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System comprising a computer and a number of portable terminals for a smart card, as well as a terminal to be used in this system

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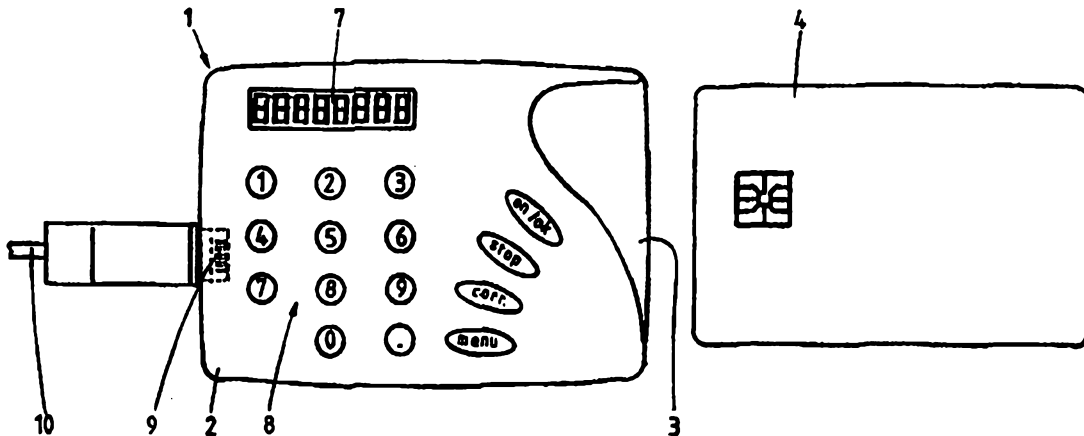
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(54) Title: SYSTEM COMPRISING A COMPUTER AND A NUMBER OF PORTABLE TERMINALS FOR A SMART CARD, AS WELL AS A TERMINAL TO BE USED IN THIS SYSTEM



(57) Abstract

A system comprises a computer and at least one portable terminal for a smart card. The terminal is provided with a housing having an insert slot for a smart card, a microprocessor, a memory, a display, a keypad, and a connector for a connecting line for connecting the terminal to the computer. Each terminal comprises means for establishing a connection with the computer via the connecting line, and the computer comprises means for communication with the smart card in the terminal.

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WO-A-95/30975 discloses a system of the above-mentioned type, wherein instead of a connector for a connecting line the terminal is provided with means for providing acoustical signals. In this manner the terminal can communicate with the computer via a standard telephone terminal.

A brochure "cartulette", CNET-IMP-91/7133, SEPT 1991, discloses a system with portable terminals having a connector for a connecting line for connecting the terminal to a computer, minitel terminal or the like.



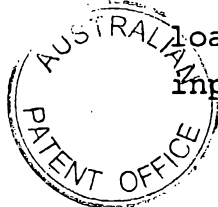
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In order to accomplish that objective the invention provides a system of the above-mentioned kind, wherein the microprocessor of each terminal has been programmed to establish a connection with the computer via the connecting
5 line upon receipt of a command provided via the keypad and wherein the computer has been programmed to control the further communication with the smart card inserted in the terminal as soon as the connection has been established.

The invention furthermore provides a portable
10 terminal for such a system, which comprises a housing having an insert slot for a smart card, a microprocessor, a memory, a display, a keypad, and a connector for a connecting line for connecting the terminal to a computer either directly or via a telephone connection, wherein said terminal has been
15 programmed to establish a connection with the computer via said connecting line upon receipt of a command via the keypad.

Since the terminal only establishes the connection with the computer with the system and the terminal according
20 to the invention, whilst the control programme for the communication with the smart card is stored in the computer, a simple adaptation to a new function of the smart card or to a new type of smart card can be made by means of a modification of said control programme. With the system
25 according to the invention the existing terminals, which are widely spread among users, need not be replaced in case of a modification or a change of the type of smart card.

