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### (54) Device for the controlled supply of products as well as a programming device and means of payment for use thereof

(57) A device (1) for the controlled supply of products (3) comprises control means which are able and adapted to receive payment means and to record settlement of an amount due in order to then release at least one product for supply to a user. The payment means comprise an electronically accessible information carrier (5) which is adapted and able to provide access to a balance of the user. Such an information car-

rier is provided with programmable memory space for receiving therein at least one indicator of the age of a user. The control means are moreover able and adapted to read said memory space and to release the at least one product for supply only when a prescribed age has been established. Also provided is a programming device for placing such an age indicator in the memory space of such a payment means.

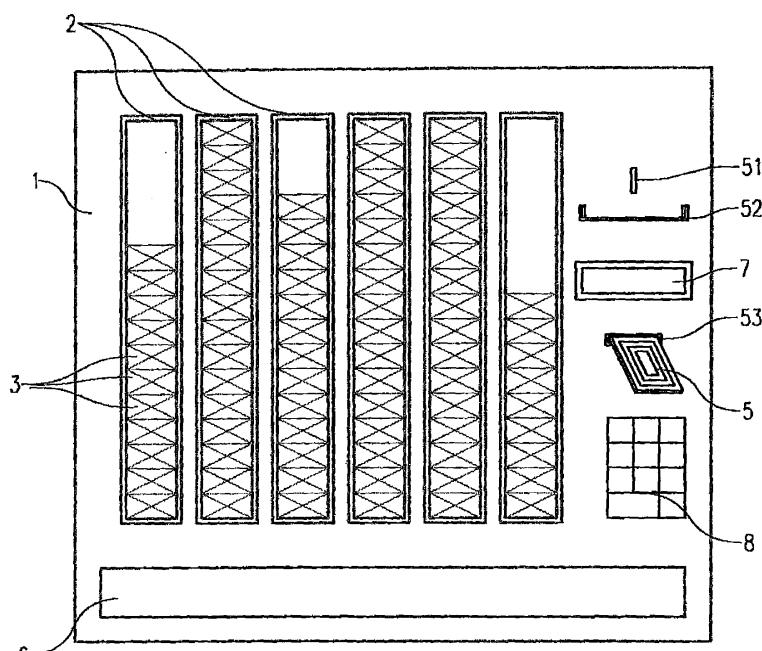


Fig.1

**Description**

**[0001]** The present invention relates to a device for the controlled supply of products, comprising control means which are able and adapted to receive payment means and to record settlement of an amount due in order to then release at least one product for supply to a user, wherein the payment means comprise an electronically accessible information carrier which is adapted and able to provide access to a balance of the user.

**[0002]** Such a device provides a complement to counter sales for the sale of products at locations or times where for various reasons counter sales are not desirable, necessary or feasible, and will hereafter be designated as machine vending. The term product must be interpreted broadly here such that it means not only physical articles but also services which are offered for payment.

**[0003]** A known device of the type stated in the preamble comprises a substantially closed housing with input means for paying an amount owed for the selected product. The input means may be an input slot for notes or coins, but machines are increasingly being equipped with a card reader for receiving electronic payment means, which then allow access to a balance of the user, from which the amount due can be transferred. With these electronic payment means there are different possibilities. This may involve a transfer from a balance stored on the payment means themselves, or a transfer from a balance which is stored on a remote computer system and with which contact is sought during the transaction. In the former case the payment means will usually comprise an integrated electronic circuit for carrying out the required authentication and mutation steps of the transaction process, while in the latter case simpler payment means suffice, which are based for instance on a magnetic strip on which are stored data relating to the identity of the user and his account.

