



**EUROPEAN PATENT APPLICATION**

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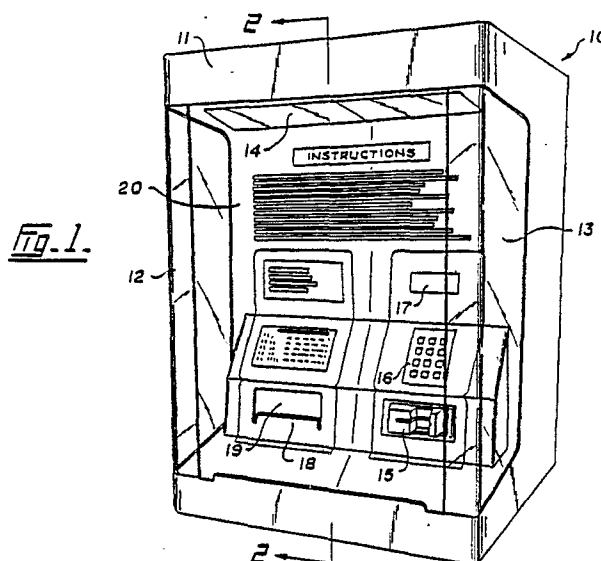
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**Key dispensing apparatus.**

This invention provides an automated electronic key dispenser for use in the motel industry. The dispenser is activated by means of a credit card inserted by a customer. The customer chooses his

accommodation by entering his requirement via a key board system. The system will record data off the credit card, bill the client, register the guests and dispense a room key.



## KEY DISPENSING APPARATUS

### FIELD OF THE INVENTION

This invention generally relates to credit card activated dispensing machines and more particularly to an automated electronic key dispenser activated by credit cards. Although this invention has been devised for use in the motel industry, other applications may be found where there exists a requirement for an electronic key dispenser.

### DESCRIPTION OF THE PRIOR ART

Those familiar with the motel industry are well aware of difficulties that may arise in having to use a night clerk for registration of guests at late and early hours of the day. Whether they are owner/managers or employees, motel operators often suffer from burnout due to the fatigue and stress of consistently having their sleep disturbed at night to register late arrivals. The attitude of even the best operator deteriorates when he begins to lose sleep. Staff is required to be on call at all hours and by doing so, will lead to inefficiency and high cost that result from excessive staff turnover. Motel managers will often have to hire night clerks and relief help for times when regular attendants are not available. The no-vacancy sign will often be raised when rooms are actually available in a motel. This situation commonly occurs when fedup operators decide they should get some much needed sleep, regardless of customer demand.

In some high crime areas, many motels go as far as refusing to check people in after 8 o'clock at night due to the security factor. Where a crime is a problem, expensive anti-robbery equipment and systems are required but a threat to human life and high insurance cost will still exist.

### SUMMARY OF THE INVENTION

The present invention will eliminate these familiar industry problems by providing an automated guest registration system or more specifically an automated electronic key dispenser which is activated by credit cards. The customer chooses his accommodation by entering his requirements via a key board system. The system records data off the credit card, registers the guest or guests according to their needs, dispenses room keys and automatically prepares billing information. The client will

automatically be billed along with other credit card purchases.

It is therefore the principal object of the present invention to provide a weather-proof and vandal-resistant electronic key dispenser which is accessible by credit card and allow customers to enter their requirements on a key pad which will then be recorded by data recorder.

Accordingly, an aspect of the present invention is to provide an automatic electronic key dispensing apparatus comprising: customer activated accessing means for enabling said apparatus and reading customer identification and information; interface means to allow said customer to select and enter required data; means for displaying said data and guide said customer in operating said apparatus; means for processing and recording said customer identification, information and said required data; key dispensing means activatable by said processing means for releasing a selected key.