According to one preferred embodiment the microprocessor is arranged for loading an amount into the
30 smart card, wherein the loading of an amount is started by inputting a load command via the keypad, wherein the microprocessor first asks for a PIN code to be input upon receiving a load command, after which the input PIN code is verified by the smart card, and if the PIN code has been
35 found correct, the microprocessor asks what amount is to be loaded, wherein the microprocessor, once the amount has been input, establishes a telephone connection with the computer.



via the connecting line, and wherein the loading of the amount takes place under the control of the computer. To a



limited extent the terminal has an independent function in this loading operation, which extends to the verification of the PIN code and the inputting of a desired amount. All other actions take place under the control of the communication means of the computer.

According to another preferred embodiment the terminal may also function as a card reader, because the terminal comprises means for functioning as a card reader, which card reader means are activated by inputting a card reader command via the keypad, wherein the card reader means verify if there is a connection with a communication port of a computer upon receiving a card reader command, whereby the communication between the smart card and the computer takes place under the control of the communication means of the computer if such a connection indeed exists. In that case the terminal only needs to verify whether there is a connection with a communication port of a computer. All further actions take place under the control of the communication means of the computer.

The invention will be explained in more detail with reference to the drawing, which schematically shows embodiments of the system and the terminal according to the invention.

Fig. 1 is a plan view of an embodiment of the terminal according to the invention.

Fig. 2 is a diagrammatic sectional view of the terminal of Figure. 1.

Fig. 3 is a strongly simplified block diagram of an embodiment of the system according to the invention.

Figs. 1 and 2 show a portable terminal 1, which comprises a housing 2 having a insert slot 3 for a smart card 4 (shown outside housing 2) comprising a pay function, which is known by the name "chipknip" in the Netherlands. Terminal 1 furthermore comprises a microprocessor 5 (diagrammatically indicated in Fig. 3), a memory 6, a display 7 and a keypad 8, which comprises the usual numeric keys and four function keys in the illustrated embodiment. Terminal 1

finally comprises a connector 9 for a connecting line 10 (partially shown in the drawing), by means of which terminal 1 or microprocessor 5 can be connected to a computer 11 (only very diagrammatically indicated in Fig. 3).

5 As is apparent from Figs. 1 and 2, housing 2 is made in the shape of a flat, substantially rectangular box, whose area approximately corresponds with the area of smart card 4. Insert slot 3 is positioned in the right-hand short side (seen in Fig. 1) of the housing and connects to a space
10 12, which extends over at least substantially the entire area of housing 2. This makes it possible to use terminal 1 also as a storage unit for the smart card. Its small dimensions make it easy for the user to take along terminal 1, and this feature and the availability of a suitable
15 battery supply enable him to use it at any desired moment and location.

 When smart card 4 is completely inserted into housing 2, the contact surfaces of the smart card which are shown in Fig. 1 make contact with a smart card connector
20 (not shown), which is mounted inside housing 2. Microprocessor 5 then verifies whether smart card 4 comprises a pay function, that is, whether it is a "chipknip". If smart card 4 does not comprise a pay function, microprocessor 5 will verify whether smart card 4
25 is authorized for telebanking functions. If the inserted smart card 4 is not a "chipknip" and is not authorized for telebanking either, microprocessor 5 will automatically have terminal 1 function as a card reader in the present embodiment, which function will be described in more detail
30 yet hereafter.

 If smart card 4 is a "chipknip", the balance and the last five mutations of the balance can be displayed on display 7 by operating the function keys on keypad 8. Furthermore the user can block the "chipknip", if desired,
35 so that third parties cannot make payments with the "chipknip" any more. The rightful user can unblock smart

card 4 by inputting his or her PIN code, so that payments can be made again.

An important function of the described terminal 1 is the loading of an amount to the smart card 4 inserted in housing 2. This function can also be selected via one of the function keys. This function can only be performed if a telephone connection with a bank computer is established. The user will first have to connect a telephone connecting line 10 comprising a standard telephone connector to connector 9, therefore.

