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㉑ Applicant: **Brown, Leonard Charles, Penthouse Warner
Doone Flats Warner Beach, Durban Natal (ZA)**

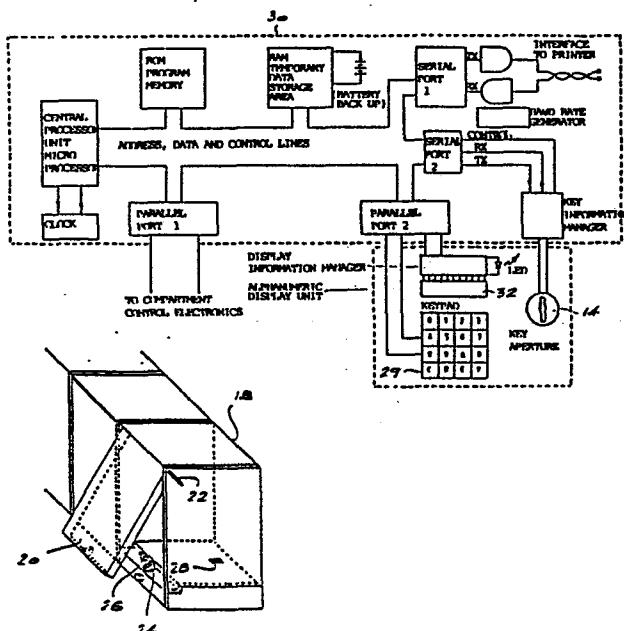
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㉑ Inventor: **Brown, Leonard Charles, Penthouse Warner
Doone Flats Warner Beach, Durban Natal (ZA)**

㉔ Representative: **Jackson, David Spence et al, REDDIE &
GROSE 16, Theobalds Road, London, WC1X 8PL (GB)**

㉔ **Video vending machine.**

㉕ An electronically controlled dispensing machine (10) for articles such as video cassettes has a plurality of individual lockable compartments (18). The compartments (18) have transparent doors (20) through which the articles can be identified. A customer presents a coded data storage token (16), with a credit amount stored on it to the machine (10), and selects and removes one or more articles. The machine (10) reduces the credit amount on the token (16). The articles can be returned to a vacant compartment in due course, and if the article is returned late, a further amount is deducted from the credit amount on the token (16). The token (16) is in the form of a key which contains a memory element, and a key receptacle (14) in the machine (10) has contacts for connecting the key memory element to a microprocessor system (30) which controls a solenoid-operated latch (24) in each compartment (18) and receives open/closed information on the state of the door (20) from a switch (26) and empty/occupied information from contacts (28) inside the compartment (18). A user prompting display (32) is also controlled by the system (30).



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"VIDEO VENDING MACHINE"

BACKGROUND OF THE INVENTION

This invention relates to a dispensing machine and in particular to a machine adapted for dispensing video cassettes intended to be used by borrowers using the 5 services of a particular video outlet.

Vending machines are well known in the prior art, these generally being of the coin-operated type in which the user of a machine inserts a coin to receive a commodity such as a pack of cigarettes, cool drinks or the like. 10 Also well known in the prior art is the new electronic banking system where a client of a particular bank inserts a card which actuates a device to deliver a predetermined or chosen amount of money. Documented prior art of which the applicant is aware includes the 15 following:

United States patent 4 179 064 (Yoshioka et al) which discloses a memory holder insertable in an opening of a vending machine. On selection of the appropriate buttons merchandise is discharged from an opening and 20 the information of the selected merchandise is transmitted to the memory holder which is readable by an accounting machine which computes the value of the merchandise.

In United States patents 4 297 569 and 4 436 993 (Flies) data storage devices shaped as keys are described. These key devices store information which is readable by the device into which the keys are inserted, and are 5 also capable of taking in new information.

