

PARKING TICKET CERTIFICATION SYSTEM MAKING USE OF AN IC TAG

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

5 The present invention relates to a parking ticket certification system making use of an IC tag contrived so that, when customers visiting various tenant stores or other facilities having a contract with a parking area use the parking area, service data concerning a parking charge or a parking time can be recorded in tickets which the customers receive when they enter the parking area.

PRIOR ART

10 As for a system providing services concerning a parking charge or a parking time, there have been known those in which a service code is written in a magnetic card (a magnetic ticket) so that a user of the magnetic card can receive various types
15 of parking services with the service code.

PROBLEMS TO BE SOLVED BY THE INVENTION

20 However, a magnetic card made from paper or plastics is used as a recording medium in any of the conventional parking service systems described above, and as the magnetic head is directly contacted to magnetic stripes on the card for reading or writing data from or into the card, the magnetic card is easily damaged and is hardly reused, so that most of the magnetic cards are discarded after the cards are used once, which disadvantageously raises the total cost, and in addition as a quantity of data recorded in the magnetic card is small, only a limited
25 quantity of data can be read out therefrom or written therein, which

disadvantageously makes it impossible to provide a sufficient quantity of data required for various types of services.

In addition, in a case where each tenant store having provided parking services to their customers and also having accounts receivable from the customers
5 in relation to the provided parking services make a settlement to an owner or a manager of the parking area, as the facilities or devices required for automating the settlement are still insufficient, sometimes a long time is required and mistakes may disadvantageously occur in the settlement.

Therefore, it is a technological objective to provide a parking ticket
10 certification system making use of an IC tag contrived so that services for a parking charge and a parking time can accurately be provided to customers in the stable state by making use of a parking ticket having a solid structure, capable of being used again and again, and making it possible to quickly read and write various types of service therefrom or therein, and that

15 also settlement of a service charge (account receivable) paid by each tenant having provided the parking services to an owner of or a management firm for the parking area.

MEANS FOR SOLVING THE PROBLEMS

20 (1) To achieve the technological objective described above, the present invention provides, as described in claim 1, a parking ticket certification system capable of recording service data to discount a parking charge or a parking time for a parking ticket owned by a user of a parking area comprising an IC tag for parking with such data as entry time recorded therein; and an IC tag certification machine
25 for recording service data to discount a parking charge or a parking time for the IC

tag for parking in a non-contact mode, wherein the IC tag for parking has a small piece-like or a coin-like form and comprises a CPU, a memory, and a signal receiver/transmitter for receiving and transmitting data when actuated by electromagnetic induction from the outside; and the IC tag certification machine
5 comprises a mount section for mounting the IC tag for parking thereon, an entry instruction section for instructing entry of service data, and a data communication section for executing data communication in a non-contact mode with the signal receiver/transmitter in the mounted IC tag for parking and writing service data in the IC tag for parking according to an instruction from the entry instruction section.

10 (2) In the present invention, as described in claim 2, the IC tag certification machine comprises a memory with service data to discount a parking charge or a parking time stored therein and one or more discount entry instruction sections, so that necessary discount data can be selected from the service data stored in the memory according to an instruction from the discount entry instruction section, and
15 the discount data can be written in a memory of the IC tag for parking mounted on the mount section.

(3) In the present invention, as described in claim 3, a key tag with service point data to discount a parking charge or a parking time is dismountably mounted on the IC tag certification machine, so that the service point data recorded in the key
20 tag is transcribed in a memory of the IC tag for parking mounted on the mount section according to an instruction from a service point entry instruction section provided in the IC tag certification system, and a point corresponding to the transcribed service point is subtracted from the point stored in the key tag.

(4) In the present invention, as described in claim 4, the IC tag certification
25 machine further comprises a tag data check means capable of reading out data

recorded in a mounted IC tag for parking or in an IC memory of the key tag and displaying the data in the display section.