### DRAWINGS

Particular embodiments of the invention will be understood in conjunction with the accompanying drawings in which:

Figure 1 is a perspective view of the electronic key dispenser disclosed in the present invention;

Figure 2 is a sectional view thereof;

Figure 3 is a perspective view of the key dispenser;

Figure 4 is an exploded view showing the key dispenser/chute arrangement;

Figure 5 is a block diagram of the key dispenser circuitry;

Figures 6, 7, 8 and 9 are a detailed flow diagram of the main program;

Figures 10 and 11 are a detailed flow diagram of the supervisory program;

Figure 12 is a flow diagram of a read/write check of the random access memory sub-routine;

Figure 13 is a flow diagram of the key setting sub-routines;

Figure 14 is a flow diagram of the print sub-routine;

Figure 15 is a flow diagram of the room rate setting sub-routine;

Figure 16 is a flow diagram of the set rate sub-routine;

Figure 17 is a flow diagram of the check sub-routine;

Figure 18 is a flow diagram of the tax setting sub-routine;

Figure 19 is a flow diagram of the season setting sub-routine;

Figure 20 is a flow diagram of the credit card checking sub-routine;

Figure 21 is a flow diagram of the key release system check sub-routine; and

Figure 22 is a flow diagram of the room selecting sub-routine.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

If we now refer to Figure 1, we have shown at reference numeral 10 the preferred embodiment of the invention. The electronic key dispenser is provided in a housing 11 which can either be mounted on a wall or on a pedestal. The internal working parts of the dispenser are made accessible through the back by means a rear panel 32 shown in Figure 2. Housing 11 is similar to a housing used in the banking industry or for public telephones. These include a somewhat rectangular box which can be made of sheets of metal, having transparent side panels 12 and 13 which can be made of polycarbonate and includes an overhead light 14 which will illuminate the key dispenser apparatus at night. In its basic form, the key dispenser includes a card reader 15, a key pad 16 by which guests can enter their requirements by pressing the appropriate keys on the key pad, a liquid crystal display 17 is provided to display appropriate data, and a key dispensing assembly 18 having a door-trap 19 permitting access to a retrieving box (not shown) for removal of a dispensed key. Instructions can be provided on the front panel 20 to guide a customer before operating the electronic key dispenser.

The card reader 15 is used by a customer to access the key dispensing apparatus 10 which will be enabled upon insertion of a credit card. A modem connected to a telephone line allows card reader 15 to read the authorization code transmitted by the appropriate credit card company, read the customer identification and permit loading and extraction of information from the credit card.

Figure 2 is a section view depicting the major components of the key dispensing assembly. This assembly is comprised of three major components which includes a key releasing mechanism 30 positioned at the top of a housing 11 and disposed so as to face rear panel 32. The key releasing mechanism 30 is placed above a chute 33 which will guide a dispensed key into a retrieving box 34. A key can be retrieved by a customer by pushing door 35a inwardly as shown at 35b. Access to the

chute from the outside is prevented by means of a preventor 36 which will limit the amount of travel allowed when door 35a swings open to the position shown at 35b.

Rear panel 32 is accessible from inside the motel in order to allow a motel operator to replace room keys that have been returned by guests, back on the key releasing mechanism 30.

Key releasing mechanism 30 is disclosed further in Figure 3. This key releasing mechanism is the subject of a co-pending patent application. In its basic form the key releasing apparatus includes a number of solenoid activated rods 40 on which a key having either a hole on key ring (not shown) is positioned. A retaining plate 41 is placed in front and makes contact with each individual rod 40 to prevent accidental releasing of a key. The individual keys are positioned into rows and columns such that each individual key will have a different row/column combination. Each row and column of keys is stepped apart from an adjacent row and column so as to prevent a key from being accidentally jammed thus preventing proper releasing of said key.

As disclosed in applicant's co-pending application, a solenoid matrix activatable by means of separate row and column select drivers is configured to allow the dispensing of any individual key.

Figure 4 shows the exploded view of the key dispensing assembly. The key releasing mechanism 30 is positioned above a funnel-shaped chute 33 which is positioned and supported behind the key dispensing box 34 which is further positioned behind front panel 20. The key releasing mechanism 30 faces the rear panel (not shown) in order to allow access to the key releasing mechanism.

