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(54) **METHOD AND SYSTEM FOR ORDERING, LOADING AND USING ACCESS TICKETS**

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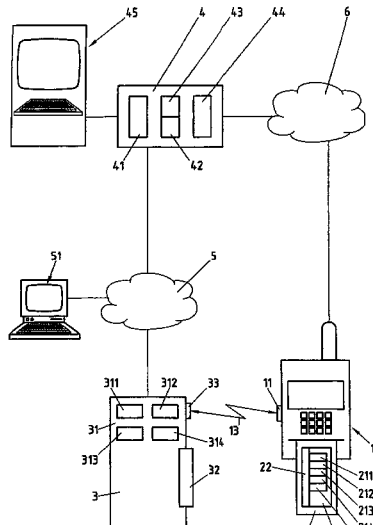
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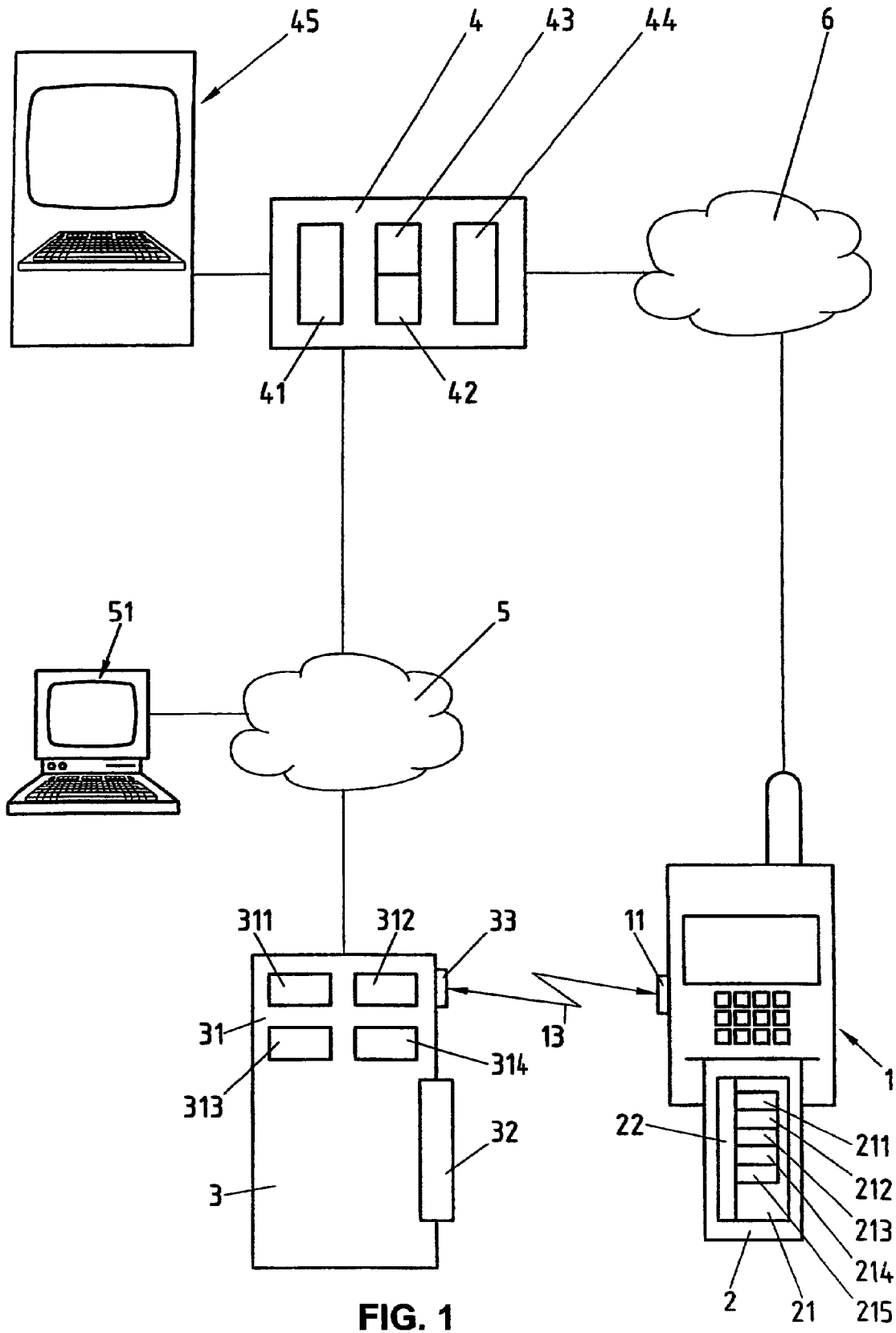
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(57) **ABSTRACT**