(5) In the present invention, as described in claim 5, when an IC tag for parking with discount data or a service point written in a memory thereof is inserted into a charge settlement machine, the parking charge settlement machine performs a charge settlement service corresponding to the discount data or the service point and allows the vehicle to leave the parking area; further the parking charge settlement machine sums up the charge receivable discounted according to the discount data as well as discount data for each tenant having finished the data entry processing and reports the sum data to an owner or a manager of the parking area; and the key tag with a service point written in a memory thereof is previously purchased from an owner or a manager of the parking area and used by setting in the IC tag certification machine.

With the means described in (1) above, the IC tag certification machine has a structurally solid and reusable recycle function for using an IC tag enabling data read/write operations from or into an IC memory thereof in a non-contact mode as a parking ticket which a customer receives when entering the parking port and makes it possible to read and write a quantity of and various types of data from and into the IC memory, so that the IC tag certification machine makes it possible to record various types of service data in addition to entry data and is installed at each tenant store or similar facility for parking service. Further with the IC tag certification machine, various parking service data such as those concerning a parking charge and a parking time can be written in a memory of the IC tag for parking in a non-contact mode only by mounting an IC tag for parking on the mount section and operating the entry instruction section, so that parking service

data can easily and very accurately be recorded in the IC tag for parking presented by a customer.

With the means described in (2) above, service data stored in a memory of the IC tag certification machine can be transferred to a memory of an IC tag for parking mounted on the mount section according to operations of the discount data entry instruction section, and different types of service data (different parking charge or different parking time) can be written in a memory of an IC tag for parking at each store according to operations of the discount data entry instruction section, so that services corresponding to a sum of used money or a total use time for each customer can be provided.

With the means described in (3) above, when a key tag previously purchased from an owner or a management firm of a parking area is set in an IC tag certification machine installed at each tenant store and a service point stored in this key tag is transferred to a memory of an IC tag for parking presented by a customer visiting each tenant store, the customer can receive services for a parking charge or a parking time, and each time service point data is transferred to the IC tag for parking, the corresponding service point is subtracted from the point stored in the key tag, so that the processing for charge settlement with the parking area owner or the like can quickly and accurately be performed.

With the means described in (4) above, as data stored in an IC tag for parking or a key tag set in the IC tag certification machine can be read out and displayed on the display section by operating a certification means provided in the IC tag certification machine, data on entry into the parking area recorded in the IC tag for parking carried and presented by a customer or service point data recorded in the key tag can specifically and visually be checked.

With the means described in (5) above, so-called the selling-on-credit system is employed in which each tenant store writes discount data in a memory of an IC tag for parking using the IC tag certification machine, and when a service for a parking charge or a parking time is provided to a customer, a parking charge settlement machine sums up data of parking services for each tenant store and reports the contents of data summed up as described above to an owner of or a management firm for the parking area with the settlement of the service charge subsequently performed for each tenant store, so that each tenant store is not required to compute or sum up service charges one by one and settlement of accounts receivable can be performed very quickly and accurately. Further, when parking service is provided by using a key tag, each tenant store uses a key tag storing therein data of a service point previously purchased by the tenant store from an owner of or a management firm for the parking area, so that the tenant store is not required to perform settlement of service charges, which reduces a work load to the tenant store, owner of or the management firm for the parking area.

As described above, with each of the means (1) to (5) described above, it is possible to achieve the technological objective described above and also to solve the problems in the conventional technology as described above.