United States patent 4 458 802 (McIver et al) discloses a method and apparatus for renting video cassettes. A token presented by a customer is retained by the apparatus until the rented cassettes are returned. 10 Alternately, an accounting system which may be linked to a central computer is envisaged for use with this apparatus. The apparatus comprises a carousel mechanism with a number of compartments, each of which holds a video cassette. The cassettes bear an individual code 15 and when a cassette is returned, the apparatus reads the code and identifies the cassette before returning it to its own particular compartment.

United States patents 4 414 467 and 4 300 040 (Gould et al) describe video cassette vending machines in which a 20 terminal enables a card holder to preview cassettes prior to ordering the cassette.

United States patent 4 020 326 (Coulthurst) describes token control equipment in which information about use of a token is recorded. The recorded information is 25 continually updated to keep track of use of the token.

SUMMARY OF THE INVENTION

According to the invention an apparatus for dispensing articles comprises a plurality of compartments for storing the articles, each compartment having an 30 electronically-controlled lockable door and at least

part of an article stored in any compartment being visible from outside the compartment; control means for selectively unlocking the compartments in response to control signals; means for accepting and reading a 5 token presented by a user of the apparatus, the token having a memory element; selection means for selecting a desired article; and processing means for providing control signals to the control means in order to unlock the door of a compartment containing an article selected 10 by use of the selection means and for transferring information to and from the token, the user removing the selected article from the unlocked compartment, and information relating to the dispensing transaction being stored by the token.

15 The apparatus may be arranged to allow the user to return a previously removed article to a vacant compartment, the door of a selected vacant compartment being unlocked to allow replacement of the article.

In a preferred form of the invention the items for 20 display are cassettes and in particular video or audio cassettes. Preferably the unit comprises a free-standing cabinet for storing and displaying video cassettes, with a large part of the front area of the cabinet being divided into a plurality of compartments 25 for displaying cassettes which are arranged in horizontal and vertical rows. Each compartment preferably has a normally locked electronically-operated door which is adapted to be unlocked by control means comprising a device such as a solenoid on receipt of a 30 control signal from the processing means.

The token preferably comprises a data storage token which is shaped in the form of a conventional key and which includes an electronic memory element for storing

and retrieving information. An example of a suitable token is that disclosed in United States patent 4 436 993.

BRIEF DESCRIPTION OF THE DRAWINGS

5 An embodiment of the invention is described by way of example with reference to the accompanying drawings in which:

Figure 1 is a front view of a video cassette dispensing machine according to the invention;

10 Figure 2 is a perspective view of a compartment of the cabinet of Figure 1;

Figure 3 is a perspective view of a data storage token or key suitable for use with the dispensing machine of Figure 1;

15 Figure 4 is a block diagram of electronic processing circuitry for the machine of Figure 1;

Figure 5 is a block diagram of an electronic control circuit for a compartment of the machine of Figure 1; and

20 Figure 6 is a diagram of electronic bus circuitry between the compartments and the processing circuitry.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings a video cassette vending machine 10 comprises a free standing cabinet 12 having a 25 key reader with an insertion aperture 14 for receiving a data storage token or key 16.

The cabinet 12 has an upper section divided into a plurality of compartments 18 which are arranged in vertical and horizontal rows. As seen in Figure 2 each compartment 18 has a transparent door 20 which is hinged 5 at a hinge pin 22 and adapted to lock and unlock by a solenoid-operated latch 24. Two sensor devices 26 and 28 are provided to sense the opening and closing of the door 20 and the presence of a cassette respectively. A lower section of the cabinet houses the key-receiving 10 aperture 14 and a keypad 29. Adjacent the keypad 29 on the front panel of the cabinet 12 is an alphanumeric display 32 which provides information to prompt a user of the vending machine.

The key receiving aperture 14 is provided with contacts 15 which make contact with complementary contacts on the shank of the key 16 and which connect an electronic memory element in the key 16 to a microprocessor-based processing circuit 30 (Figure 4). Information stored in the memory element, which is an electrically-erasable 20 element such as an EEPROM, is thus passed through a serial port into the microprocessor bus. Information from the processing circuit 30 can also be fed into the memory element of the key 16 and stored therein.