**[0004]** Although machine vending has many advantages, it also has drawbacks. A significant drawback is that the sometimes desirable supervision is lacking in machine vending. This is particularly the case with products whose sale is only permitted, by the

**[0005]** Although machine vending has many advantages, it also has drawbacks. A significant drawback is that the sometimes desirable supervision is lacking in machine vending. This is particularly the case with products whose sale is only permitted, by the authorities or others, to persons above a determined minimum age. Here can be envisaged for instance all sorts of stimulants, such as tobacco products and alcoholic drinks, which may not be sold to persons below a determined age. Services such as showing a film or providing a game of chance are also often subject to regulations where the age of the customer is relevant. Since in a known device of the type described in the preamble there is no check at all on the age of the consumer, machine vending of these and other types of product has

thus far not been possible when age restrictions are imposed thereon.

**[0006]** The present invention has for its object, among others, to provide a device of the type stated in the preamble, which obviates this drawback in that a reliable age verification can be performed thereby.

**[0007]** In order to achieve the intended object, a device for the controlled supply of products of the type stated in the preamble has the feature according to the invention that the information carrier is provided with programmable memory space for receiving therein at least one indicator of the age of a user, and that the control means are able and adapted to read said memory space and to release the at least one product for supply only when a prescribed age has been established. The age indicator thus read by the device determines whether or not a product can be obtained from the device. By making use of electronic payment means, which provide access to a balance of the user, for the storage of such an age indicator, a user who is of age is prevented to a significant extent from handing over his card for use by a minor and thus providing the latter with access to the products, since access to this balance is hereby also provided. Electronic payment means are furthermore strictly personalized, so that abuse can be easily traced back to the original user. The age indicator is recorded or mutated on the payment means by a reliable party within the organisation responsible for managing and optionally the issue of the payment means. This must be subject to further safety requirements to be fixed, such as for instance showing identification documents which adequately show the age of the user. An age-linked sale of products from machines can thus be achieved which is at least as watertight as counter sales.

**[0008]** In respect of the sale of articles such as tobacco products, alcoholic drinks, film carriers and the like strictly to persons above a determined minimum age, a particular embodiment of the device according to the invention is characterized in that the products comprise one or more articles which are received in at least one product holder, and that the at least one product holder is provided with release means which, when energized, are adapted to release for supply at least one of the articles from the product holder and which are coupled to the control means to receive a control signal therefrom. By thus activating the release means from the control means, which only generate the required control signal when the minimum age indicator is recorded, it is avoided that a user can remove the product from the device without having available an information carrier with the required age information.

**[0009]** In a preferred embodiment the device according to the invention is characterized in that the information carrier comprises a convenient card body provided with an integrated circuit with said memory space. Such a card body is normally designated as chip card or smart card and provides the advantage that the entire transaction relating to the supply of products can be dealt

with locally. A telecommunication connection and telecommunication means for making connection to a remote computer system can hereby be omitted, which significantly simplifies the placing of new devices and possible modification of existing ones. In a further preferred embodiment the device according to the invention has the feature that the information carrier is compatible with a system for transfer of funds via banks. In this embodiment there is connection to information carriers for transfer of funds via banks, such as bank cards and credit cards and the like such as have now been introduced on a large scale and have a high degree of acceptance among the population. The issue, management and use of such cards are furthermore protected by the necessary safety procedures, whereby the device according to the invention also gains in reliability.

**[0010]** Although the device according to the invention can remain suitable, either exclusively or not, for the input of coins and notes, in which case the information carrier is used solely for the necessary age verification, a further preferred embodiment of the device according to the invention is characterized in that the control means are able and adapted to transfer the amount due from a balance of the user which is accessible by means of the payment means. In this case payment by means of the electronic payment means is possible in addition to or instead of payment by notes or coins.

**[0011]** From a viewpoint of protecting more or less privacy-sensitive personal data, a further particular embodiment of the device according to the invention has the feature that the at least one at least age indicator comprises a logical indicator which indicates that a prescribed age has been reached by a user. In this case it is not the age of the user which is stored on the card, but only whether or not he/she complies with the set age limit. When the card is misused, it is therefore only this information which can be traced. This will usually be an age limit of, typically, between 16 and 21 years of age, so that in the unlikely event that only such a logical age indicator becomes known, this does not encroach, or hardly so, on the personal life of the user. For further protection of the personal data of the user, a further embodiment of the device according to the invention has the feature that information in the memory space is stored in encrypted form.