When the loading function is selected, this means in fact that a loading command is given to microprocessor 5 via keypad 8, whereupon the microprocessor asks the user, via a suitable message on display 7, to input the PIN code. As usual the PIN code is a four-digit number, which can be input via keypad 8. Smart card 4 verifies the PIN code, and if this is found to be correct microprocessor 5 asks the user, via a message on display 7, to input a desired amount. Microprocessor 5 compares the amount which has been input via keypad 8 with a maximum value and with a minimum value. The minimum value is an amount of for example Hfl. 25. The maximum amount is determined on the basis of the maximum amount allowed for the smart card 4 in question and the balance on the smart card. If the desired amount does not fall within the allowed range of values, microprocessor 5 will display an error message on display 7. If the desired amount does fall within the allowed range of maximum and minimum amounts, microprocessor 5 will activate means for establishing a connection with a computer of a bank. Microprocessor 5 functions as a modem thereby, for example in accordance with modem standard V21, and dials a telephone number which is stored in memory 6. If microprocessor 5 does not receive a dialling tone, it will display the message **NO DIALLING TONE** on display 7. If microprocessor 5 does receive a dialling tone, it will dial the number stored in memory 6. If the microprocessor does not receive a response from computer 11, it will break the connection and report on

display 7 that it was not possible to establish a connection. If desired it is possible to store a second and possibly more telephone numbers in memory 6, which will be dialled after the first number if it appears to be impossible to establish a connection with the first telephone number.

As soon as microprocessor 5 receives a response from computer 11, the loading of the desired amount to smart card 4 is completed under the control of the means for communication with the smart card present in computer 11. Said means comprise a control program suitable for the smart card 4 in question, which program deals with the further communication with smart card 4. After the connection has been established, terminal 1 is present in a fully transparent manner between smart card 4 and computer 11, as it were. A significant advantage of this is the fact that when new functions are allocated to smart card 4, only the control program in computer 11 needs to be adapted, whereas the program of microprocessor 5 does not require any modifications. Furthermore new types of smart cards are capable of co-operating with terminal 1, because also in this case it is only necessary to modify the existing control programs or to install new control programs in computer 11.

The microprocessor will display several messages on display 7 while the amount is being loaded, so that the user can determine whether terminal 1 is functioning correctly. Once the loading operation has been successfully completed, microprocessor 5 will display the message **COMPLETED**.

Another important function of the above-described terminal 1 is the so-called card reader function. As already noted before, microprocessor 5 can select this function automatically if a smart card 4 not comprising a paying function or a telebanking function is inserted into terminal 1. Furthermore it is possible to select this function via the function keys of keypad 8.

If terminal 1 functions as a card reader, the user will of course have to connect a connecting line 10 to connector 9, which is at the other end connected to the parallel port of a computer 11. Microprocessor 5 verifies whether such a connection exists, and if this is not the case, it will display an error message on display 7. If a connection with a parallel port of a computer does exist, the communication between computer 11 and smart card 4 is also in this case fully controlled by the control programs provided in computer 11 for this purpose. Computer 11 may first determine what type of smart card 4 is present in terminal 1, by supplying a reset command to smart card 4. Computer 11 is capable of determining the type of smart card on the basis of the response from smart card 4, and select a corresponding communication protocol for the further communication from the available control programs. Also in this case terminal 1 has the advantage of being present in a fully transparent manner between smart card 4 and computer 11.

Another advantage of using the above-described terminal 1 as a card reader is the fact that the PIN code, which must normally be input via the keyboard of the computer, can be input via keypad 8 of terminal 1 in order to gain access to computer 11. Computer 11 sends a PIN verification command to terminal 1, whereby microprocessor 5 detects the receipt of said verification command. Microprocessor 5 then asks the user, via display 7, to input the PIN code, after which verification of the PIN code by smart card 4 will take place. Then microprocessor 5 sends the result of this PIN code verification to computer 11 via connecting line 10. This makes it impossible to tap the PIN code from connecting line 10, from computer 11 or from the network of which computer 11 forms part.

When a smart card 4 comprising a telebanking function is inserted, the above-described terminal 1 may furthermore be used for identifying the user. As a result of this measure it is no longer necessary to use separate

apparatus for the identification function, as has been usual so far. The identification function of terminal 1 can be selected via the function keys of keypad 8. Usually a number is displayed on the screen of a computer user for
5 telebanking, which number must be input on keypad 8 of terminal 1. This number is supplied to smart card 4 by microprocessor 5, which generates a reply code in response to this number, which code is shown on display 7. Said reply code can then be input via the keyboard of the computer. It
10 is also possible, of course, to use the identification code when telebanking via a telephone connection or via the Internet.