A method and system for ordering, loading, and using admission tickets for access to access-controlled service devices, in which admission tickets are ordered from a reservation center through transmission of order data by an order channel. The order data includes the call number of a mobile communications terminal to which the ordered admission tickets are transmitted by a mobile network and are stored there in a memory module. The data exchange between this memory module and a reading device of the service device takes place over a contactless interface. Decisions about the access authorization of the user of the communications terminal are made, for example, in the reading device or in the communications terminal, taking into account the ticket information contained in the admission ticket, for example, limited to a digitally signed ticket number or with indications about the respective service device. And, in accordance with the decision, access to the service device is given or denied to the user through an access device connected to the reading device.

**21 Claims, 1 Drawing Sheet**





## METHOD AND SYSTEM FOR ORDERING, LOADING AND USING ACCESS TICKETS

This invention relates to a method and a system for ordering, loading and using admission tickets for access to access-controlled service devices.

In generally known methods and systems for ordering admission tickets, the order is carried out by means of telephone call, through a mobile or fixed-installed telephone apparatus, to a reservation center, which informs the interested customer, for example by means of spoken menu presentation, about events and/or performances, and receives reservations, or respectively orders, of admission tickets from the customer via the dialing keys of his telephone apparatus. The reservations and orders are typically stored in a database and forwarded to a respective organizer, for example, who prepares the desired admission tickets for the customer to collect, or the desired admission tickets are sent to the customer directly by mail, it being possible for the billing to take place by dispatched invoice, by cash payment upon collection, or by telephone bill. Drawbacks of such methods and systems are, for example, that considerable time passes between the ordering and the handing over of the admission tickets to the customer or that it is not always ensured that admission tickets ordered are also collected.

For automated access control of access-controlled service devices, such as, for example, means of public transportation, secured buildings, halls or exhibition grounds, systems and methods are known in which reading devices are typically used that are able to read the admission tickets and which are connected to access devices that automatically open doors or barriers on the basis of the information read in the admission tickets and clear entry to respective access-controlled devices. In particular in the case of secured buildings or places of employment where the recording of working time is linked to the access control, use of personal chipcards is known which serve the authentication of persons and the automatic access control connected therewith. In general, such personal chipcards are designed in a targeted way only for this special application and, as a rule, the data, relating to persons and application specific, is only seldom changed.

Described in the patent publication DE 43 01 039 C2 is a system for administration of jointly used motor vehicles which system combines the telephone reservation described above and the access control with a personal chipcard. In the system according to DE 43 01 039 C2, the customer clarifies the reservation by telephone with a center. A computer with a reservation program transmits customer reservation data, in accordance with the reservation made, by means of a modem via the telephone network and from a fixed station with a wireless telephone to a vehicle, where they are able to be stored. The customer is equipped with a chipcard on which his customer number and an encrypted code is stored. The chipcard is inserted into a portable infrared hand apparatus that is able to communicate with a board computer. The access authorization is established through the exchange and the encryption of random numbers and, if applicable, the vehicle door opened. Inside the vehicle, the chipcard is inserted into a card reader and the authorization to drive is checked on the basis of the stored reservation data. The chipcard used as admission ticket in the system according to DE 43 01 039 C2 is designed in such a way, however, that it can only be used as an admission ticket in a targeted way for this application.

be loaded on a chipcard by the customer at a sales terminal which has data input and data display means in exchange for electronic payment from the chipcard. According to EP 713 198 A2, the data exchange between the sales terminal and the chipcard can take place through a contactless interface or an interface having contacts. In the ticket sale system according to EP 713 198 A2, a plurality of sales terminals can be connected through communications links, in particular the telephone network, to one or more ticket sale centers, which ticket sale centers transmit the requested tickets to the sales terminal from which the tickets have been requested.