BRIEF DESCRIPTION OF THE INVENTION

Fig. 1 is a general block diagram showing a parking ticket certification system making use of an IC tag according to the present invention;

Fig. 2A is a perspective view showing appearance of an IC tag certification machine and an IC tag for parking used in the present invention;

Fig. 2B is a side cross-sectional view showing the IC tag certification

machine above;

Fig. 3 is a block diagram showing electrical configuration of the IC tag certification machine;

Fig. 4 is a block diagram showing electrical configuration of an IC tag for parking as well as of a key tag;

Fig. 5A shows a data format for a key tag;

Fig. 5B shows a data format for an IC tag for parking;

Fig. 6 is a flow chart showing a processing sequence for checking data written in a key tag;

Fig. 7 is a flow chart showing a processing sequence for checking data written in an IC tag for parking;

Fig. 8 is a flow chart showing a processing sequence for writing data on accounts receivable (service data) in an IC tag for parking; and

Fig. 9 is a flow chart showing a processing sequence for transferring service point data from a key tag to an IC tag for parking.

Description of Signs

- A: Parking ticket issuing machine
- C: Parking charge settlement machine
- 20 P: Parking area
- R: Tenant store
- PX: Owner of or management firm for a parking area
- PT: IC tag for parking
- KT: Key tag
- 25 1: IC tag certification machine

- 1A: Intrusion chamber
- 2: Mount section
- 3: Account-receivable entry switch
- 4: Service point entry switch
- 5 5: Contents check switch
- 6: Display unit
- 9: Read-write module

DETAILED DESCRIPTION OF THE EMBODIMENTS

10 Embodiments of the parking ticket certification system making use of an IC tag according to the present invention is described below with reference to the related drawings. Fig. 1 is a block diagram showing illustrating general concept of the present invention, and in this figure, the sign P indicates a parking area, sign A indicates a parking ticket issuing machine provided at an entrance of the parking area P, the sign C indicates a parking charge settlement machine provided at an exit of the parking area P, the sign R indicates a tenant store contracting with the parking area P, and the sign PX indicates an owner of or a managing firm for the parking area P (described simply as owner hereinafter), and a user B of the parking area receives an IC tag PT with an entry time recorded therein from the parking ticket issuing machine A when the user B enters the parking area.

20 The IC tag PT for parking is a small pierce-like or coin-like tag (Refer to Fig. 2) with an IC chip incorporated therein, and in a case of a user using only the parking area P, the user injects the IC tag PT for parking, when leaving from the parking area P, into the parking charge settlement machine C provided at an exit of the parking area, and then a parking charge is computed from the entry time, and

when the user pay the parking charge, an exit gate (not shown) opens and the user can go out of the parking area. In the present invention, when the user B makes shopping at any tenant store R contracting with this parking area P, the user can receive services for a parking charge or a parking time corresponding to the
 5 amount of money paid by the user B for shopping.

Further, the reference numeral 1 indicates an IC tag certification machine installed at the tenant store R, and service data such as a parking charge or a parking time is written in a memory of an IC tag PT for parking carried and injected by the user B of the parking area into the IC tag certification machine 1, and when
 10 this IC tag PT for parking already certified is injected into the parking charge settlement machine C for going out of the parking area, discounted parking charge corresponding to the service data recorded in the IC tag is computed and displayed, and when the user B pays the charge, the user B can go out of the parking area.

The system for the IC tag certification machine 1 to write service data in the
 15 IC tag PT for parking is classified to the sale-on-credit system in which the IC tag certification machine 1 writes service data in a memory of the injected IC tag PT for parking, and a service point system in which a key tag KT (Refer to Fig. 2) with data of a discounted service point the tenant store R purchases from the owner PX of the parking area recorded therein is set in the above-described IC tag certification
 20 machine 1 as indicated by the line E2 in the figure; each time the IC tag PT for parking is loaded into the IC tag certification machine 1, the discounted service point is transcribed to a memory of the IC tag PT for parking; and the transcribed service point is subtracted from the point data stored in the key tag KT.