Figure 5 shows an electronic control circuit together 25 with a solenoid 34 which operates the latch 24 of each compartment to unlock the door 20. Each compartment has its own control circuit which has a unique address code. Also shown in the circuit of Figure 5 are the sensors 26 and 28.

Figure 6 shows the layout of the communication bus between the processing circuit 30 and the various control circuits. The processing circuit addresses the control circuits of each compartment on a multiplexed 5 parallel bus.

Prior to use of the vending machine 10, a customer of the establishment which operates the machine is provided with a key 16 which is pre-programmed with, inter alia, a personal identification number of four digits, a 10 credit amount corresponding to a preselected number of video cassettes, information identifying the customer such as his name and identity number, the number of cassettes which may be taken by the customer at one time and the like. The customer's key is programmed using 15 the machine itself, after a supervisor has first inserted a master key and set the machine to a "key initialise" mode, and then removed the master key. A blank key is then inserted and by means of the keypad the required data is entered into the machine and the 20 customer's key is encoded accordingly.

To use the machine 10, a customer approaches the machine and, prompted by the alphanumeric display 32, inserts his key 16. He is then prompted to enter his personal identification number. The machine 10 reads the 25 information in the key 16, and if the information is valid and if the customer's identification number corresponds to that read from the key 16, the display 32 prompts the customer to proceed. The customer can identify various video cassettes through the transparent 30 doors 20 of the compartments 18. Each compartment 18 has its own number and by entering that number into the keypad 29, the customer causes the processing circuit 30 to transmit a code which is decoded only by the control circuit of that compartment. An LED next to the number

on the compartment selected is then illuminated to confirm to the customer that he has entered the correct number, and the control circuit then energises the solenoid 34 and unlocks the compartment. The customer 5 may then remove the cassette, and close the door. The sensors 26 and 28 ensure that non-closure of the door or non-removal of the cassette is detected, and the customer is prompted accordingly. In addition, an audible warning device can be provided. The processor 10 circuit 30 monitors the transaction and may trigger an alarm or erase the key 16 if an improper transaction is attempted. The processor circuit also monitors the condition of the doors 20 and an alarm is triggered if a door 20 is forced open.

15 The customer can select further cassettes up to the preset limit. When the transaction is completed, the credit amount stored in the key 16 is reduced according to the number of cassettes removed, and the customer may then remove the key. The vending machine 10 can include 20 a printer to provide a printed transaction record for the customer if this is required.

To return a cassette, the customer inserts the key 16 into the aperture 14 and, again prompted by the display 32, selects the number of any vacant compartment, and 25 places the cassette in the compartment and closes the door. The sensor 28, which comprises a pair of electrical contacts, makes contact with a metallic label attached to the cassette container when the cassette is placed in the compartment, so that non-return of 30 a cassette is detected. If the cassette is returned after a predetermined time limit has expired, the credit amount stored in the key 16 is further reduced.

The machine 10 can be provided with an internal logging printer to record details of all transactions, or it can store a number of transactions, say, the last one hundred transactions, in memory for recall by a 5 supervisor holding a master key. A remote control computer can be used to monitor the operation of a number of vending machines at different locations.

A particular advantage of the described vending machine is that it is mechanically simple compared to other 10 proposed machines, since the only mechanical parts are the door lock solenoids. If one solenoid becomes inoperative, the machine can still be used.

Another advantage is that the customer's token is directly debited by an amount corresponding to the 15 transaction, so that a complex accounting system is not required in the machine.