Described in the patent application WO 98/58510 is a mobile radio telephone with a removable SIM card (Subscriber Identification Module), that has at least one wireless interface, for example an inductive interface or an infrared interface, via which the SIM card is able to exchange data with an external device without using a mobile telephone network. According to WO 98/58510, the external device can be an access-control device which releases the access to a protected zone in exchange for receipt of an electronic key stored on the SIM card.

Described in the patent application WO 99/09502 is an electronic commerce system in which it is possible to order electronic tickets from a service providing system by means of a mobile radio telephone over a mobile radio network. According to WO 99/09502, the user identification of the ordering user is transmitted in the ticket order by the mobile radio telephone to the service providing system. According to WO 99/09502, the ticket order is passed on by the service providing system to a ticket issuing system, the user identification in the service providing system being replaced by a customer number of the respective user. According to WO 99/09502, the ordered ticket is subsequently transmitted by the ticket issuing system via the service providing system to the mobile radio telephone, from which the ticket order was placed, and is stored there, for example on a chipcard. According to WO 99/09502, the stored tickets can be used as admission tickets for admission to access-controlled service devices, for example in a cinema, the tickets being transmitted to the service device, for example via a contactless interface.

It is an object of the present invention to propose a new method and a new system for ordering, loading and using admission tickets for access to access-controlled service devices which in particular are able to be used in a flexible way for the most various access-controlled service devices.

According to the present invention, this object is achieved through the features of the independent claims. Further advantageous embodiments follow moreover from the dependent claims and from the description.

In particular this object is achieved through the invention in that admission tickets for access to access-controlled service devices, such as, for example, means of public transportation, secured buildings, halls or exhibition grounds, are ordered from a reservation center, through transmission of order data via an order channel, of various possible order channels, to this reservation center, the order data containing the call number of a mobile telecommunications terminal, the mobile telecommunications terminal being, for example, a mobile radio telephone or a laptop or palmtop computer with suitable communications module for mobile networks, ordered admission tickets being transmitted via a mobile network, for instance a GSM or UMTS network, to the communications terminal, to which the said call number is assigned, received admission tickets being

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said communications terminal, data being exchanged between the memory module and a reading device of a said service device via a contactless interface, for example an infrared interface, for instance a High Speed Infrared (HSIR) interface or an IrDA (Infrared Data Association) interface, an inductive interface, e.g. a Radio Frequency Identification (RFID) interface, a home RF (Radio Frequency) interface, a Digital European Cordless Telecommunications (DECT) interface or another Cordless Telecommunications System (CTS) interface or a high frequency radio interface, for instance a so-called "Bluetooth interface," decisions about access authorization for the user of the said communications terminal being made taking into account ticket information contained in said admission tickets, and, in accordance with the decision made, access for the user to the respective service device being granted or denied through an access device connected to the said reading device. The advantage of this procedure is that admission tickets for the most various access-controlled service devices can be ordered over the most various order channels, for example in writing, by telephone with a fixed-installed telephone, with the said mobile communications terminal, by means of a dedicated input terminal, or by means of a personal communications terminal, for example via the Internet, and, independently of the order channel used and of the orderer, the ordered admission ticket is loaded in a memory module of the mobile communications terminal to which the specified call number is assigned, by means of which mobile terminal the respective user can visit a respective access-controlled service device without further effort and without time delay.

In an embodiment variant, admission tickets each contain a ticket number that is provided with a digital signature. An admission ticket stored in the memory module is transmitted to the said reading device. Access data are transmitted from the said reservation center to the said reading device, and the decision about access authorization is made taking into consideration these access data and by checking the said signature. This embodiment variant is advantageous if the data structure of the admission ticket is supposed to be kept simple and if the activities for the processing of the admission ticket are supposed to be moved into the reading device of the service device. The disadvantage consists at most in that the reading device of the service device has to be supplied with current data by the reservation center, so a communication link is necessary between the reading device of the service device and the reservation center.