Alternatively it is also possible to have terminal 1 establish a direct telephone connection with the bank
15 computer via connecting line 10, and have the identification function carried out automatically, for example after the PIN code has been input.

It is noted that if a connection between terminal 1 and bank computer 11 exists, the bank computer may also
20 write one or more new telephone numbers into memory 6, which numbers must be used when carrying out a next loading function. The bank computer 11 may also display certain messages for the user on display 7 of terminal 1, if necessary.

25 Furthermore it is noted that terminal 1 may also be arranged such that a connection can be selectively established with one of a series of different computers 11, depending on the type of transaction a user wishes to make.

The invention is not limited to the above-described
30 embodiment, which can be varied in several ways within the scope of the claims.

CLAIMS

1. A system comprising a computer (11) and at least one portable terminal (1) for a smart card (4), which terminal is provided with a housing (2) having an insert slot (3) for a smart card, a microprocessor (5), a memory (6), a display (7), a keypad (8), and a connector (9) for a connecting line (10) for connecting the terminal to the computer, wherein the microprocessor (5) of each terminal (1) has been programmed to establish a connection with the computer via the connecting line upon receipt of a command provided via the keypad (8) and wherein the computer (11) has been programmed to control the further communication with the smart card inserted in the terminal as soon as the connection has been established.

2. A system according to claim 1, wherein the microprocessor (5) is arranged for loading an amount into the smart card (4), wherein the loading of an amount is started by inputting a load command via the keypad (8), wherein the microprocessor (5) first asks for a PIN code to be input upon receiving a load command, after which the input PIN code is verified by the smart card (4), and if the PIN code has been found correct, the microprocessor asks what amount is to be loaded, wherein the microprocessor, once the amount has been input, establishes a telephone connection with the computer (11) via the connecting line (10), and wherein the loading of the amount takes place under the control of the computer (11).

3. A system according to claim 2, wherein the microprocessor (5) compares the input amount with a maximum value and with a minimum value, wherein the microprocessor will only establish a connection if the input amount falls within said range of values, wherein the microprocessor will display an error message if the desired amount does not fall within said range of values.



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4. A system according to claim 2 or 3, wherein the microprocessor (5) signals the successful loading of the desired amount on the display (7).

5 5. A system according to claim 2, 3 or 4, wherein at least one telephone number is stored in the memory (6) of the terminal (1), which number is used by the terminal to establish a connection, wherein the computer (11) comprises means for storing a new telephone number in the memory (6) of the terminal once a connection with the terminal has been
10 established.

6. A system according to any one of the preceding claims, wherein the terminal (1) comprises means (5) for functioning as a card reader, which card reader means (5) are activated by inputting a card reader command on the
15 keypad (8), wherein the card reader means verify if there is a connection with a communication port of a computer (11) upon receiving a card reader command, wherein the communication between the smart card (4) and the computer takes place under the control of the computer (11) if such a
20 connection indeed exists.

7. A system according to claim 6, wherein the computer (11) comprises various communication protocols for various types of smart cards (4), wherein the computer (11) is arranged for determining the type of smart card and the
25 computer selects the corresponding communication protocol.

8. A system according to claim 6 or 7, wherein the computer (11) for verifying the smart card (4) sends a PIN verification command to the terminal (1), wherein the terminal microprocessor (5) displays a PIN input request
30 upon receipt of a PIN verification command, and wherein the microprocessor (5) inserts the input PIN code into the PIN verification command and supplies said command to the smart card (4) and the terminal supplies only the result of the PIN verification to the computer (11) via the connecting
35 line (10).

9. A system according to claim 6, 7 or 8, wherein the microprocessor (5) is arranged for detecting the type of smart card (4), wherein the microprocessor will



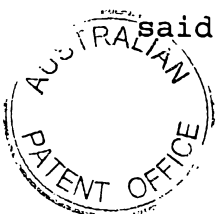
automatically activate the card reader means if a chip card not comprising a pay function and/or a telebanking function is detected.