We have shown, in Figure 5, a block diagram of the electronic circuitry used in the operation of the electronic key dispenser. Most of the operations and instructions are controlled by the central processing unit 50. The CPU controls all data flow between peripheral devices and synchronization of the information flow. The CPU is connected to a watch dog reset circuit 51 which will reset the CPU to start executing the instructions. The circuit also monitors for hardware failure, and monitors for clock pulses occurring at regular intervals. If the clock does not re-trigger the watch dog reset 51 will assume that a failure in hardware has occurred and will therefore reset the CPU to the starting address stored in EPROM 52. The CPU can use a clock rate variable from 2 to 5 MHz.

Processor 50 is connected to a card reader 53 such that when the processor has been reset by a power up or manual reset, the processor will wait for a data ready strobe from the card reader 53. The credit card reader converts magnetic flux information stored on the credit card's magnetic strip

into a binary code. Processor 50 can access EP-ROM 52 and RAM 54 by means of address 55, buffer 56 and chip select circuit 57.

The primary function of address 55 is to demultiplex a lower order address from an 8 bit data word. Buffer 56 will control the direction of data movement to the data bus lines i.e. read or write. Chip select circuit 57 allows the selection of an appropriate peripheral device. A port input adaptor 58 is provided to extend the existing ports of processor 50 to increase its input and output capabilities. It is used to perform input and output functions for printer 59, room setting panel 60 and will generate a 4 bit data strobe to the column select chip 61 and a 3 bit data strobe to the row select chip. Column select chip 61 will generate a 16 bit data word to operate the column driver 63, of which, one of 10 bits available will be used to activate one solenoid of the 6 x 10 solenoid matrix 65. Similarly, row select chip 62 will generate an 8 bit data word to operate the row driver 64, of which, one of 6 bits available will be used by matrix 65.

Printer 59 is used as a permanent record keeper and will print all transactions that have been carried out as well as customer information and supervisory program dump. Display 66 can be a liquid crystal display, CRT, LED or similar displaying device. It is used to instruct and guide customers through the sequences required for receiving a key. Data is presented to display 66 in an 8 bit data word. The display will automatically convert this 8 bit word into the appropriate character to be displayed. Processor 50 controls the input and output of data to the display. Keypad 67 is used to interface the customer and processor 50. The keypad will receive key scan strobes from adaptor 58 and return a key return strobe depending on what buttons are depressed. As indicated previously column select 61 receives a 4 bit word from adaptor 58 thereby activating one of 10 output bits to enable driver 63 to supply power to the solenoid and consequently delivering a key.

Similarly, row select circuit 62 receives a 3 bit word from adaptor 58 and upon decoding will activate one of 6 output bits, thereby connecting the proper solenoid to ground. Signals from both the column driver 63 and row drive 62 will occur simultaneously, thereby coupling the current to flow from the power supply to the appropriate solenoid to ground. The 6 x 10 solenoid matrix 65 is composed of a possible 6 rows and 10 columns of solenoids. A common line exists for each row solenoid so as to produce the ground path for current flow. On the other hand the column solenoids are connected in parallel at the column driver output 63. Current can thereby be supplied to a selected column.

In operation, the processor 50 will strobe the matrix column and row to deliver a key by means of a port input adaptor 58. Two or more EPROMS 52 and/or RAM 54 store program executions and instructions for the processor 50. The EPROMS thereby give the system a minimum of 16 K x 8 read only memory. The EPROMS are enabled by a strobe signal from address 55. A minimum 8 K x 8 random access memory 54 is used to store programmed information such as pricing, date, tax rate, etc. Also, when a credit card has been read, verified for good credit, and an authorized number received, the card information such as name of customer, expiry date, account number, are all stored in the random access memory, for later printout. The random access memory also has the added provision of lithium battery backup, such that if a power failure occurred the owner does not have to reprogram the tax, room pricing, etc. Room setting panel 60 is a simple switch matrix of 6 x 10 design. The purpose of the switch setting panel is to enter into the random access memory the number of rooms that are available for late night business. The programming is performed by the motel operator. Power supply 68 provides a plus 5V DC and plus or minus 12V DC to the circuitry.

The basic flow charts including instructions and sub-routines for processor 50 are shown in Figures 6 to 22.

