

TOBACCO DISPENSER

Field of the Invention

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The present invention relates to a tobacco dispenser for use in dispensing cigarette packets and the like, and to the controlled operation of such a dispenser.

Background of the Invention

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Vending machines are used for dispensing a wide range of products, such as cans of drink, confectionery, and so on. One drawback with vending machines is that customers do not always have the exact money for making their desired purchase. Although some (more complex) machines do have the facility to offer change, this is not always available. A further problem is that the presence of cash inside vending machines can make them attractive targets for thieves (especially if installed in relatively isolated locations). Any such theft results in a loss of takings for the vending machine operator, as well as typically a broken machine.

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A vending machine that addresses such problems is described at:

<http://www.ti.com/tiris/docs/solutions/pos/vending.shtml>

This document proposes the use of radio frequency identifier (RFID) cards as an alternative payment mechanism for use in vending machines. More particularly, a consumer is issued with an RFID card that contains data that uniquely identifies the consumer. When the RFID card is used at a vending machine, the machine contacts an authorisation server, and the purchase is billed to a credit card account for the customer holding the RFID card.

Although such an approach obviates the need for cash during a transaction, it requires a large and complex infrastructure. The vending machine must be network-linked to a credit card system, and customers must all be issued with appropriate RFID cards. In addition, there are security concerns if an RFID card is lost or stolen.

Vending machines are also frequently used for selling tobacco products. In venues such as hotels, restaurants, cafes and bars, there are typically two different approaches for selling cigarettes and other tobacco products. In one approach (front-of-bar), a vending machine is provided for customers to use. The venue owner usually has a contract with a vending machine operator (VMO), who supplies the machine and is responsible for maintaining its performance and its stock capability. In return for the space in the venue, the VMO generally pays the venue owner a fixed fee for every packet of tobacco that is sold. A vending machine for front-of-bar use is described in EP-A-1426905.

In the other approach (back-of-bar) the cigarette packets are displayed on a shelf or in a merchandising dispenser behind the bar. With this approach a cigarette packet is normally passed to the customer by a member of staff upon payment of the relevant price, rather than having a customer access the product directly. A vending machine for back-of-bar use is described in GB 2180527.

It will be appreciated that cigarette vending is generally subject to legislative restrictions. It is desirable for venue owners to be able to readily demonstrate compliance with such restrictions. In addition, because cigarette packets are relatively high value products, it is generally desirable for a venue owner and/or tobacco dispenser operator to be able to track stock usage and access.

US 2002/183893 discloses a vending machine with a transponder interrogator. If a customer presents a transponder to the machine, the transponder is identified and debited with the relevant purchase price. The system enables the vending machine operator to track the purchasing habits of the transponder.

US 65843091 discloses a system for making a vending machine purchase via a consumer's cellular telephone. The consumer requests a product by dialling a specific number and receives a vend code in return. Upon receipt of the vend code from the consumer, the machine dispenses the requested product.

US 2002/194387 discloses a remote data acquisition and transmission system in which multiple vending machines are each provided with an application controller. The application controllers communicate with an application host via a local area network.

5 Summary of the Invention

 The invention is defined in the appended claims.

 Accordingly, one embodiment of the present invention provides a tobacco dispenser including a dispensing mechanism, a memory, an input device and control
10 logic. The memory is used for storing authorisation data concerning at least two or more different operations to be performed in relation to the dispenser and information about each event in which a product is dispensed from the machine. The stored information includes at least the date and time of the event and an identifier of the product dispensed. The input device is operable to receive a request to access the dispenser. The control
5 logic is then able to validate the request against the stored authorisation data. An operation is only permitted as a result of the request if the request satisfies the authorisation data for that particular operation.

thereby provides secure and reliable access to the dispenser across a range of multiple operations. Note that such a tobacco dispenser is primarily intended for use in an attended retail setting, where a member of staff is available to access the machine on behalf of a customer (this is generally the case in bars, restaurants, and so on).

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There are a variety of systems that could be used for the input device, such as a keypad (potentially implemented on a touch sensitive screen), a radio frequency identifier (RFID) reader, a reader for magnetic cards or fobs, a bar-code reader, a receiver for a wireless remote control device, and so on. Users can then be issued
10 with the relevant information (keycode) or access device (e.g. card with printed bar-code, RFID tag, etc.) in order to access the dispenser.

In one embodiment, security for the dispenser is based on a role-based model, in which two or more roles are defined in relation to the machine. The authorisation
15 data then specifies which operations are permitted for each of the roles. When a request is received, the control logic determines whether or not the request satisfies the authorisation data for the particular operation by examining whether the operation is permitted for the role associated with the person making the request.

Note that there are a variety of ways that a role may be associated with a
20 person making the request. One possibility is to incorporate the role directly into the request itself. For example, each role might be assigned a different RFID tag or different keypad code (according to the access mechanism involved). A user is then assumed to have the role assigned to the RFID tag or keypad code that was utilised in
25 making a request, and therefore authorised accordingly.