10. A system according to any one of the preceding
5 claims, wherein the microprocessor (5) of the terminal (1) is arranged for performing an identification function in co-operation with an inserted smart card (4) comprising a telebanking function, wherein the microprocessor (5) asks the user, via the display (7), to input a first code
10 supplied by a bank computer, wherein the input code is supplied to the smart card and the smart card generates a reply code in response to said code, which reply code is shown on the display.

11. A system according to claim 10, wherein the
15 microprocessor (5) establishes a telephone connection with the computer (11) upon selection of the identification function, and wherein the computer supplies the first code to the smart card (4) and the microprocessor (5) supplies the reply code to the computer.

20 12. A portable terminal (1) for a system according to any one of the preceding claims, which terminal comprises a housing (2) having an insert slot (3) for a smart card (4), a microprocessor (5), a memory (6), a display (7), a keypad (8), and a connector (9) for a connecting line (10)
25 for connecting the terminal to a computer (11) either directly or via a telephone connection, wherein said terminal has been programmed to establish a connection with the computer via said connecting line upon receipt of a command provided via the keypad (8).

30 13. A portable terminal (1) according to claim 12, wherein the housing (2) is in the shape of a flat, substantially rectangular box, whose area approximately corresponds with the area of a smart card (4), wherein the insert slot (3) is positioned in a short side of the housing
35 and connects to a space (12) for accommodating a smart card, which extends over at least substantially the entire area of said housing.



14. A system substantially as herein described with reference to Figs. 1 to 3 of the drawings.

15. A portable terminal substantially as herein described with reference to
5 Figs. 1 to 3 of the drawings.

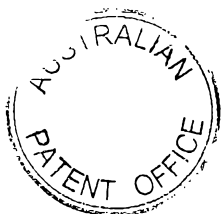
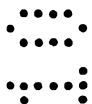
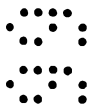
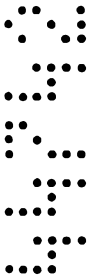
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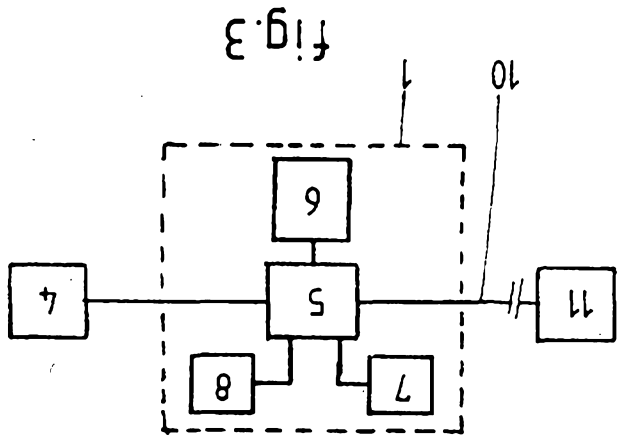
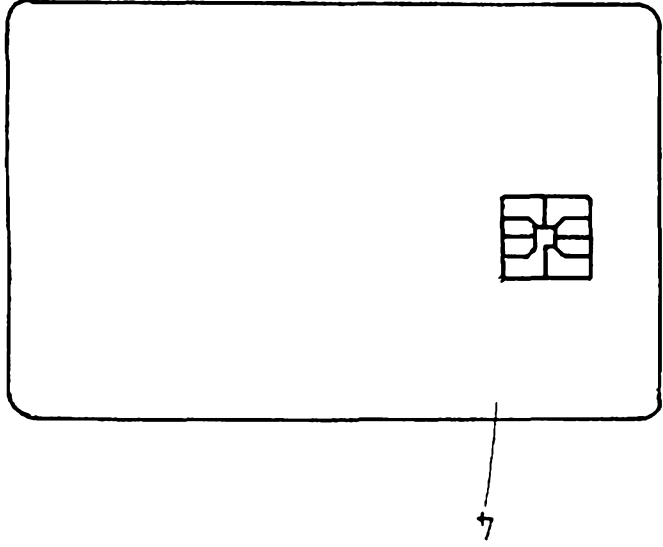