**[0012]** The integrity of the device according to the invention greatly depends on the integrity of the parties charged with the registration and mutation of age indicators on the payment means. In order to prevent misappropriation in this area, a further particular embodiment of the device according to the invention has the feature that, in addition to the at least one age indicator, the memory space also contains an indication of a point of issue of the information carrier. In the case of misuse, the payment means used therein for this purpose can thus be traced directly back to the point of issue. By collecting these data, statistical relationships can thus be made and conclusions drawn for the purpose of identi-

fying an unreliable point of issue within a short time. This is possible particularly in a further embodiment of the device according to the invention which is characterized in that a memory space is provided therein for storage of transaction data per delivered product. In this case transaction data can be stored during each transaction and later analysed and read, if desired. These transaction data comprise for instance data which have been read from the payment means employed, such as, in addition to an identification of the payment means themselves, for instance also an identification of the point of issue thereof. For this purpose a further embodiment of the device according to the invention has the feature that the transaction data comprise an encryption of an identification of the used information carrier, of a point of issue thereof and of the control means. Misuse can be traced more easily using these data. The encryption of the data recorded for this purpose avoids on the one hand the possibility of privacy-sensitive data relating to the purchases of a user being retrieved without the required decryption keys and on the other hand the possibility of the data being manipulated without these keys.

**[0013]** The present invention furthermore relates to a programming device for use in combination with the above described device according to the invention for the controlled supply of products, comprising input means for receiving the information carrier, an interface for data exchange with the information carrier and a central processor unit. According to the invention such a programming device has the feature that the central processor unit, loaded with software provided for this purpose, is able to provide access to the memory space of the information carrier and therein mutate an indicator of the age of the user. In a completely operational system such programming devices are distributed to one or more locations whose reliability and integrity are deemed sufficient. Users can go to these locations to provide the information carrier held by them with an age indicator, or in any case activate it. This step can be accompanied by the necessary safeguards, such as for instance compulsory identification with a means of identification which shows the age of the user, so that deception of the system can be avoided. From this moment the information carrier is suitable for use in the above described device for the controlled supply of products.

**[0014]** The integrity of the system of controlled, age-linked delivery of products intended with the invention is greatly dependent on the integrity of the people responsible for operating the programming device. In order to monitor this, a particular embodiment of the programming device according to the invention has the feature that a memory space is provided therein for storing transaction data per mutated information carrier, and more in particular in that the transaction data are stored in encrypted form. Through the storage of transaction data, including for instance the identity of the operator and the information carriers programmed by him or her, the source of misuse, when detected, can be traced rel-

atively easily. The storage of the transaction data in encrypted form avoids the possibility of the data being manipulated by unauthorized persons.

**[0015]** A further particular embodiment of the programming device has the feature according to the invention that the programming device is provided with a telecommunication interface so that it can be coupled to telecommunication means and is able to transmit the transaction data, optionally periodically, to a remote computer system. This embodiment provides a centralized storage and a centralized management of the transaction data, so that when fraud or other misuse has been established, these data are directly accessible and available.

**[0016]** The invention further relates to payment means for application with an above described device, comprising a convenient, card-like body provided with at least one integrated electronic circuit with memory space which is allocated for receiving therein at least one indicator of an age of a card holder.

**[0017]** The invention will be further elucidated hereinbelow on the basis of an embodiment and an associated drawing. In the drawing:

- figure 1 shows a device for the controlled supply of products according to an embodiment of the invention;
- figure 2 shows an embodiment of product release means as applicable in the device of figure 1; and
- figure 3 shows an embodiment of programming means for use in combination with an electronically accessible information carrier according to the invention.

**[0018]** The figures are otherwise purely schematic and not drawn to scale. For the sake of clarity some dimensions in particular are exaggerated to a greater or lesser extent. Corresponding parts are designated in the figures as far as possible with the same reference numeral.