In other embodiments, a more indirect approach might be utilised, in which each user is allocated his or her own serial number. The set of serial numbers for all users is then stored as part of the authorisation data, with each serial number being
30 assigned to a role. In this case, each access mechanism (keypad code, RFID tag, etc.) is assigned a serial number identifying the person using it, and this serial number is provided as part of the request to the dispenser. For example, the serial number might be encoded into an RFID tag or bar-code to be swiped, or might be incorporated into a keycode to enter. Receipt of the serial number then allows the control logic to

determine the role of the person making the request (via the received serial number), and therefore whether to allow or to disallow the relevant operation based on the determined role.

5 Other embodiments of the tobacco dispenser need not use a role-based authorisation model. For example, the authorisation data might simply specify the operations allowed for each of a set of serial numbers (in effect, omitting role as an intermediary between serial number and operation).

10 A wide variety of operations involving the dispenser may be defined and controlled in the above manner. Examples of such operations include replenishment of the dispenser, updating pricing information for products available from the dispenser, dispensing (vending) tobacco products from the dispenser, and performing administration tasks, such as adding new authorisation data into the system (e.g. to
15 enable a new user or to disable a member of staff who is now leaving).

 Note that in some embodiments, a user may specify the desired operation when making the request (perhaps implicitly, depending on how the request was entered). In this case the desired operation can either be enabled or disabled in
20 accordance with the authorisation data corresponding to the request. Alternatively, the initial request might not specify the operation to be performed, in which case an authorisation might be performed against all potential operations. It is then only subsequently when a user attempts to perform a particular operation that this attempted operation is enabled or disabled in accordance with the authorisation.

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 In one embodiment, the stored information in memory further includes the role and/or serial number of the person performing the operation, dependent upon the particular authorisation model used. (Note that storing serial numbers allows a distinction to be made between multiple members of staff who might all be assigned
30 the same role). Furthermore, information may also be stored about other events, such as replenishment of the machine, the addition of new users, etc. It will be appreciated that such stored information then provides a full audit trail of access to the dispenser. This is useful for internal stock control purposes, as well as for demonstrating compliance with any relevant regulatory requirements.

In one embodiment, the dispenser is provided with one or more data ports for providing external access to the stored information. Such a data port might be utilised for outputting the stored information to a local printer, or for outputting the stored
5 information over a network connection to a remote system. Another possibility would be to utilise the data port to synchronise the stored information with a laptop or PDA. It will be appreciated that any given dispenser may support one or more of these output routes. Typically the stored information is output in the form of reports. These reports may be available covering multiple time-scales (e.g. daily, weekly,
10 monthly, quarterly, etc.).

A data port can also be used as a mechanism for the transport of data into the dispenser, such as for configuration purposes. For example, settings for the pricing of the different product lines in the dispenser and/or the permissions to be associated
15 with various users or roles might be downloaded through the data port into the dispenser from some external source. Again, there may be multiple options for this download operation, such as synchronisation with a laptop and/or communication over a network from a remote system.

20 Another embodiment of the invention provides a method of operating a tobacco dispenser such as described above. The method involves storing in the dispenser authorisation data concerning at least two or more different operations to be performed in relation to the dispenser. The method further involves receiving a request to access the dispenser and then validating the received request against the
25 stored authorisation data. An operation is only permitted as a result of the request if the request satisfies the authorisation data for that particular operation.

It will be appreciated that such a method can generally utilise the same particular features as described above in relation to the apparatus embodiments.

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Another embodiment of the invention provides a tobacco dispenser for use in dispensing cigarette packets and other similar products (e.g. cigar packets). In one embodiment, the tobacco dispenser includes a dispensing mechanism, a radio frequency identifier (RFID) reader, a memory, and control logic. The RFID reader is

used for accessing a serial number from an RFID card, while the memory is used for storing a set of serial numbers permitted to operate the dispensing mechanism. The control logic enables or disables the dispensing mechanism in accordance with whether or not the serial number accessed from the RFID card is included in the set of
5 authorised serial numbers.

In one particular embodiment, the tobacco dispenser controls stock removal and replenishment based on a role-based security model. Thus the dispenser requires a secure activation, typically via an RFID tag or card, in order to access stock in the
10 machine. All stock removal events can be date and time stamped, with information about such events stored to a local memory in the dispenser. The stored data can include information about pricing and the particular slot or column that has dispensed. Other roles defined in the system, and specified on particular RFID tags, may include the ability to replenish the dispenser and the ability to update pricing information
15 stored in the dispenser.

In one embodiment, the tobacco dispenser is equipped with at least one data port to allow local and remote access to the stored data. One possibility is to attach a thermal printer via the data port to provide a local reporting mechanism. The tobacco
20 dispenser typically outputs a range of report formats for the stored data, providing information such as sales by period (day, week, month, etc.), by user (as determined from the RFID tag) and by brand (as determined from the operated slots), as well as information on current stock levels and pricing.

25 Another embodiment of the invention provides a method of operating a tobacco dispenser. The method includes entering into the dispenser a set of serial numbers permitted to dispense from the machine, and accessing a serial number from an RFID card using an RFID reader incorporated into the tobacco dispenser. It is then determined whether or not the accessed serial number is included in the set of serial
30 numbers permitted to dispense from the dispenser. A product is dispensed from the dispenser only if it is determined that the accessed serial number is included in the set of serial numbers permitted to dispense from the machine.