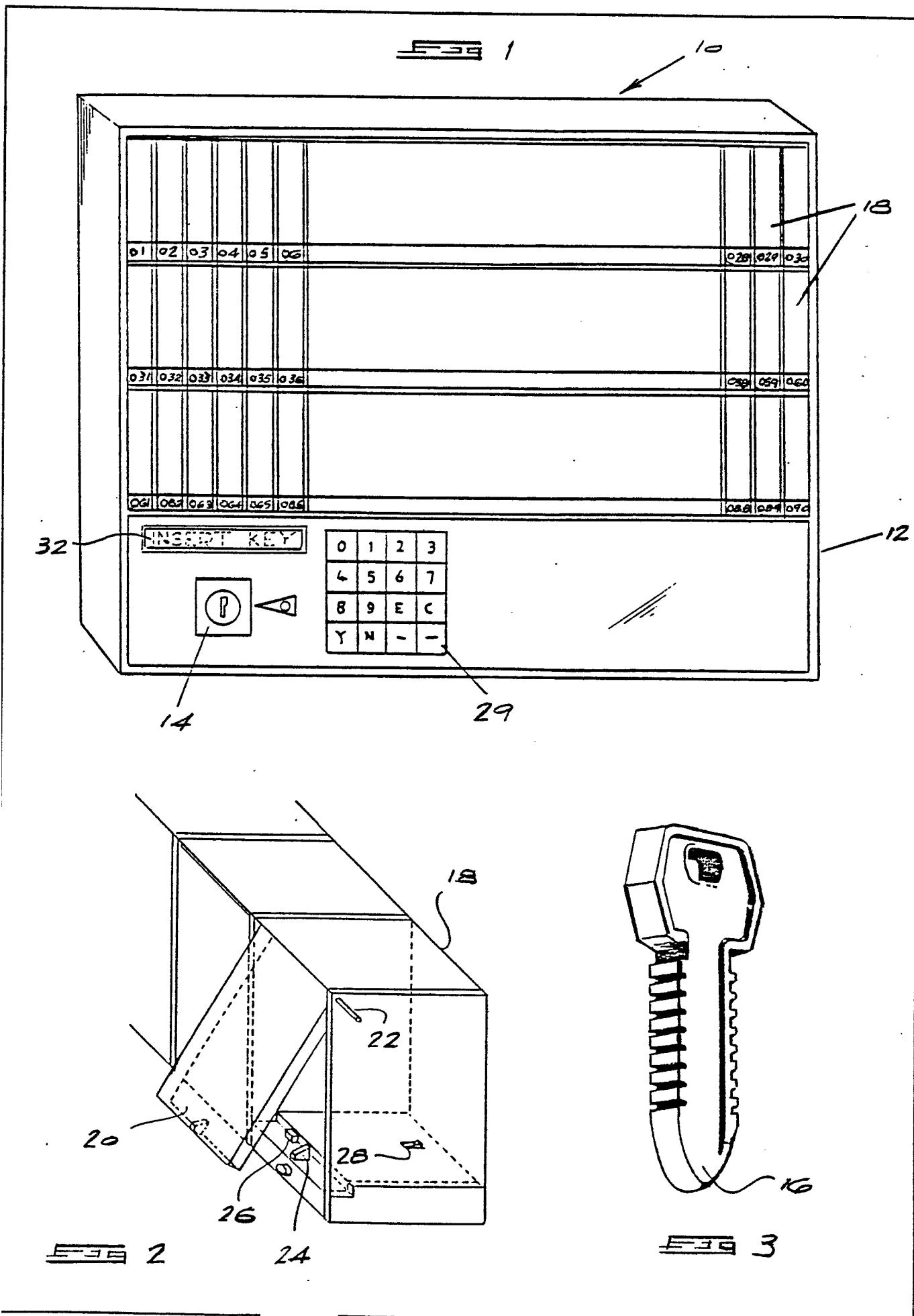
The use of transparent doors on the compartments makes it unnecessary to provide a display of the contents of the machine other than the information (e.g. title) 20 marked on the cassette and visible to the user from outside the machine, and eliminates the need to correlate a particular cassette with a particular compartment.