In Fig. 1, the sign D indicates a parking area control room installed at the
 25 owner PC of the parking area (a parking area control unit such as a computer), the

sign E indicates a key tag entry machine for writing a parking service point in the key tag KT under control by the parking area control room D according to an instruction therefrom, and further the sign F1 indicates a counting line in which the parking charge settlement machine C processes the service data written in certified
 5 IC tag PT for parking, namely counts accounts receivable provided on sale on credit for parking services for each tenant store R, and sends the data to the parking area control room D, and the parking area control room D requests payment of the counted service parking charges (charges receivable) to the tenant store R through a payment demand line F2 or through a mailing system.

10 Fig. 2A is a perspective view showing the IC tag certification machine 1, while Fig. 2B is a side cross-sectional view showing the same, and in these figures, designated at the is a mount section into which the IC tag PT for parking is inserted, at 9 a write-read module provided along the inner side of the mount section 2, at 3 a sale-on-credit data entry switch, at 4 a service point entry switch, at 5 a contents
 15 check switch, at 3A, 3B, and 3C select switches used to select various preset values for sale-on-credit data, at 6 a display unit, at 7 and 8 lamps for OK and for an error respectively, and at 10 a print board with the switches 3 to 3C, display section 6, and lamps 6, 7 connected thereto.

Further in the figure, designated at the sign 1A is a key tag intrusion
 20 chamber provided along one side face (opposite to the mount section 2) of the read-write module 9 inside the IC tag certification machine 1, at 1A' a cover plate for this intrusion chamber 1A, and when this cover plate 1A' is removed, the key tag KT can removably be set in the intrusion chamber 1A.

Fig. 3 is a block diagram showing electrical configuration of the IC tag
 25 certification machine 1, and in this figure, designated at the reference numeral 20 is

a CPU, at 21 a memory with a system program stored therein, and at 23 an interface connecting the CPU 20 via a bus 22 to the memory 21, and connected to this interface 23 are sale-on-credit data entry switches 3 including the select switches 3A, 3B, and 3C, a service point entry switch 4, contents check switch 5, display unit 6, OK and error lamps 7, 8 and a sound generator 11 respectively, and further the module 9 comprising an encoder 25, a modulator 26, an antenna 27, and a decoder 28 is connected to this interface 23 via a protocol converter 24, and each of the components is driven and controlled by a system program stored in the memory 21 under control by the CPU 20.

Of the switches described above, the sale-on-credit data entry switch 3 including the select switches 3A, 3B, and 3C is used to write sale-on-credit data comprising such data as a tenant store number and discount data in a memory of the IC tag PT for parking mounted on the mount section 2. The service point entry switch 4 is used to transcribe service point data stored in the key tag KT set in the intrusion chamber 1A to a memory of the IC tag PT for parking mounted on the mount section 2. Further the contents check switch 5 is used to display whether an IC tag PT for parking mounted on the mount section 2 or a key tag KT set in the intrusion chamber 1A is a regular one or not or other entered data on the display unit 6 for checking.

Fig. 4 is a block diagram showing electrical configuration of the IC tag PT for parking and the key tag KT illustrated in one figure for convenience, and in this figure, designated at the reference numeral 30 is a central processing unit, at 31 an enciphering block, at 32 a memory, at 33 a power control block, at 34 an antenna used for reading and writing various types of data from and in the IC tag certification machine 1 via the read-write module 9 described above, at 36 a

modulator, and at 37 a decoder, and a memory 32 of the key tag KT has the key tag data format as shown in Fig. 5A, and the memory 32 of the IC tag PT for parking has the parking tag data format including the contents as shown in Fig. 5B.

In the key tag data format shown in Fig.5A, the "data ID" in block No. 2 indicates a type of the key tag KT, and the "service point" and "valid period of the service point" in blocks No. 5 and No. 6 respectively are used in the service point system. In the data parking tag data format shown in Fig. 5B, the "valid block" in block No. 5 is used when a read or write operation is performed quickly by specifying any block to be used among the blocks No. 1 to No. 18; the "data ID" in block No. 6 indicates a type of the IC tag PT for parking; and the "parking area No." in block No. 7 shows a No. 5 of the parking area which can be used. Further the "sale-on-credit store No." and "service store No." in blocks No. 13 and No. 14 are used, when a customer receives parking services at a plurality of tenant stores, to store the sale-on-credit data and service point data for each tenant store, and the "accumulated time" and "exit time" in blocks No. 15 and No. 16 are used in the "central pay system" in which the parking charge settlement machine C is installed at a place other than the exit of the parking area and the settlement of a parking charge is performed at the machine.