**[0019]** Figure 1 shows a device for the controlled supply of products according to an embodiment of the invention. This is a vending machine for tobacco products. The device comprises a robust, substantially closed housing 1 in which a number of product holders 2 are arranged. Product holders 2 serve to receive the products for sale and in this embodiment each comprise a different type or brand of cigarettes, which are packaged per twenty in standard-size boxes 3. The boxes of cigarettes thus lie enclosed in a continuous column in the relevant product holders 2. The device further comprises input slots 51,52 for coins respectively banknotes in addition to a card reader 53 for electronic payment means in the form of a card-like, electronically accessible information carrier 5 which provides access to a balance of the user, from which the amount due can be transferred. Use is made in this embodiment of a "chip

card" or "smart card". This is a card, normally manufactured from plastic, in which an electronically integrated circuit is incorporated, the so-called "chip". The chip comprises a processing unit, an electronically readable memory, in which is stored, among other things, balance or credit information, and is provided with a number of electrical contacts for communication with the outside world. The card 5 applied here is compatible with a public system for electronic transfer of funds via banks and for this purpose is designed to support cryptographic processes as are applied for safety reasons in electronic payment transactions. The device is thus able to accept an amount payable for a product in various ways.

**[0020]** Product holders 2 are provided on their outer end with release means 4 enabling controlled release of a product 3 from the holder. A product is only released if the payment of an amount due therefor is recorded by control means not further shown here. Figure 2 further shows an embodiment and the operation of such release means, although within the scope of the invention many other forms of release means, assumed to be sufficiently known to the person with ordinary skill in the art, can be applied instead. In this embodiment use is made of release means in the form of two sets of holding projections 42,43. In the position of rest shown under A the last and last but one products 32,33 each rest on a pair of holding projections 42,43 respectively. By energizing the bottom pair of holding projections 43, see B, these open to release the bottom product 33. The last holding projections 42 but one herein hold the other products in place. The purchased product 33 is thus withdrawn from product holder 2 and falls into a delivery compartment 6 of the device. The product can be removed herefrom by the user. After the product has thus been delivered, the bottom holding projections close again, see C, and the other pair of holding projections 42 is then energized to cause the products to shift up one position, see D. Finally, the last pair of holding projections 42 but one also closes in order to once again take up the starting position shown under A. An alphanumeric image display panel 7 provides the user with the necessary information and instructions during the whole process, while the user can make a product choice by means of a keypad 8 provided for the purpose. Any invalid or otherwise unusable coins and change are returned to the user via delivery compartment 6.

**[0021]** For reasons of public health, governments are increasingly making efforts to reduce the consumption of tobacco products, particularly among young people. As part of this, the supply of tobacco products can be subject to special rules so that they are not sold to people who have not yet reached a determined, prescribed minimum age. The device according to the invention provides a check of the age of a user, thereby enabling such age-linked sales. For this purpose the information carrier 5 is provided with an electronically accessible memory which is suitable for storing therein an indicator of the age of the user. In this embodiment, wherein use

is made as information carrier of a chip card intended for electronic transfer of funds via banks, specific memory space is allocated for storage of this age indicator on the same chip on which the banking data of the user are also stored. The control means in the device, which ensure the actual payment of the amount of money due for a product, are also able to read such an age indicator and will only activate the release mechanism 4,42,43 if the prescribed age is indicated therein.

**[0022]** Before card 5 can be used as a payment means, the card is personalized. Data relating to the user are herein loaded into the chip, and encryption keys are loaded which must prevent unauthorized persons from being able to alter information on the chip. One of the data loaded is the expiry date which shows the date until which the card is valid. The present bank cards in circulation have a period of validity of 2 to 5 years after issue of the card. After thus personalizing the card, it is issued to the user/card holder. This will usually be done by the bank with which the user has an account. Before payment can be made with the card, it must first be "loaded", which takes place in a conventional top-up terminal as placed at diverse locations. The invention does not intervene in this process, so that it will not be described further here and is assumed to be sufficiently known. Personalization and crediting with money of the card makes the card highly personal, whereby the user will not be readily inclined to give the card to someone else. The invention makes grateful use of this fact. Furthermore, a large percentage of the eligible part of the population already possesses a bank card, so that device 1 is generally accessible and usable from the outset.