In an alternative embodiment variant, the admission tickets contain ticket information about at least one access-controlled service device, for example the identity of a theater or a sports stadium, the date of a performance, or respectively of a sports event; the decision about access authorization is made taking into consideration this ticket information, and in the case of a positive decision the admission ticket stored in the memory module is marked as used. The advantage of this variant consists in that access-controlled service devices do not have to be updated with current data, and therefore can be set up autonomously without communication link.

In a first sub-variant of the last-mentioned embodiment variant, ticket information is transmitted to the said reading device, and the decision about access authorization for the respective user is made in this reading device. In a second sub-variant of the last-mentioned embodiment variant, the reading device transmits a clear device identification to the respective communications terminal; the decision about

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tion the said device identification, and the result of this decision is transmitted to the said reading device. The second sub-variant is advantageous above all when the reading device of the access-controlled service device is supposed to be designed as simple as possible, in particular without networking of the reading device.

In an embodiment variant, at least certain admission tickets are assigned to a particular user, and with the decision about access authorization it is checked whether a respective certain admission ticket is assigned to the user, who is identified through a user identification in the memory module.

In an embodiment variant, the reading device transmits a digitally signed, unambiguous device identification to the communications terminal, and the reading device is authenticated in the communications terminal on the basis of this device identification before data stored in the memory module are transmitted to the reading device. This has the particular advantage that admission tickets are not received, or respectively marked as used, by unauthorized reading devices.

In an embodiment variant, following a positive authentication of the reading device, a user identification stored in the memory module is transmitted with a digital signature to the reading device, and the reading device authenticates the user of the said communications terminal on the basis of this user identification.

In an embodiment variant, following a positive decision by the reading device, an access confirmation is transmitted to the said memory module regarding successful admission. This has the advantage that the respective user is able to prove at a later point in time the access to the respective service device on the basis of this admission confirmation.

In an embodiment variant, the said contactless interface is supplied with energy by the said reading device, for example by means of induction. This has the particular advantage that an exchange of data between the memory module and the reading device can take place even with turned-off communications terminal.

In addition to the method according to the invention, the invention also relates to a suitable system for execution of this method.

An embodiment of the present invention will be described in the following on the basis of an example. The example of the embodiment is illustrated by the single, attached FIGURE, which

shows a schematic block diagram that presents a communications terminal which is connected via a mobile network to a reservation center and is able to communicate with the reading device of an access-controlled service device via a contactless interface.

An interested customer is able to order admission tickets for the most various access-controlled service devices **3**, such as, for example, public transportation means, performing arts buildings (e.g. theaters or opera houses), performance halls (e.g. cinemas or concert halls) or premises for events (e.g. trade fair premises or sports premises) through transmission of order data over the most various order channels. The reference number **45** relates to an input terminal which is connected to a reservation center **4** via a communications link. Such an input terminal **45** could be set up at places accessible to the public, for instance in public telephone booths (public phones), at shopping centers, in railway stations or in other publicly accessible places that are frequented by many people, and can be used by inter-

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relates to a personal communications terminal, for example a personal computer with communications modules which is connected to the reservation center **4** via a telecommunications network **5**, for example the public switched telephone network or the Internet, and is able to be used by interested customers to order admission tickets from the reservation center **4**. Mentioned here as further possibilities for order channels should be personal verbal ordering at a counter or ticket window of the operator of the reservation center **4** or a special marketing organization, telephone calls with verbal ordering or ordering with spoken menu presentation or with speech recognition or also by written order or ordering by means of a mobile communications terminal **1** via a mobile network **6** (for instance verbally or by means of SMS or USSD messages), in the case of the verbal and written variants subsequent data entry by data typists of the reservation center **4** being possibly necessary. The order data transmitted by the interested user to the reservation center **4** comprise, for instance, indications about a specific event, for example a theatre premiere at the city theater on the 13<sup>th</sup> of May at 8 p.m., indications about the desired seating row or, if applicable, the transportation class, the number of tickets desired, indications about the type of ticket, for instance tickets in a person's name, multiple tickets (subscriptions, day passes, weekly passes, etc.) or transferable tickets, indications about mode of payment, for instance through written invoice by mail, by credit card with indication of the credit card number, billing by way of the telephone bill or, if applicable, by cash payment, etc. Indicated in addition in the order data with each order is the call number of (at least) one mobile communications terminal, for example the MSISDN number (Mobile Subscriber ISDN number), on which the ordered admission tickets are supposed to be loaded.