In one particular embodiment, multiple roles are provided within the tobacco dispenser. Each role has one or more operations that it is permitted to perform. Each serial number is allocated to one of the multiple roles. One example of such a role is stock replenishment, whereby a user having an RFID card with a serial number
5 allocated to the stock replenishment role would be permitted to open the dispenser to refill product. Another possible role might be venue owner. A user having an RFID card with a serial number allocated to the venue owner role would be permitted to add new serial numbers to the set of serial numbers and to allocate serial numbers to roles. A further possible role might be stock dispenser. A user having an RFID card with a
10 serial number allocated to the stock dispenser role would be permitted to dispense product from the dispenser.

Brief Description of the Drawings

15 Various embodiments of the invention will now be described in detail by way of example only with reference to the following drawings in which like reference numerals pertain to like elements and in which:

Figure 1 is a front, perspective view of a tobacco dispenser in accordance with one embodiment of the invention;

20 Figure 2 is an exploded view of the tobacco dispenser of Figure 1;

Figure 3 is a front, perspective view of a tobacco dispenser in accordance with another embodiment of the invention;

Figure 4 is an exploded view of the tobacco dispenser of Figure 3;

Figure 5 is a schematic diagram illustrating the use of the tobacco dispenser of
25 Figures 1-4 in accordance with one embodiment of the invention; and

Figure 6 is a flowchart illustrating the use of the tobacco dispenser of Figures 1-4 in accordance with one embodiment of the invention.

Detailed Description

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Figures 1 and 2 illustrate a tobacco dispenser 10 in accordance with a first embodiment of the invention. Figures 3 and 4 illustrate a tobacco dispenser in accordance with a second embodiment of the invention. These two embodiments have many components in common, and so will be described together.

As shown in Figures 1 to 4, the tobacco dispenser 10 incorporates a central cavity 8 within a housing defined by a top cover 52, a bottom cover 35, and a back cover 50. In the illustrated embodiments, the covers are formed from aluminium or a composite derived therefrom, such as alucobond (which comprises two sheets of aluminium separated by a plastic core). The covers are attached to one another by stainless steel fasteners 28. Although aluminium has the advantage of being sturdy and robust, it will be appreciated that other embodiments may use other materials for the housing (e.g. some form of acrylic).

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A key lock 44 is provided on the back cover 50 of the dispenser. This lock can be used by someone with the relevant key to obtain access to cavity 8 by removing the back cover 50 and (if necessary) the top cover 52 as well. Such access is typically required during service operations. Key lock 44 also serves as a manual override to provide access to stock within the dispenser, for example in the event of a machine malfunction.

The cavity 8 houses one or more drawers 18 that act as cassettes for holding cigarette packets. Note that these cassettes are generally waterproof, in order to avoid product damage due to any spillage that might occur in the vicinity of the dispenser. Each drawer contains multiple slots 12, and each slot can be filled with a line of cigarette packets. In the embodiments of Figure 1 and Figure 2, there is one drawer 18 having six slots 12, while in the embodiment of Figures 3 and 4 there are two drawers 18, each containing three slots 12. It will be appreciated that many other configurations of slots and drawers are possible, depending upon the desired physical dimensions and orientation of the tobacco dispenser, as well as the number of brand lines and volume of trade to be supported.

Typically the packets placed in one slot all belong to the same brand of cigarette, so that all packets in the same slot have the same price. Different slots may be used to hold different brands, and so the pricing may vary from one slot to another (in accordance with the different pricing of different brands). Cigarette packets are dispensed (one at a time) from slots 12 on the front of the machine 10. Note that any packet displayed to the user at the front of the slot is capable of being dispensed (so

that a user does not think that the machine has available stock unless this is indeed the case).

Attached to the bottom cover 35 of the tobacco dispenser are rubber feet 24 for
5 supporting the dispenser. In addition, a power cord 26 extends from a socket
provided in a recess (not visible in the Figures) in the bottom cover. This power
supply is passed into a 110 Volt to 220 Volt switch mode transformer 42, which then
provides power to the rest of the dispenser. Note that in one embodiment tobacco
dispenser 10 also contains a NiCd battery (not shown in the Figures), which can be
10 used to provide back-up power to the machine should mains power be interrupted.

The front of the tobacco dispenser includes a key lock 20 which has three
settings, Off, On, and Alarm. In the Alarm setting, the machine is non-operational for
vending purposes, but any attempt to tamper with the machine leads to the sounding
15 of an alarm. The tobacco dispenser may also be rendered non-operational by simply
disconnecting power cord 26. Note that in one embodiment the dispenser is provided
with an additional alarm facility that is active in the standard operational setting to
detect any tampering (e.g. insertion of hand up the delivery chute).

20 The front of the tobacco dispenser further provides a serial data port 22. This
data port can be used both for inputting data and control commands into the dispenser
10 and also for extracting data from the dispenser, as will be described in more detail
below. It will be appreciated that the data ports do not need to be based on a wired
serial connection, but could use any appropriate form of data link, e.g. a parallel
25 connection, or some form of wireless connection such as Bluetooth. Note that
tobacco dispenser 10 may in fact support multiple data ports. One possibility is to
locate such additional port(s) in the same recess as used for attaching the power cord.