**[0023]** Before card 5 is suitable for use in the device, the age indicator must be set thereon. The age indicator can comprise the actual age or date of birth of the user but, from the viewpoint of protecting personal details, it is also possible to suffice with a logical indicator which indicates that the user has reached the prescribed age of for instance 16 years. In this embodiment this latter option has been chosen. Initially, i.e. upon issue by the bank, the value of this indicator is 'untrue' and the card is not therefore suitable for purchasing tobacco products in the device according to the invention. The user can apply to an agency provided with programming means according to the invention in order to activate the age indicator, i.e. give it the value 'true'. An example of such programming means is shown in figure 3.

**[0024]** The programming means comprise a terminal 90 with a card reader 93. Card reader 93 provides on the one hand input means for receiving the card 5 of the user and on the other a physical interface which enables terminal 90 to exchange data with the card. Terminal 90 is provided with a central processor unit which, loaded with the necessary software and cryptographic keys, is able to carry out reading and writing operations in the memory space of card 5 in which the age indicator is stored. The value of the age indicator, among other

things, can thus be mutated. Terminal 90 is activated from a personal computer 95 or other suitable user interface provided for this purpose and is controlled by an operator assumed to be reliable. After the age of the card holder has been established on the basis of for instance a reliable proof of identity, and this has shown that the card holder is the rightful owner of the card and has reached the prescribed age, the age indicator is accordingly arranged on the card.

**[0025]** An encryption is herein applied to prevent misuse. Specific transaction data, such as an identification of the used programming means 90, of the operator and the transaction date, are also incorporated in this encryption so that when a fraudulent card is seized it can be traced back directly to programming means 90 and operator. These transaction data are likewise stored in terminal 90 which has the necessary memory space for this purpose. These log files, in which the encrypted transaction data are held, are periodically transferred to a central body which monitors the integrity of the entire system. For this purpose the terminal is equipped with a telecommunication interface and coupled to telecommunication means such as a telephone line or data network for transmitting the log files with some regularity to a remote computer system. The data are otherwise always inaccessible to an operator of the terminal.

**[0026]** Tobacco products can be purchased in the device of figure 1 only by using bank cards provided with the thus arranged age indicator. As soon as card 5 is inserted into card reader 53 of machine 1, an authentication procedure first takes place which determines whether the bank card is valid. Use is made in this authentication process of cryptographic keys stored in the card and in a so-called Secure Access Module (SAM) of device 1. These are the same encryption keys which are used in dealing with financial transactions using the card and which have thus proven to be reliable. One of the components of the authentication process is checking the expiry date of the card.

**[0027]** If it is established that card 5 is valid, card reader 53 reads the part of the card in which the age indicator is stored. An invalid card is further refused. The age indicator is located in a freely readable part of the bank card, but cannot be modified without the application software and especially the cryptographic keys required for the purpose. A card without age indicator is always a no-card and will not be able to provide access to the products in the device. Only if the card contains a correct age indicator is the device released for carrying out financial transactions and supplying the product. In the opposite case, not only is the card refused but it will not be possible to pay in cash either and no supply at all of a product takes place.

**[0028]** During electronic payment a balance check is first performed. If a balance is sufficient the card is debited by the amount payable for the selected product. If cash notes or coins are used to pay via input slots 51,52, the total amount inserted is determined and any change

is given via delivery compartment 6. During payment with cash, the card must remain in the card reader during the whole transaction to avoid the age verification being uncoupled from the supply of the product. Age verification and the financial transaction are inextricably linked to each other in the device. As soon as a card is removed while one of the steps involved is being performed, the device is immediately blocked. If the transaction of an authorized person is ended prematurely, this for instance prevents a device remaining available for a certain period for payment and supply of a product to an unauthorized person.

