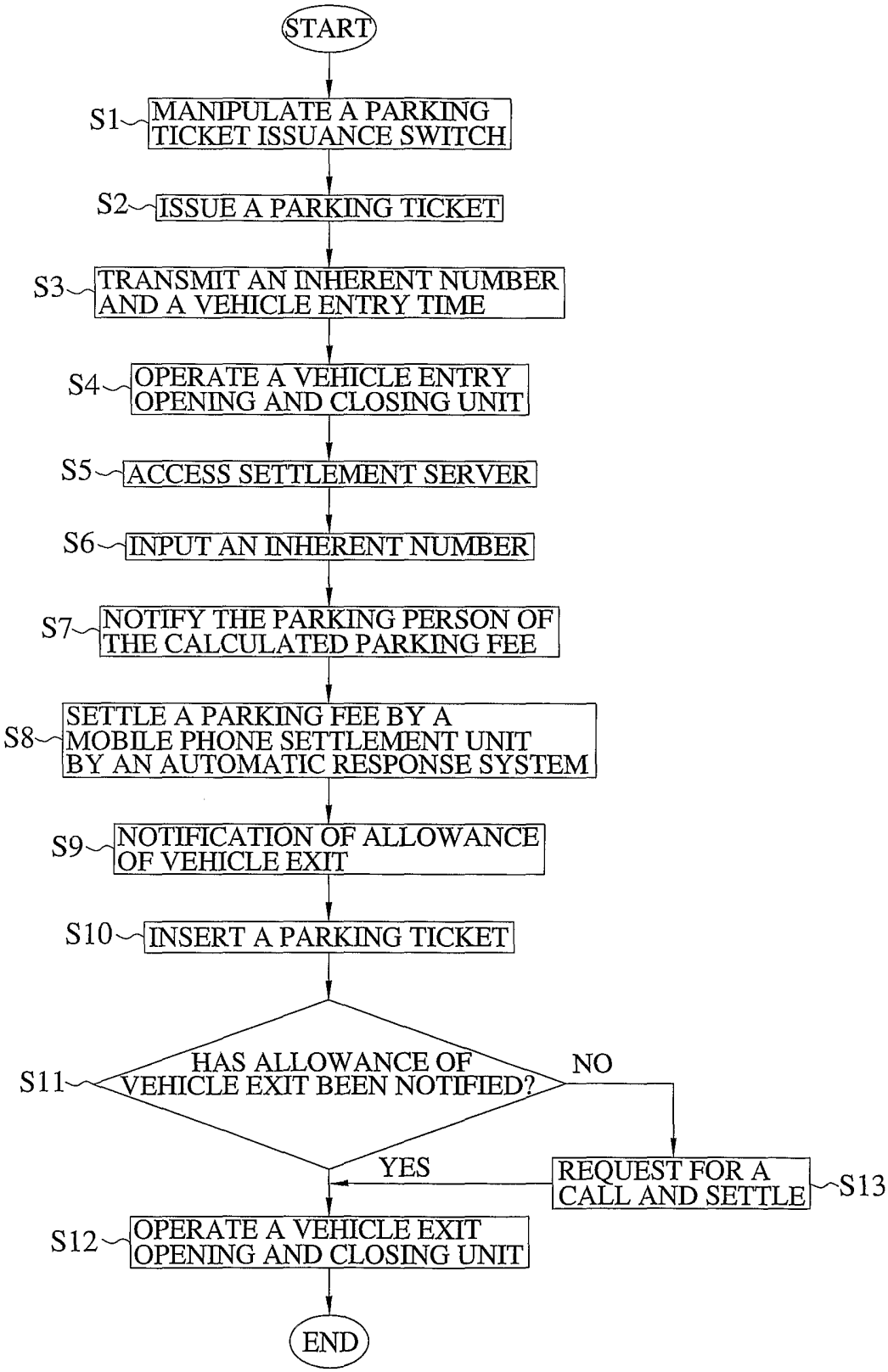

PARKING TICKET
VEHICLE ENTRY TIME : 12:34:58
CALL UP BY PHONE NUMBER
700-7777 OR 1588-7777
DURING VEHICLE EXIT
INHERENT NUMBER : 1234

FIG. 6


START
S1
MANIPULATE A PARKING TICKET ISSUANCE SWITCH
S2
ISSUE A PARKING TICKET
S3
TRANSMIT AN INHERENT NUMBER AND A VEHICLE ENTRY TIME
S4
OPERATE A VEHICLE ENTRY OPENING AND CLOSING UNIT
S5
ACCESS SETTLEMENT SERVER
S6
INPUT AN INHERENT NUMBER
S7
NOTIFY THE PARKING PERSON OF THE CALCULATED PARKING FEE
S8
SETTLE A PARKING FEE BY A MOBILE PHONE SETTLEMENT UNIT BY AN AUTOMATIC RESPONSE SYSTEM
S9
NOTIFICATION OF ALLOWANCE OF VEHICLE EXIT
S10
INSERT A PARKING TICKET
S11
HAS ALLOWANCE OF VEHICLE EXIT BEEN NOTIFIED?
NO
YES
REQUEST FOR A CALL AND SETTLE
S13
S12
OPERATE A VEHICLE EXIT OPENING AND CLOSING UNIT
END