The front of the tobacco dispenser is further provided with a plurality of
30 pressure sensitive buttons (PSBs) 15. These buttons are used to dispense cigarette
packets from the tobacco dispenser 10. Each button includes an identifier (a number)
to indicate the slot from which that particular button dispenses. In addition, each
button is provided with a light emitting diode (LED) 16. This does not illuminate if
the corresponding slot is empty and so cannot be dispensed from.

The front of the tobacco dispenser further includes a small display 11, which may be provided by an LED, a liquid crystal display (LCD), or any other appropriate device. The display 11 is typically used to show the current time, but may also be
5 used to provide any other desired information. For example, if one of the PSBs is pressed, display 11 may be used to indicate the price of the brand located in the slot associated with that PSB. Display 11 might also be used to show machine status, such as whether set to the Alarm state.

10 A radio frequency identifier (RFID) tag reader 30 is included within tobacco dispenser 10. As will be described in more detail later, the tag reader 30 cooperates with the dispensing mechanism of the machine to ensure that only properly authorised personnel have access to stock in the dispenser. In other words, only users having properly authorised RFID tags or cards are allowed to operate the machine.

15 Note that technologies other than RFID might also be utilised for access control to tobacco dispenser 10. For example, magnetic key fobs, barcodes, key code entry via a touchpad, and/or some form of biometric checking could potentially be used for such purpose. Nevertheless, RFID tags have the advantage that they are
20 generally cost-effective, can be used to uniquely identify users, and are re-programmable.

A wide variety of dispensing mechanisms (not visible in the Figures) can be used in tobacco dispenser 10 to release a cigarette packet once stock removal has been
25 authorised. Such mechanisms are already known (per se) in the art, for example to release a product when correct payment has been made into a vending machine. Typically the dispensing mechanism will cause the packet being dispensed to fall into a tray 38 (see Figure 2) for collection by the user. However, other dispensing mechanisms may be employed, such as releasing a door on the front of the machine to
30 allow direct user access to the packet to be dispensed. (Note that in a back-of-bar context, where there is no direct customer access to the tobacco dispenser 10, the security requirements for the dispensing mechanism may be relaxed somewhat compared to a front-of bar context).

The tobacco dispenser 10 further incorporates one or more microelectronic boards 30, 31. Boards 10 include some form of processor, such as a digital signal processor (DSP) or application specific integrated circuit (ASIC), as well as both volatile and non-volatile memory. The volatile memory is typically provided in the form of random access memory (RAM), while the non-volatile memory may be provided by flash memory, a disk drive, and/or any other appropriate storage device. The boards 10 incorporate appropriate software (firmware) and/or hardware to implement the functionality of the tobacco dispenser, as detailed below. This software is generally stored in non-volatile memory, and is loaded as appropriate into the RAM for execution by the system processor.

It will be appreciated that the embodiments of tobacco dispenser 10 as illustrated in Figures 1 to 4 are provided by way of example only. The skilled person will be aware of many potential variations in matters such as construction materials, fixtures, layout and number of components, etc.. For example, tobacco dispenser 10 may be equipped with a keypad for various forms of data entry, and/or a display screen (typically an LCD panel) for data output. The latter might be used in a report context for viewing sales data, and for displaying promotional messages when otherwise idle.

Figure 5 is a schematic diagram illustrating the use of tobacco dispenser 10 in a bar or similar environment. A typical transaction commences with a customer 103 requesting a packet of cigarettes from a bar attendant 101 or other staff member. The customer may make a payment 191 with the request, or upon actual receipt of the packet, dependent upon the practice of the establishment.

Each attendant or operator 101 at the venue is typically equipped with his or her own RF ID tag or card 102. Such tags generally resemble a credit card, although they can be provided in a variety of shapes and sizes. The RFID cards 102 might be provided with a facility to attach to key rings, belts, etc for ready portability and ease of use. Each card contains a unique serial number 107 stored in some form of read only memory (ROM). One side of the card may carry a photograph of the person to whom the card has been allocated for identification purposes, while the other side may carry instructions for use of the card. Note that card 102 might potentially be

used by attendant 101 for other business purposes, such as building access, clocking on/off etc. In this way, access to tobacco dispenser 10 can be integrated if so desired into general security and management facilities for the organisation. This has the advantage of eliminating dual (or plural) card issuing and tracking procedures.

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In order to use the card, the operator 101 engages (swipes) the card 102 with tobacco dispenser 10. This causes the RFID reader 30 (see Figure 1) within tobacco dispenser 10 to access the unique serial number 107 in card 102, as indicated by arrow 190. (It will be appreciated that RFID technology is well-known to the skilled person, and so the details of the activation of and data access from card 102 will not be described here).

The tobacco dispenser 10 now compares the received serial number 107 against a set of stored roles 108 in order to determine whether or not to authorise the stock dispensing. These roles 108 are described in more detail below. In some situations, the operator may also be required to hold his or her RFID card 102 against the reader 30 for a predetermined period of time (say 4 seconds) as a secondary form of authorisation. Assuming that comparison of the serial number 107 against the role information 108 indicates that the operator 101 is suitably authorised and that any other relevant criteria are satisfied, the machine dispenses the required packet of cigarettes. This can then be provided by the operator 101 to the customer 102 in order to complete the sale.