**[0029]** If both the age verification and the financial transaction have run successfully, release means 4,42,43 are activated to release the selected product. The product can then be removed via delivery compartment 6.

**[0030]** A step can optionally be incorporated prior to this, which alerts a user to a card still inserted in the device and only releases the product after this card has been removed. The whole transaction is recorded in the sense that transaction information, such as for instance an identification of the card used, an identification of the device itself, a designation of the point of issue of the card where the age indicator was arranged therein and the date of the transaction, is collected by the device during the above described process. This information is stored as a sort of log file by the device in memory means provided therein for this purpose. Here too a cryptographic encryption of the information is applied to make this information inaccessible to third parties. The thus collected log files are periodically read via a suitable telecommunication connection, locally or remotely, to be transferred to a remote computer system of a central body monitoring the integrity of the system.

**[0031]** Although the invention has been further elucidated above on the basis of only a single embodiment, it will be apparent that the invention is by no means limited thereto. On the contrary, many variations and embodiments are still possible within the scope of the invention for a person with ordinary skill in the art. As already stated, the device according to the invention can also be advantageously utilized, as well as for tobacco products, to supply other stimulants, products and services for which an age verification of the consumer is desirable or even required. Use can be made here of the same, common age indicator for the different applications, although it is also possible to arrange different age indicators on the card, each one for its specific product group or collection of product groups. For an increased security and as remedy against misuse of lost and stolen payment means, the use thereof can be made dependent on the input of a confidential access code, such as for instance a PIN-code. For this purpose the device must then be embodied with input means and adequate application software to carry out the necessary validation. Nor is the application of the invention limited to bank cards provided with an integrated circuit, but the

invention can also be applied in combination with less "intelligent" magnetic cards and credit cards. It is also possible to deviate from the card format of the information carrier, and it is possible to choose optionally contactless data exchange with the information carrier. In all these and more modifications, the invention provides a device for the controlled supply of products on the basis of a reliable age verification, without human supervision being required, at least on-site, for this purpose.

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## Claims

1. Device for the controlled supply of products, comprising control means which are able and adapted to receive payment means and to record settlement of an amount due in order to then release at least one product for supply to a user, wherein the payment means comprise an electronically accessible information carrier which is adapted and able to provide access to a balance of the user, **characterized in that** the information carrier is provided with programmable memory space for receiving therein at least one indicator of the age of a user, and that the control means are able and adapted to read said memory space and to release the at least one product for supply only when a prescribed age has been established.
2. Device as claimed in claim 1, **characterized in that** the products comprise one or more articles which are received in at least one product holder, and that the at least one product holder is provided with release means which, when energized, are adapted to release for supply at least one of the articles from the product holder and which are coupled to the control means to receive a control signal therefrom.
3. Device as claimed in claim 1 or 2, **characterized in that** the information carrier comprises a convenient card body provided with an integrated circuit with said memory space.
4. Device as claimed in claim 1, 2 or 3, **characterized in that** the information carrier is compatible with a system for transfer of funds via banks.
5. Device as claimed in one or more of the foregoing claims, **characterized in that** the control means are able and adapted to transfer the amount due from a balance of the user which is accessible by means of the payment means.
6. Device as claimed in one or more of the foregoing claims, **characterized in that** the at least one at least age indicator comprises a logical indicator which indicates that a prescribed age has been reached by a user.

7. Device as claimed in one or more of the foregoing claims, **characterized in that** information in the memory space is stored in encrypted form.