CLAIMS

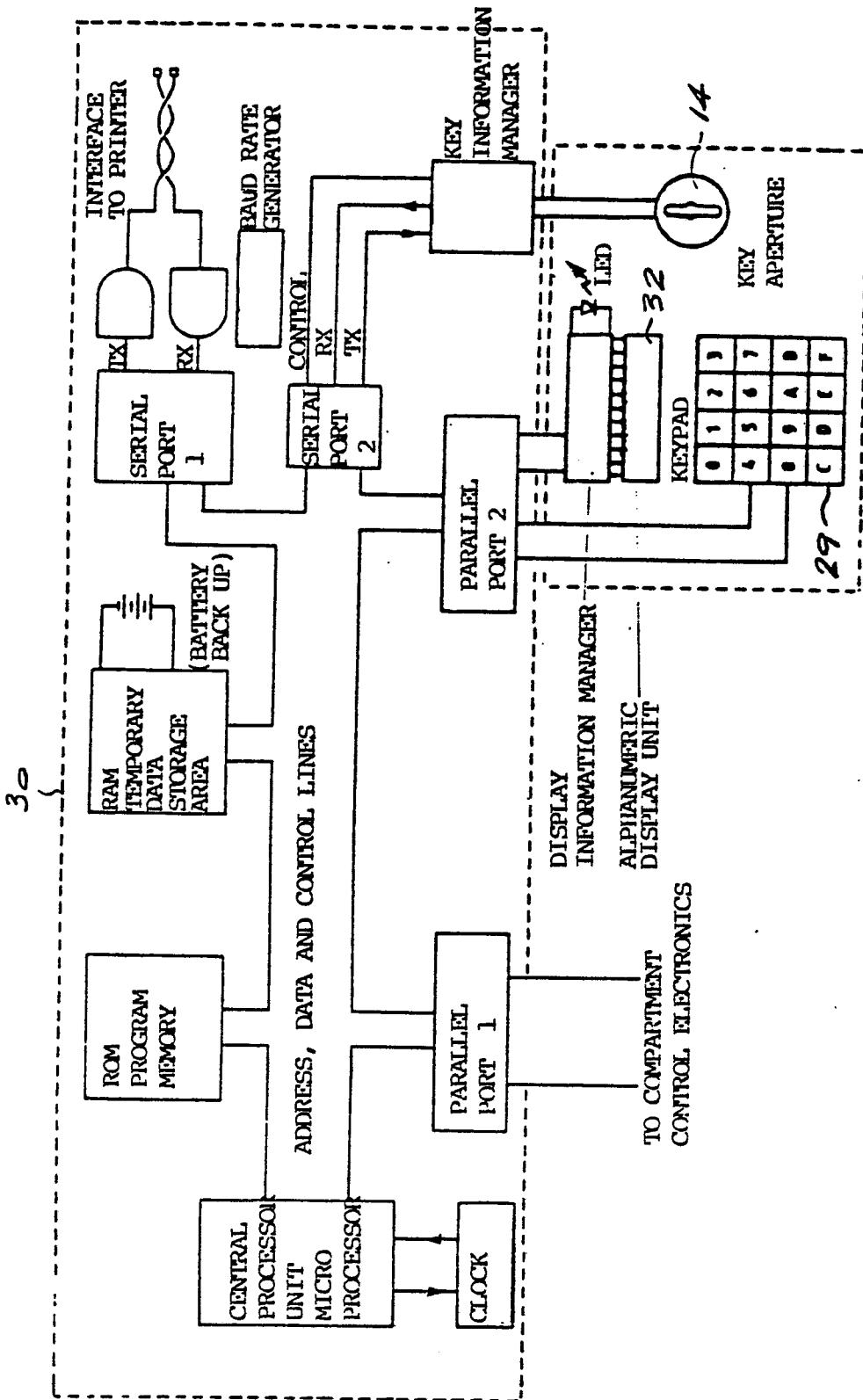
1. An apparatus for dispensing articles comprising a plurality of compartments (18) for storing the articles, each compartment (18) having an electronically-controlled lockable door (20) and at least part of an article stored in any compartment (18) being visible from outside the compartment; control means (26,30,34) for selectively unlocking the compartments (18) in response to control signals; means (14,30) for accepting and reading a token (16) presented by a user of the apparatus, the token (16) having a memory element; selection means (29,30) for selecting a desired article; and processing means (30) for providing control signals to the control means (26,30,34) in order to unlock the door (20) of a compartment (18) containing an article selected by use of the selection means (29,30) and for transferring information to and from the token (16), the user removing the selected article from the unlocked compartment (18), and information relating to the dispensing transaction being stored by the token (16).
2. An apparatus according to claim 1 characterised in that the apparatus is adapted to receive a previously removed article in a vacant compartment, the door (20) of a selected vacant compartment (18) being unlocked to allow replacement of the article.
3. An apparatus according to claim 1 or claim 2 characterised in that the door (20) of each compartment (18) is at least partially transparent.
4. An apparatus according to any one of claims 1 to 3 characterised in that the token (16) is a data