Note that in an alternative embodiment, the role level for operator 101 might be encoded onto the RFID tag 102 itself. In this case, the tobacco dispenser 10 simply has to confirm that the encoded role matches the requested task. If so, then the relevant operation (e.g. stock dispensing) is authorised. In this embodiment the RFID tags do not need to store an individual identifier (serial number) for the operator 101 in order to provide authorisation for use of the dispenser. Nevertheless, in general it is still desirable for serial numbers to be recorded on the card and then provided to the tobacco dispenser 10 for each transaction. This allows usage of the machine to be tracked on a per user basis.

Whenever dispensing a packet of cigarettes, the tobacco dispenser records details of the transaction in store 109. The stored data for any particular transaction typically includes the date and time of the transaction, the serial number 107 of the RFID card used to authorise the purchase, and the slot from which the cigarette packet was purchased (this then maps to the particular brand purchased). Note that the serial number 107 may be supplemented with more information about the holder of the card 102 (such as their name or staff number) where such information is available within tobacco dispenser 10 (such information may be provided during set-up).

10 In some embodiments, a special facility may be incorporated into tobacco dispenser 10 in order to confirm that a packet of cigarettes has actually been dispensed. For example, the falling of a pack into tray 38 may interrupt a light beam, and thereby signal the provision of a packet of cigarettes. Such confirmation might be used as a trigger to write event data to store 109 and to update recorded stock levels.

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Tobacco dispenser 10 may be connected via network 120 to a remote machine (indicated as back office 130 in Figure 5). Network 120 may be provided by a local area network (such as an Ethernet), a bus (such as USB), a fixed or mobile telephone line, or any other appropriate form of connection. Note that in one embodiment, multiple tobacco dispensers 10 may be daisy-chained together to provide ready access to all of the different machines.

Network 120 allows a sales analyst 131 or other appropriate person to access records 109 on tobacco dispenser 10 from the remote system 130. Such remote access can be used for various purposes. For example, a machine operator or a tobacco company may track sales in order to determine when tobacco dispenser 10 needs replenishment. The sales data might also be tracked for auditing purposes, or for marketing purposes (e.g. to compare sales from machines at different locations to try to understand the various factors that effect dispenser sales performance).

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Figure 6 is a flowchart illustrating the operations in dispensing a cigarette packet from machine 10 in accordance with one embodiment of the invention. The transaction commences with a customer request for a cigarette packet (step 210). In response to this request, the attendant swipes his or her RFID card 102 against the

tobacco dispenser 10, which allows the dispenser to access the serial number 107 within card 102 (step 215). The tobacco dispenser then accesses its stored role data 108 (step 220), in order to determine whether the user indicated by serial number 107 has authority to dispense a packet of cigarettes (step 225).

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If the user does not have the necessary authority, the machine refuses to dispense the requested packet of cigarettes (step 228). Note that the tobacco dispenser may store in records 109 details of the attempted (failed) operation, such as time and date of request, and ID of the operator making the request. More generally, the tobacco dispenser may store details of all requested transactions, and include a field in such records indicating whether or not the particular transaction was authorised.

Assuming that the user ID 107 is authorised according to stored role information 108, then the outcome from step 225 is positive. In this case, the desired cigarette packet is dispensed (step 235) and can be supplied to the customer (step 240). In addition, the tobacco dispenser 10 records details of the transaction (step 230) into store 109 for subsequent retrieval and analysis.

Table 1 specifies the role information 108 of the various parties involved in operating tobacco dispenser 10 in accordance with one embodiment of the invention. In particular, Table 1 specifies the different classes of role, the functionality such a role is expected to perform, and the access constraints imposed on such a role.

User Group	Role	Function	Access Constraints
Venue Owner	Management of users within the system.	Create, amend and delete users according to staff turnover; replenish stock; obtain/print system reports (if supported). Can also vend packs in the same way as an ordinary venue staff member.	Access to all functions.
Venue Staff	Sale of goods to the consumer.	Removal of stock from the dispenser, as well as printing a report of own sales.	Access restricted to removal of stock only.
Tobacco Sales Rep	Replenishes machine and analyses sales.	Stock replenishment; obtain/print sales reports (if supported).	Access denied for removal of stock and user updates.

Marketing analyst (etc)	Sales data analysis	Obtain/print sales reports, possibly remotely (if supported).	Access denied apart from sales data.
Administrator	System Administrator	Sets parameters for all other groups within dispenser's local memory.	Access to all functions.

Table 1

The precise manner of operating tobacco dispenser 10 depends upon the interconnectivity of the machine to external systems (such as illustrated in Figure 5). According to one embodiment, this may be set to one of three levels:

Level 1 (stand-alone) – in this case, the machine is a stand-alone unit incorporating its own data storage module. It is not connected to any third party device. Each user is allocated a unique ID via an RFID key. The venue owner and/or administrator can produce a static report for a session in hard format (e.g. via a link to a printer) in order to access reporting information 109.

Level 2 (pre-programmed reports) – level 2 dispensers provide the same base functionality as level 1 but with two main additions:

- (a) a number of pre-programmed and predefined reports are provided (as described in more detail below); and
- (b) the tobacco dispenser includes the capability of connectivity to an external device, such as a laptop, PDA etc, via serial data port 22 or any other appropriate data link.

Information about transactions 109 can be downloaded to this external device for further analysis and interrogation.