8. Device as claimed in one or more of the foregoing claims, **characterized in that** in addition to the at least one age indicator the memory space also contains an indication of a point of issue of the information carrier. 5

9. Device as claimed in one or more of the foregoing claims, **characterized in that** a memory space is provided therein for storage of transaction data per delivered product. 10

10. Device as claimed in claim 9, **characterized in that** the transaction data comprise an encryption of an identification of the used information carrier, of a point of issue thereof and of the control means. 15

11. Programming device for use in combination with the device as claimed in one or more of the foregoing claims, comprising input means for receiving the information carrier, an interface for data exchange with the information carrier and a central processor unit, **characterized in that** the central processor unit, loaded with software provided for this purpose, is able to provide access to the memory space of the information carrier and therein mutate an indicator of the age of the user. 20 25

12. Programming device as claimed in claim 11, **characterized in that** a memory space is provided therein for storing transaction data per mutated information carrier. 30 35

13. Programming device as claimed in claim 12, **characterized in that** the transaction data are stored in encrypted form. 40

14. Programming device as claimed in claim 12 or 13, **characterized in that** the programming device is provided with a telecommunication interface so that it can be coupled to telecommunication means and is able to transmit the transaction data, optionally periodically, to a remote computer system. 45

15. Payment means for application with a device as claimed in one or more of the foregoing claims, comprising a convenient, card-like body provided with at least one integrated electronic circuit with memory space which is allocated for receiving therein at least one indicator of an age of a card holder. 50