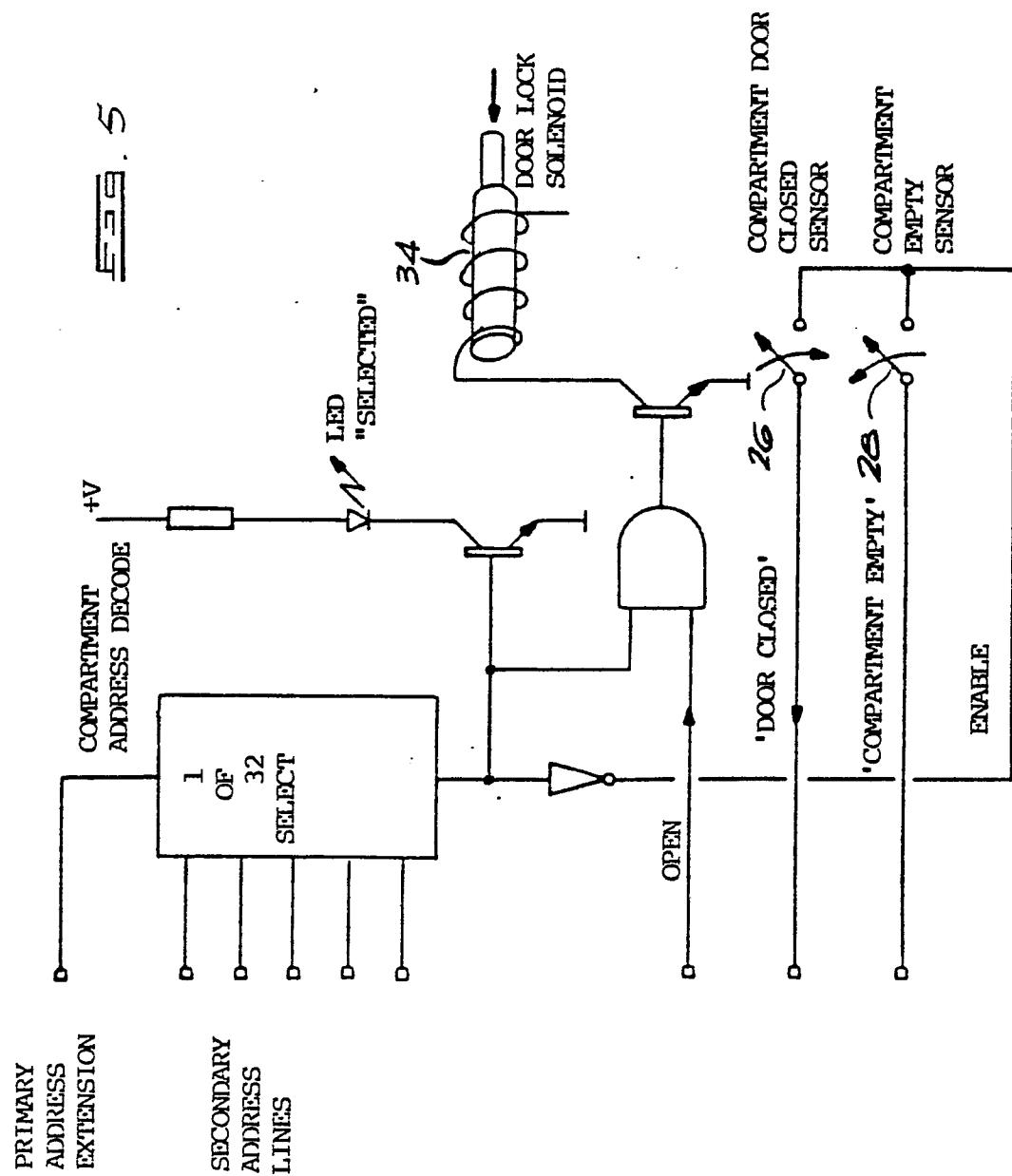
storage key containing an erasable memory element.