Level 3 (real-time connectivity) – level 3 dispensers provide the same base functionality as level 1, but with the following additions:

- (a) permanent real-time connectivity into a network, e.g. a local area network (LAN) 120;
- (b) push/pull of data via the network to and from the dispenser;
- (c) real time data interrogation and bespoke report generation both at the dispenser and through the network, such as at back office 130.

The operations supported by tobacco dispenser 10 and performed by the various parties will now be considered in more detail.

5 **1. System Configuration**

This involves the initial configuration of the tobacco dispenser by the administrator at the time of installation into a venue. After system configuration, the system is live and ready to be provided with staff details for the venue.

10 System configuration commences with the administrator activating the dispenser (i.e. by powering up the machine and switching key lock 20 to the On position). The administrator now plugs a laptop into the tobacco dispenser 10 and runs a setup program on the laptop. In addition, the administrator holds his or her RFID card against the RFID reader for 4 seconds or longer. This causes the tobacco
15 dispenser to transmit its own serial number to the laptop, which can then be passed to some centralised recording facility.

The administrator now enters various configuration data into the dispenser. This is achieved by first entering the data into an appropriate configuration program
20 on the laptop, and then uploading the configuration settings into the dispenser. In particular, the administrator inputs details of the date, time and venue, and sets up tags for one or more venue owners. The administrator typically also sets up a replenishment role for a tobacco sales rep and configures the reporting system. The form of reporting generally depends on how (and if) the machine is externally
25 connected, which is reflected in the level of the machine (as described above). The administrator also enters details for each slot of the relevant brand and pricing, although this task may be deferred to the venue owner.

Once the above information has been uploaded, the dispenser LED 11 should
30 now display the correct time. At this point, the administrator normally performs some testing of the machine, such as verifying that the dispensing and reporting functionality is operating correctly, and that display 11 shows the correct time.

Note that for level 2 and level 3 dispensers, some or all of the system configuration may be performed using a remote system. Thus after tobacco dispenser 10 has been activated, the administrator may establish a data connection between the tobacco dispenser 10 and one or more remote systems, such by using network 120 to connect to back office 130 (see Figure 5). The administrator may then use this link to pull one or more configuration settings over the network 120 onto tobacco dispenser 10. For example, there may be a standard reporting format that is deployed to all tobacco dispensers operated by a particular organisation.

10 2. User Configuration

Once the tobacco dispenser has been installed and configured in a particular venue, the venue owner (or more accurately, someone allocated the role of venue owner) creates the additional users of the machine at that location. In particular, the venue owner defines to the tobacco dispenser 10 the venue staff who will be primarily responsible for dispensing cigarettes from the machine.

In one embodiment the process of user configuration involves the venue owner first swiping his or her card as a form of identification to the dispenser. Note that this card may have to be held against the RFID reader for a predetermined period of time before being authorised. (This prevents any unintentional authorisation, for example if the venue owner were simply just passing the tobacco dispenser). The venue owner now activates the appropriate number of RFID tags for the desired staff members, and then sets the role for each of these tags to correspond to Staff member (or to some other appropriate setting). The venue owner can then test the RFID tags to ensure that they are properly operational. In addition, the venue owner can check that the tags only provide staff members with the appropriate level of access (i.e. they can dispense from the tobacco dispenser, but cannot perform tasks that require more privileges, such as creating or deleting users).

It will be appreciated that handling cards for staff members is typically an ongoing process, in that staff members on the tobacco dispenser will be created, amended and deleted as necessary to reflect staff turnover and re-assignment. Note that one possibility is to handle such ongoing staff changes by passing already authorised cards between staff members as appropriate. Nevertheless, it is generally

desirable to track which RFID card is allocated to which staff member at any given time. Such a record may be kept externally from tobacco dispenser 10, or could be incorporated into stored data 109.

5 Note that the venue owner is generally responsible for defining roles and distributing RFID cards to other parties involved with the machine. For example, the venue owner may activate and allocate an RFID tag for the tobacco company sales rep for use during stock replenishment.

10 3. **Stock Replenishment**

 The dispenser is restocked when stock volumes are low. The replenishment operation is typically performed by the venue owner or a sales representative from the tobacco company, both of whom may be assigned the relevant access. Another possibility is to specifically define a role associated with stock replenishment and to
15 issue RFID cards that support this particular function to one or more appropriate staff members. (This may be in addition to or instead of having the venue owner and/or the sales representative replenish the stock).

 Stock replenishment is performed by swiping a suitably authorised RFID card
20 102 over the RFID reader 30. This then causes the unit to be opened to give access to drawer 18 in order for the stock to be replenished. After having re-filled the machine, the operator now resets the system and validates the number of packs in each slot. The operator then closes the tobacco dispenser, whereupon it is ready for use. Note that information about the replenishment operation (e.g. date and time, and card serial
25 number of the person involved) may be recorded in the stored data 109.

 In an alternative embodiment, stock replenishment is largely outside the scope of the RFID control mechanism. For example, a special key 44 (see Figure 2) might be provided to open the tobacco dispenser and give access to the product drawers. In
30 this embodiment, a simple reset button is provided once the stock has been replenished. It is assumed on pressing this reset button that each slot is now filled with cigarette packets, and this can be appropriately indicated in the stored data 109. A further possibility is that tobacco dispenser 10 is provided with sensors that can

automatically determine how many packets are currently located in any given slot, with this information then being recorded as appropriate with data 109.