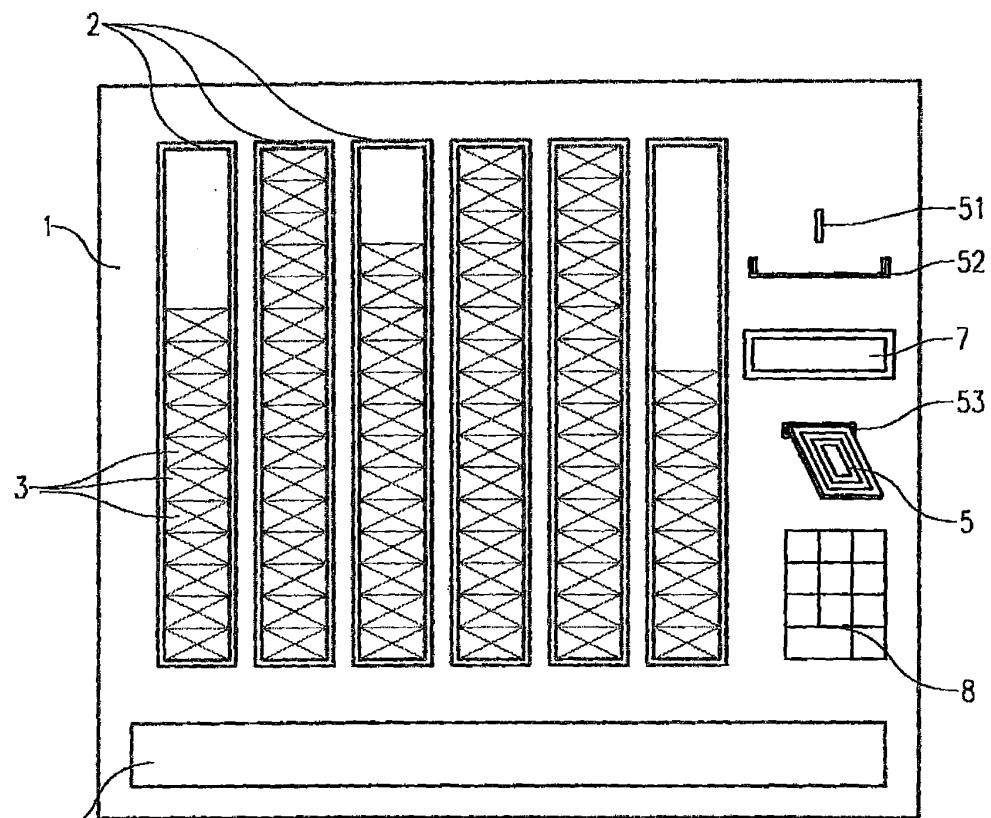


Fig.1

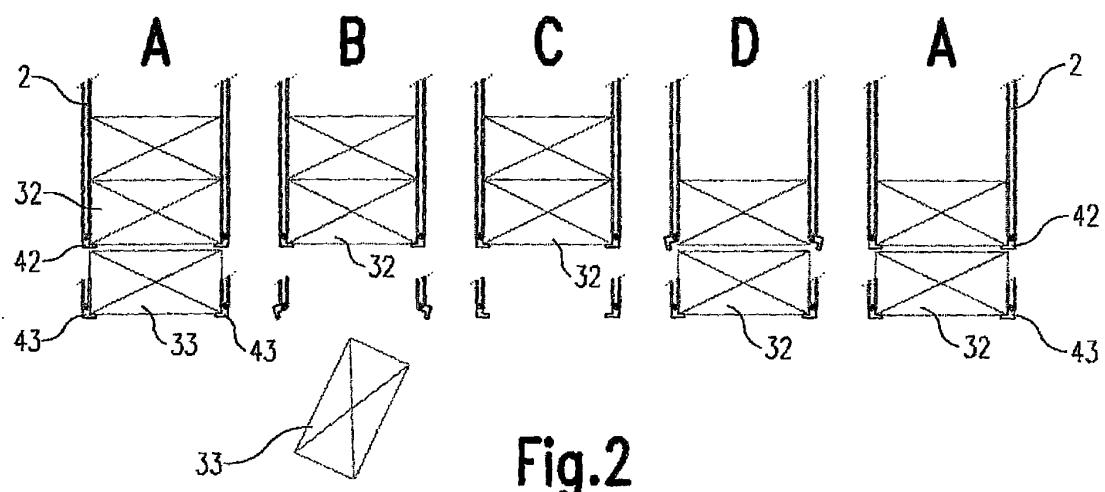


Fig.2

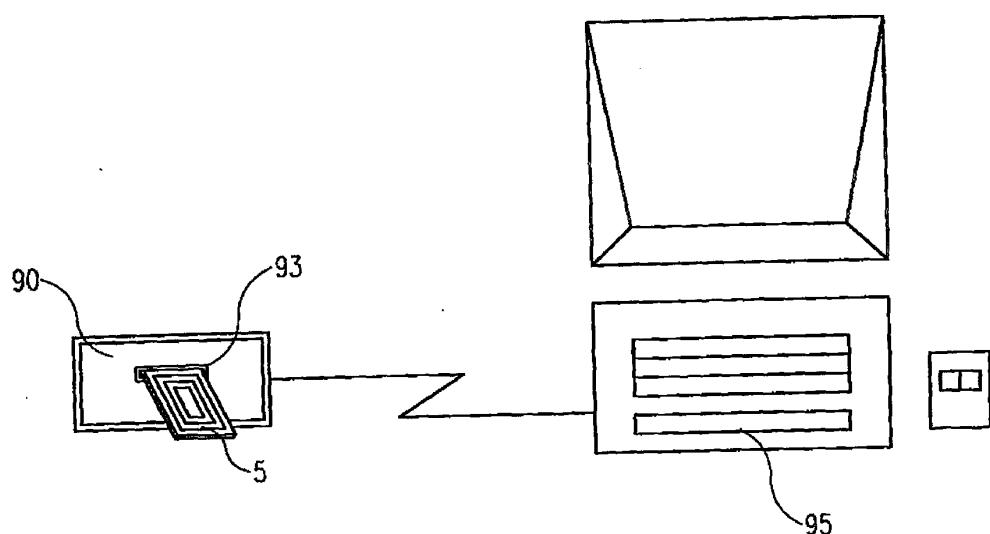


Fig.3



European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 03 07 8414

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)						
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim							
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A	WO 01/86385 A (DETISKY GROUP LP) 15 November 2001 (2001-11-15) -----	-----	TECHNICAL FIELDS SEARCHED (Int.Cl.7) G07F						
<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 34%;">Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>8 April 2004</td> <td>Guivol, 0</td> </tr> </table>				Place of search	Date of completion of the search	Examiner	THE HAGUE	8 April 2004	Guivol, 0
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