The parking ticket certification system making use of the IC tag according to the present invention has the configuration as described above, and operations thereof are described below with reference to the flow charts shown in Fig. 6 through Fig. 9. Fig. 6 shows a processing sequence of checking data stored in the memory 32 of the key tag KT, and when the key tag KT purchased from the owner PX of the parking area is inserted into the intrusion chamber 1A of the IC tag certification machine 1 in step S1 and then the contents check switch 5 is turned

ON in step S2, the operations from step S3 to step S12 are executed, and especially in step S7 and step S9, a remaining point number of a valid period for the service point can be displayed on the display unit 6 respectively.

Fig. 7 shows a processing sequence of checking data stored in the memory 32 of the IC tag PT for parking, and when the IC tag PT for parking received by a user upon entrance to the parking area with the entrance time data recorded therein is mounted on the mount section 2 of the IC tag certification machine 1 in step S20 and then the contents check switch 5 is turned ON in step S21, the operations in step S22 to step S29 are executed, and especially in step S24 and step S26, the entrance time data and sale-on-credit data are displayed on the display unit 6 respectively.

Fig. 8 shows a processing sequence of mounting the IC tag PT for parking on the mount section 2 of the IC tag certification machine 1 for entering sale-on-data (service data) thereto, and when the IC tag PT for parking is mounted (inserted) onto the mount section 2 as described above in step S30, the sale-on-credit data entry switch 3 is turned ON and at the same time any of the select switches 3A to 3C is selected and turned ON according to a purchased amount or any other factor in step S31, operations from step S32 to step S40 are executed, and especially in step S35, sale-on-credit data (service data) corresponding to the selected one among the select switches 3A to 3C is entered to a memory of the IC tag PT for parking.

Fig. 9 shows a processing sequence of mounting the IC tag PT for parking onto the mount section 2 of the IC tag certification machine 1 to transcribe the service point data from the key tag KT inserted into the intrusion chamber 1A of the IC tag certification machine 1 to a memory of the IC tag PT for parking, and when

the IC tag PT for parking is mounted on the mount section 2 in step S41 and the service point entry switch 4 is turned ON in step S42, operations from step S43 to step S54 are executed, and especially in step S46, the service point data is transcribed into a memory of the IC tag PT for parking, and further in step S48, the
5 transcribed service point is subtracted from the data stored in a memory of the key tag KT.

The flow chart described above assumes a case where certification is performed once at one tenant store R, namely a case where entry of sale-on-credit data or transcription of service point is performed once at one tenant store R, but as
10 a memory of the IC tag PT for parking has a large capacity, it is possible to perform entry and transcription of sale-on-credit data or a service point two or more time for making the discount ratio larger, and further it is also possible to additionally enter or transcribe sale-on-credit data and a service point at another tenant store R into the IC tag PT for parking with sale-on-credit data or a service point at a tenant store
15 R having been transcribed or entered.

EFFECTS OF THE INVENTION

As described above, with the parking ticket certification system making use of an IC tag according to the present invention, it is possible to enter and transcribe
20 sale-on-credit data or a service point in the IC tag as a parking ticket in a non-contact mode, and further as an IC tag making it possible to process a large volume of data is used, sufficient services can be provided to customers, and convenience and economical feature enabling recycled use of parking tickets are provided. Further the sale-on-credit data (service data) written in the IC tag for
25 parking is reported by the parking charge settlement machine in batch for each

tenant store to an owner of or a management firm for the parking area, and a key tag purchased from the owner of or management firm for the parking area is used for transcription of a service point, so that the settlement of parking charge between each tenant store and the owner of or management firm for the parking area can easily and accurately be performed, and thus the parking ticket certification system according to the present invention is well adapted to a case where parking services for a parking charge or a parking time are provided to customers of tenant stores contracting with a parking area.