4. Sale of Stock

5 This operation corresponds to the flowchart of Figure 6, wherein a customer requests a packet of cigarettes, and a bar attendant or other staff member removes stock from the tobacco dispenser for sale to the customer. Such operation is typically performed by an ordinary staff member, although a venue owner might also perform such a transaction.

10

Considering this operation in more detail, the dispenser is initially assumed to be in idle mode. A staff member then touches the PSB 15 corresponding to the desired selection, which causes the LED 11 to toggle between the channel price and stock level. The staff member now swipes his or her RFID tag against the reader.

15 This allows the tobacco dispenser to access the serial number on the tag. In one embodiment, there is an audible beep to confirm that the dispenser has successfully read the serial number, which is now checked against the authorisation levels in the dispenser.

20 Assuming that the staff member is appropriately authorised to dispense stock, the machine goes into vend mode, with the LEDs 16 on all vendible channels going green. The staff member then presses the PSB 15 corresponding to the desired cigarette brand. All other channel lights go out, and there is a beep to provide audible confirmation of the selection. The dispensing mechanism for tobacco dispenser 10
25 now operates and the selected cigarette packet is delivered down the chute. The staff member then removes the cigarette packet and supplies the cigarette packet to the customer. Meanwhile, the tobacco dispenser records in stored information 109 details concerning which stock was taken, as well as the serial number of the staff member involved. Finally the dispenser reverts back to idle mode.

30

5. Reporting

The system supports various types of reporting, including daily, weekly and monthly. Each report generally includes data indicating the date range covered by the report, as well as the date and time of production of the report. Local reports are

typically run at the close of business each day to allow the stock movement to be reconciled with the venue's payment system. In this situation, the venue has generally stopped trading for a given period, or at least the tobacco dispenser is temporarily withdrawn from service while the report is being obtained. The data is
5 then cleared and archived using a different PSB pressed by the operator. Archiving the data ensures that it is still available to reports generated over a longer time-scale, such as weekly, monthly or quarterly. In one embodiment, it is assumed that the archived data will be accessed and cleared on a monthly basis. However, any desired time schedule may be implemented compatible with the size of memory in the
10 tobacco dispenser. For example, in one implementation the memory size is approximately 1 Mbyte, which allows events corresponding to roughly 10 full stocks to be stored.

A local report is generated by a suitably authorised person such as the venue
15 owner activating the dispenser using the relevant RFID tag. In one embodiment, this is achieved when the dispenser is in idle mode by holding a suitably authorised RFID tag for 4 seconds against the reader. The user then enters an appropriate instruction into the machine in order to access the desired local report. Note that the user may first connect a suitable printer to the machine to allow a hard copy of the report to be
20 produced. Once the desired report has been obtained, the user can then exit the system.

As previously discussed, level 2 and level 3 machines have additional communications abilities. These can be utilised to download report data 109 stored
25 on tobacco dispenser 10 to a central repository, where it can be analysed and interrogated to produce specific and bespoke reports.

Selection between reports is typically achieved by pressing different PSBs on the tobacco dispenser. For example, in one embodiment, a local report to a printer
30 can be obtained by the operator concerned swiping his or her RFID card and then pressing a specific first report PSB. A specific button may also be provided to initiate a data transfer to a remote system.

in one embodiment, the following fields are included in a level 1 (i.e. local) daily report:

Date & time of report
Venue
5 Sales volume
User ID
Qty sold
Slot number (i.e. brand)
Totals
10 Sales by user ID
Sales by user ID by slot
Sales by slot
Total sales

15 Another report that might be supported includes monthly sales volume by user:

Date & time of report
Period covered (wks x-y)
User ID
20 Qty sold by slot
Total sales by user by slot

In addition, the system may support a stock report, based on total sales by slot (i.e. brand) within the relevant period:

25 Date & time of report
Starting stock levels by slot (from previous figures)
Qty sold by slot
Total remaining stock by slot

30 Note that different levels of tobacco dispenser may support alternative (or additional) reporting formats. For example, in one embodiment a level 2 or level 3 machine is generally able to download the raw information from the local data store 109 to a third party device via an appropriate cable connection, such as through serial data port 22. The data can then be interrogated further using the software on the third

party device. For level 3 machines, a real-time link via a land-line can be used to pull data from the local repository 109 into a central data resource, where it can be presented for detailed analysis and for the generation of bespoke reports.

- 5 In conclusion, a variety of particular embodiments have been described in detail herein, but it will be appreciated that this is by way of exemplification only. The skilled person will be aware of many further potential modifications and adaptations that fall within the scope of the claimed invention and its equivalents.