The transmitted order data are received in the reservation center **4** by an order module **41**, and are stored in a database of the reservation center **4**. The reservation center **4** is implemented, for example, on a conventional communications server which has at its disposal hardware and software components to connect with mobile networks **6** and fixed networks **5** and to communicate over them. The reservation center **4** has at its disposal function modules, for example the already mentioned order module **41** or further function modules that are described in the following paragraphs and which are implemented, for instance, as programmed software. In accordance with the obtained order data, a transmission module **44** of the reservation center **4** transmits admission tickets over the mobile network **6**, for example a GSM (Global System for Mobile Communication), a UMTS network (Universal Mobile Telephone System) or another mobile network, to the mobile communications terminal **1** specified through the above-mentioned call number, for instance a mobile radio telephone or a laptop or palmtop computer with suitable communications module for mobile networks **6**.

The transmission of admission tickets by the reservation center **4** to communications terminals **1** takes place, for example, according to the SICAP method described in the patent document EP 0 689 368 B1, the reservation center **4** having at its disposal a short message service center (SMSC) for this purpose, for example. According to the SICAP method, transmitted in addition to the standard header in so-called SMS short messages are special codes which indicate a special service and are recognized in the identification modules of mobile communications terminals, for

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procedure. The transmission can also take place in another way, for instance by means of USSD messages (Unstructured Supplementary Services Data) or via a data link.

The transmitted admission tickets are received in the respective mobile communications terminal **1**, and are stored there, by a loading module **211**, in a memory module **21**, for instance on an SIM card (Subscriber Identification Module) of the mobile communications terminal **1**. The loading module **211** is, for example, a special procedure activated according to the SICAP method, as mentioned above, which is implemented for instance as a programmed software module on the identification module of the mobile communications terminal **1**, which is, e.g. a chipcard **2**, in particular a SIM card **2** with a processor **22** and a memory module **21**.

Depending upon the embodiment variant and/or application, admission tickets each contain a ticket number that is provided with a digital signature, for example, or they contain ticket information about at least one access-controlled service device **3**, for instance the identity of a theater or a sports stadium and the date of a performance, or respectively a sporting event, and, if applicable, further additional information, such as a reserved seating row or seat number, or, particularly for multiple tickets, a duration of validity or period of validity as well as a number of authorized admissions, if applicable. A respective customer is preferably able to check (in particular) the detailed marking of an admission ticket on the display of his mobile communications terminal **1**, as if he had a physical admission ticket. Admission tickets can be loaded, for example, in the form of small program applications, so-called applets, on chipcards **2**, which are able to handle such applets, for instance a so-called Java card (Java is a registered trademark of SUN Microsystems). Such applets, for example, can be automatically erased during marking as used, which will be described later.

The user of a mobile communications terminal **1** approaches, with his mobile communications terminal **1**, a reading device **31** of an access-controlled service device **3**, for which he has an admission ticket stored in a memory module **21** of the mobile communications terminal **1**. Described in the following paragraphs will be different embodiment variants for the process during the ticket check between the mobile communications terminal **1** and the reading device **31** of the access-controlled service device which all have in common the exchange of data via a contactless interface **13** between the mobile communications terminal **1** and the reading device **31**, for which the reading device **31** and the mobile communications terminal **1** are designed with suitable transceivers **33**, respectively **11**. These receivers **11**, **33** are suited, for example, for an infrared interface, for example a High Speed Infrared (HSIR) interface or an IrDA (Infrared Data Association) interface, an inductive interface, for instance a Radio Frequency Identification (RFID) interface or a Home RF (Radio Frequency) interface, the inductive interface operating, for example, with a frequency situated at 13.56 MHz, a Digital European Cordless Telecommunications (DECT) interface or another Cordless Telecommunications System (CTS) interface, or a high frequency radio interface, for example a so-called "Bluetooth interface." Depending upon the type of contactless interface, the suitable transceiver in the mobile communications terminal **1** can be integrated in the housing or on the identification module **2** of the communications terminal **1**. For the data exchange with the reading device **31**

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