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WHAT IS CLAIMED IS:

1. A parking ticket certification system capable of recording service data to discount a parking charge or a parking time for a parking ticket owned by a user of a parking area comprising:

an IC tag for parking with such data as entry time recorded therein; and

an IC tag certification machine for recording service data to discount a parking charge or a parking time for the IC tag for parking in a non-contact mode, wherein the IC tag for parking has a small piece-like or a coin-like form and comprises a CPU, a memory, and a signal receiver/transmitter for receiving and transmitting data when actuated by electromagnetic induction from the outside; and the IC tag certification machine comprises a mount section for mounting the IC tag for parking thereon, an entry instruction section for instructing entry of service data, and a data communication section for executing data communication in a non-contact mode with the signal receiver/transmitter in the mounted IC tag for parking and writing service data in a memory of the IC tag for parking according to an instruction from the entry instruction section.

2. The parking ticket certification system making use of an IC tag of claim 1, wherein the IC tag certification machine comprises a memory with service data to discount a parking charge or a parking time stored therein and one or more discount entry instruction sections, necessary discount data is selected from the service data stored in the memory according to an instruction from the discount entry instruction section, and the discount data is written in a memory of the IC tag for parking mounted on the mount section.

3. The parking ticket certification system making use of an IC tag of claim 1, wherein a key tag with service point data to discount a parking charge or a parking time is dismountably mounted on the IC tag certification machine, the service point data recorded in the key tag is transcribed in a memory of the IC tag for parking mounted on the mount section according to an instruction from a service point entry instruction section provided in the IC tag certification system, and a point corresponding to the transcribed service point is subtracted from the point stored in the key tag.

4. The parking ticket certification system making use of an IC tag according to any of Claims 1, 2, and 3, wherein the IC tag certification machine further comprises a tag data check means capable of reading out data recorded in a mounted IC tag for parking or in an IC memory of the key tag set in an IC tag certification machine and displaying the data in the display section.

5. The parking ticket certification system making use of an IC tag according to any of Claims 1, 2, 3, and 4, wherein, when an IC tag for parking with discount data or a service point written or transcribed in a memory thereof is inserted into a charge settlement machine, the parking charge settlement machine performs a charge settlement service corresponding to the discount data or the service point and allows the vehicle to leave the parking area; further the parking charge settlement machine sums up the charge receivable discounted according to the discount data as well as discount data for each tenant having finished the data entry processing and reports the sum data to an owner or a manager of the parking area;

and the key tag with the service point written in a memory thereof is previously purchased from an owner or a manager of the parking area and used by setting in the IC tag certification machine.

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PARKING TICKET CERTIFICATION SYSTEM MAKING USE OF AN IC TAG

ABSTRACT OF THE DISCLOSURE

The present invention provides a parking ticket certification system making use of an IC tag having a solid structure, capable of being used repeatedly, and contrived so that services for a parking charge or a parking time can accurately be provided to customers under stable conditions by using a parking ticket making it possible to quickly and accurately read and write various types of service data therefrom and therein in a non-contact mode and also contrived so that settlement of service charges (sale-on-credit charges) paid by each tenant store having provided the parking service to an owner of or a management firm for the parking area can easily and accurately be performed. This system comprises an IC tag for parking received by users when entering the parking area, and an IC tag certification machine for recording service data for discounting a parking charge or a parking time in this tag in a non-contact mode, and the IC tag certification machine has a data communication section for writing service data in an IC tag for parking mounted on the mount section in response to a switch operation.

Fig. 2