fig. 3

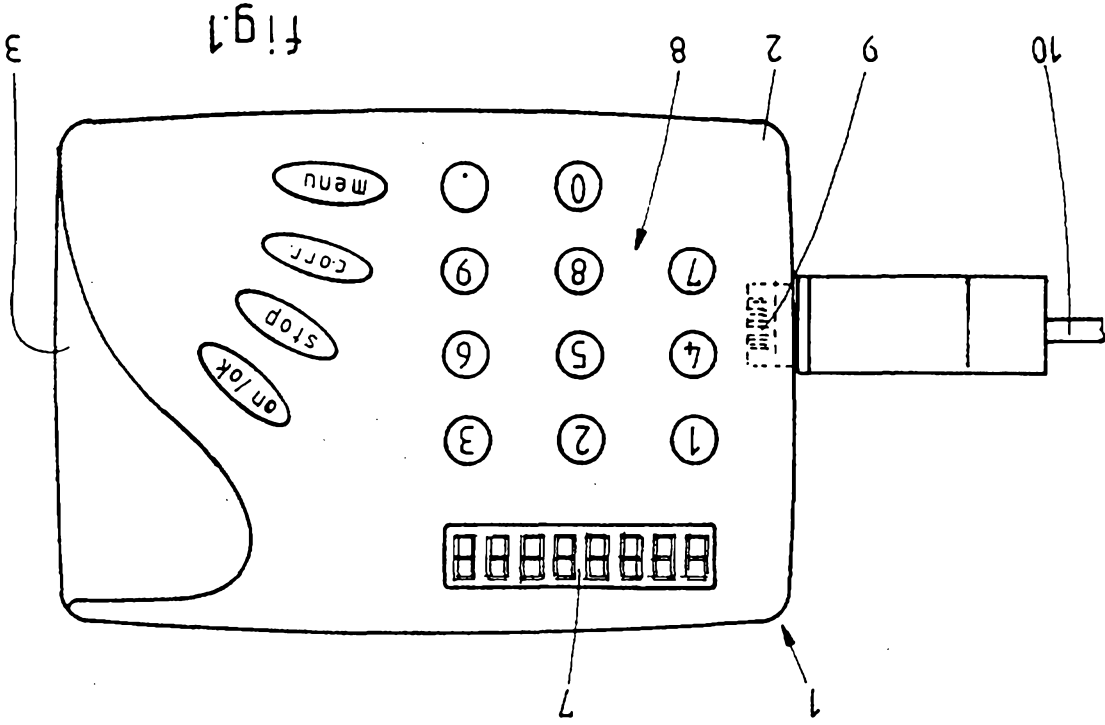


fig. 1

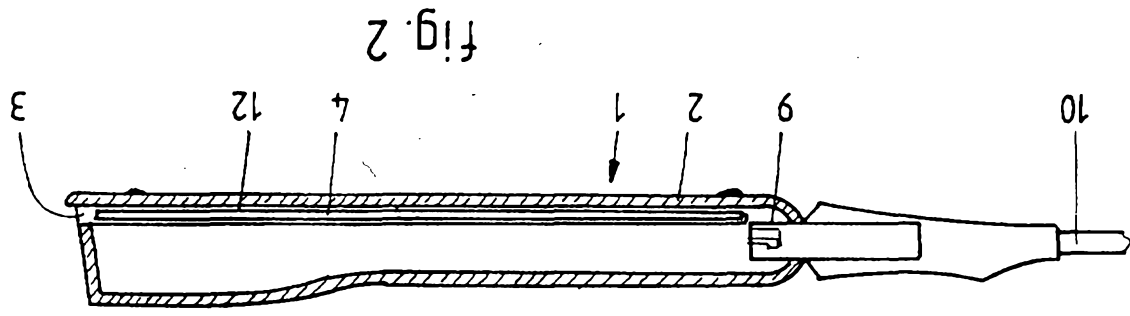


fig. 2