5. An apparatus according to claim 1 characterised in that the key (16) is encoded with information representing a credit amount, the amount being reduced when an article is dispensed and the reduced amount being recorded on the key.
10. An apparatus according to any one of claims 1 to 5 characterised by including means (30) for detecting improper transactions and for erasing at least part of the information encoded on the token (16) to invalidate the token (16) when an improper transaction is detected.
15. An apparatus according to any one of claims 1 to 6 characterised by including article sensor means for detecting the presence of an article in a compartment.
20. An apparatus according to claim 7 characterised in that the article sensor means (28) comprises electrical contacts arranged to make contact with an electrically-conductive portion of an article which has been correctly inserted into the compartment (18).
25. An apparatus according to any one of claims 1 to 9 in which the article are tape cassettes.

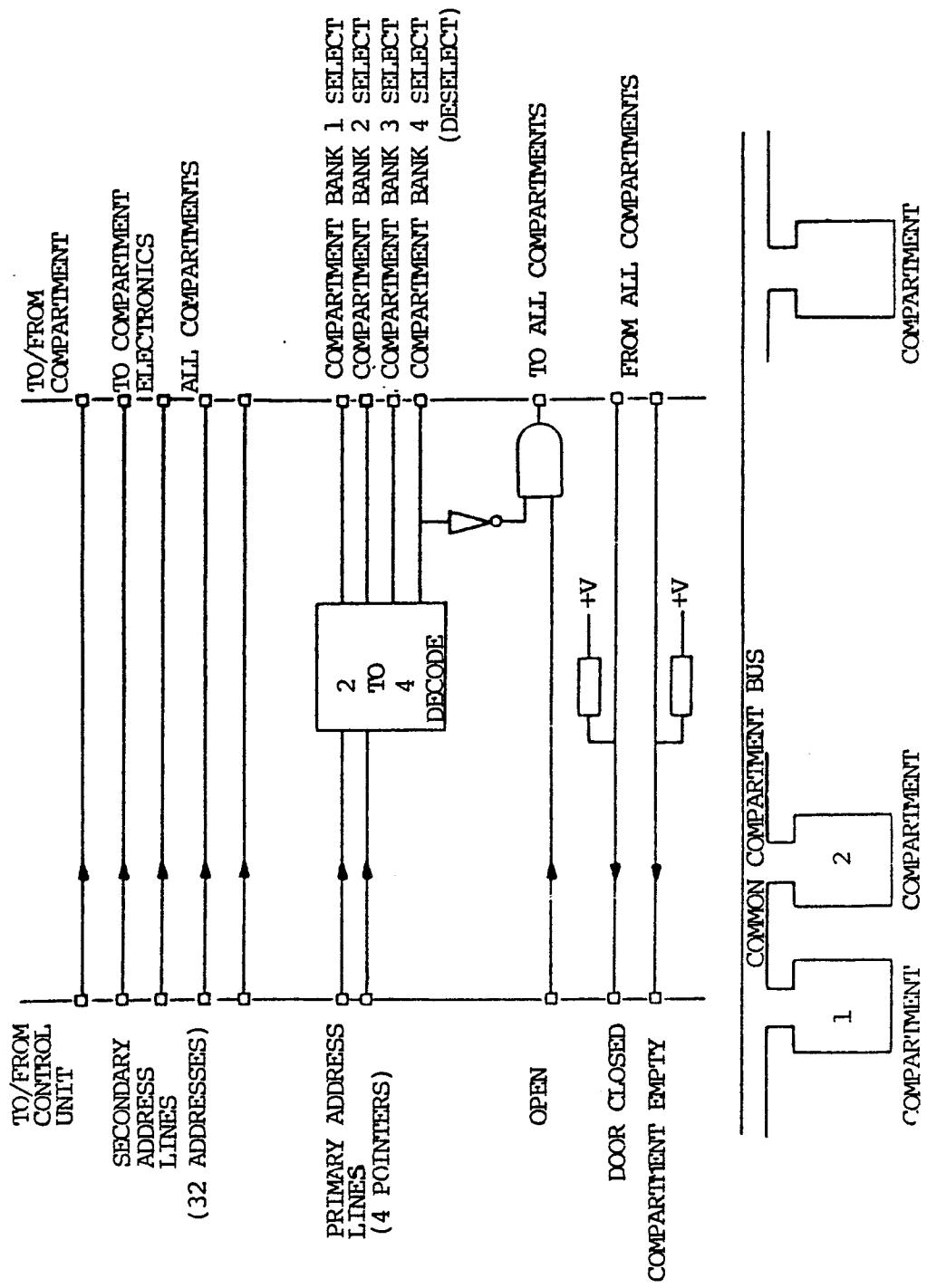


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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	DE-A-3 336 619 (GOLDMAN) * Page 9, line 16 - page 14, line 22; figures *	1-5	G 07 F 7/06 G 07 F 7/00
A	---	6-8,10	
Y	FR-A-2 542 115 (J. GUERRERO et al.) * Page 1, line 1 - page 2, line 40; page 3, lines 10-24; claims 1-6; figure *	1,4,5	
Y	---	1-3	