Claims

1. A tobacco dispenser including:
5 a dispensing mechanism;
a memory operable to store authorisation data concerning at least two or more
different operations to be performed in relation to the dispenser, and information
about each event in which a product is dispensed from the machine, including at least
the date and time of the event and an identifier of the product dispensed.
10 an input device operable to receive a request to access the dispenser; and
control logic operable to validate the request against the stored authorisation data,
wherein an operation is only permitted as a result of the request if the request satisfies
the authorisation data for that particular operation.
- 15 2. The dispenser of claim 1, wherein said input device comprises a keypad.
3. The dispenser of claim 1, wherein said input device comprises a radio
frequency identifier (RFID) reader.
- 20 4. The dispenser of claim 1, wherein said input device comprises a reader for
magnetic cards or fobs.
5. The dispenser of claim 1, wherein said input device comprises a bar-code
reader.
- 25 6. The dispenser of claim 1, wherein said input device comprises a receiver for a
wireless remote control device.
7. The dispenser of any preceding claim, wherein:
30 two or more roles are defined in relation to the machine;
said authorisation data specifies which operations are permitted for each of
said two or more roles; and

said control logic determines whether or not the request satisfies the authorisation data for the particular operation by examining whether the operation is permitted for a role associated with the person making the request

5 8. The dispenser of claim 7, wherein:

said request incorporates a serial number of the person making the request;

said authorisation data includes a set of serial numbers, each of which is

assigned to one of said two or more roles; and

10 said control logic is operable to access said authorisation data to locate in the set of serial numbers the serial number of the person making the request, wherein the role associated with the person making the request is the role assigned to the located serial number.

9. The dispenser of claim 7, wherein said request incorporates the role associated
15 with the person making the request.

10. The dispenser of any preceding claim, wherein one of said two or more operations comprises replenishment of the dispenser.

20 11. The dispenser of any preceding claim, wherein one of said two or more operations comprises updating pricing information stored in the dispenser.

12. The dispenser of any preceding claim, wherein one of said two or more operations comprises dispensing tobacco products from the dispenser.

25

13. The dispenser of claim 12, wherein said control logic enables or disables said dispensing mechanism in accordance with whether or not the request satisfies the authorisation data for the operation of dispensing.

30 14. The dispenser of any preceding claim, wherein said information stored in memory includes at least a role associated with a person making the request.

15. The dispenser of any preceding claim, wherein said information stored in memory includes at least a serial number associated with a person making the request.

16. The dispenser of any preceding claim, further comprising at least one data port for providing external access to the stored information about events.
- 5 17. The dispenser of claim 16, wherein said at least one data port may be used for supplying one or more configuration settings to the dispenser from an external system.
18. The dispenser of any preceding claim, wherein said request specifies the
10 particular operation to be performed.
19. A method of operating a tobacco dispenser comprising:
storing in the dispenser authorisation data concerning at least two or more
different operations to be performed in relation to the dispenser;
15 receiving a request to access the dispenser;
validating the request against the stored authorisation data, whereby an
operation is only permitted as a result of the request if the request satisfies the
authorisation data for that particular operation; and
storing information about each permitted operation in which a product is
20 dispensed from the machine, including at least the date and time of the operation and
an identifier of the product dispensed.
20. The method of claim 19, further comprising:
defining two or more roles in relation to the machine, wherein said
25 authorisation data specifies which operations are permitted for each of said two or
more roles; and
wherein said validating comprises determining whether said operation is
permitted for a role associated with the person making the request
- 30 21. The method of claim 20, wherein:
said request incorporates a serial number of the person making the request;
said authorisation data includes a set of serial numbers, each of which is
assigned to one of said two or more roles; and

said determining comprises accessing said authorisation data to locate in the set of serial numbers the serial number of the person making the request, wherein the role associated with the person making the request is the role assigned to the located serial number.

5

22. The method of claim 20, wherein said request incorporates the role associated with the person making the request.

23. The method of any of claims 19 to 22, wherein one of said two or more
10 operations comprises replenishment of the dispenser.

24. The method of any of claims 19 to 23, wherein one of said two or more operations comprises updating pricing information stored in the dispenser.

15 25. The method of any of claims 19 to 24, wherein one of said two or more operations comprises dispensing tobacco products from the dispenser.

26. The method of claim 25, further comprising enabling or disabling a dispensing mechanism in accordance with whether or not the request satisfies the authorisation
20 data for the operation of dispensing.

27. The method of any of claims 19 to 26, wherein one of said two or more operations comprises adding new serial numbers to said authorisation data.

25 28. The method of any of claims 19 to 27, wherein one of said two or more operations comprises assigning serial numbers to roles.

29. The method of any of claims 19 to 28, wherein said stored information includes at least a role associated with a person making the request.

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30. The method of any of claims 19 to 29, wherein said stored information includes at least a serial number associated with a person making the request.

31. The method of any of claims 19 to 30, further comprising using a data port for providing external access to the stored information about permitted operations.
32. The method of claim 31, further comprising supplying one or more
5 configuration settings to the dispenser from an external system via said data port.
33. The method of any of claims 19 to 32, further comprising outputting said stored information to a local printer.
- 10 34. The method of any of claims 19 to 32, further comprising outputting said stored information over a network connection.
35. The method of any of claims 19 to 34, further comprising generating reports based on said stored information, wherein said reports are available covering multiple
15 time-scales.
36. The method of any of claims 19 to 35, further comprising synchronising data or information in said dispenser with a laptop or PDA.
- 20 37. The method of any of claims 19 to 36, wherein said request specifies the particular operation to be performed.
38. The method of any of claims 19 to 37, wherein said method is used to provide attended service in a back of bar context.