	CH-A- 440 790 (E. LANDENBERGER) * Column 1, lines 27-39; column 3, lines 8-31; figures *		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	---	9	
A	AU-B- 514 126 (MATSUSHITA REIKI) * Claims; figures *	1,4,5	G 07 F
A	---	1-3,9	
	GB-A-2 115 197 (A.H. MELVYN) * Abstract; page 1, lines 31-61 and line 106 - page 2, line 7; page 2, lines 44-50; figures *		
	---	-/-	
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	19-02-1986	MEYL D.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone	T : theory or principle underlying the invention		
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A : technological background	D : document cited in the application		
O : non-written disclosure	L : document cited for other reasons		
P : intermediate document	& : member of the same patent family, corresponding document		



EUROPEAN SEARCH REPORT

0205691

Application number

EP 85 30 4325

DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	GB-A-2 143 662 (ESSEX ENGINEERING CO.) * Page 1, line 46 - page 2, line 27; page 3, lines 48-63; figures * --- US-A-4 458 802 (J.A.M. KENNETH et al.) * Page 1, line 11 - page 2, line 44; page 8, lines 21-57; claims; figures * -----	1,10	
A,D		1,4,5,10	
TECHNICAL FIELDS SEARCHED (Int. Cl.4)			
The present search report has been drawn up for all claims			
Place of search THE HAGUE	Date of completion of the search 19-02-1986	Examiner MEYL D.	
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	