As an example, in one scenario, the electronic dispenser will function as follows: Upon arrival, a guest or customer is asked to insert his credit card into the card reader. The card reader will pick up information from magnetic strip and will send it to CPU which will verify if it complies with the magnetic strip and coding scheme of the American National Standard Institute and also verify the expiry date. The CPU will send a signal via the modem 69 and telephone line 70 to the appropriate credit card company to validate credit. At this time an authorization code is received by the CPU 50. The customer account number is checked for guaranteed reservation. If the customer has a guaranteed reservation the display will show the room rate and wait for the approval of the customer. If the customer approves, the customer is asked to remove the credit card and the customer information is saved and an appropriate room key is released. Customer information will have been printed for use by the motel manager. If the customer wants to make changes to his reservations, the electronic key dispenser will allow him to do so. A customer with no reservation can also obtain a room key after having been polled by the electronic key dispenser for the type of room that he wants as well as the number of people in his party. These and other scenarios have been provided in a number of sub-routines disclosed in Figures 6 to

22.

The previously disclosed key releasing mechanism including the 6 x 10 solenoid matrix is further explained in applicant's co-pending application.

As will be apparent to those skilled in the art in light of the foregoing disclosure, many alterations and modifications are possible in the practise of this invention without departing from the spirit or scope thereof. Accordingly, the scope of the invention is to be construed in accordance with the substance defined by the following claims.

### Claims

1. An automatic electronic key dispensing apparatus comprising:  
customer activated accessing means for enabling said apparatus and reading customer identification and information;  
interface means to allow said customer to select and enter required data;  
means for displaying said data and guide said customer in operating said apparatus;  
means for processing and recording said customer identification, information and said required data;  
key dispensing means activatable by said processing means for releasing a selected key.
2. An apparatus as defined in claim 1 wherein said customer activated accessing means includes credit card reader means for enabling said apparatus upon insertion of a credit card, said reader means being able to read identification data from said card and directly access through a modem means customer's credit card account in order to verify customer's account status.
3. An apparatus as defined in claim 1 wherein said interface means includes key pad means to allow said customer to enter the number of guests in customer's party and the type of room selected.
4. An apparatus as defined in claim 1 wherein said display means is able to display instructions and customer's selections.
5. An apparatus as defined in claim 1 wherein said processing and recording means includes a central processing unit to control data flow and synchronize executing instructions, said recording means including memory means to store program execution instructions, pre-programmed information, and customer identification and information.
6. An apparatus as defined in claim 1 wherein said key dispensing means includes a key dispenser used in cooperation with a row and column matrix selecting means to activate a solenoid driver means in said key dispenser thereby releasing a key.
7. An apparatus as defined in claim 6 wherein said key dispensing means further includes guiding

means positioned below said key dispenser, for guiding a dispensed key from said key dispenser to key retrieving means.

8. An apparatus as defined in claim 7 wherein said key retrieving means includes a key retrieving box having a door trap permitting access to said key retrieving box for removal of a dispensed key.
9. An automatic key dispensing apparatus, comprising:  
credit card reader means for enabling upon insertion of a credit card, said apparatus, said reader means being able to read identification data from said card and directly access through modem means customer's credit card account in order to verify customer's account status;  
key pad means to allow said customer to select and enter required information;  
display means for displaying instructions and customer's selections;  
processor means to control data flow and synchronize executing instructions;  
memory means accessible by said processor means to store program execution instructions, pre-programmed information, and customer identification and information;  
key dispensing means activatable by said processing means for releasing a selected key.
10. An apparatus as defined in claim 9 wherein said required information includes the number of guests in customer's party and the type of room selected.
11. An apparatus as defined in claim 9 wherein said key dispensing means includes a key dispenser used in combination with a row and column matrix selecting means to activate a solenoid driver means in said key dispenser thereby releasing a key.
12. An apparatus as defined in claim 11 wherein said key dispensing means further includes guiding means positioned below said key dispenser, for guiding a dispensed key from said key dispenser to key retrieving means.
13. An apparatus as defined in claim 12 wherein said key retrieving means includes a key retrieving box having a door trap permitting access to said key retrieving box for removal of a dispensed key.
14. An apparatus as defined in claim 11 wherein said row and column matrix selecting means includes row and column select driver means activated by said processor means.

Fig. 1.

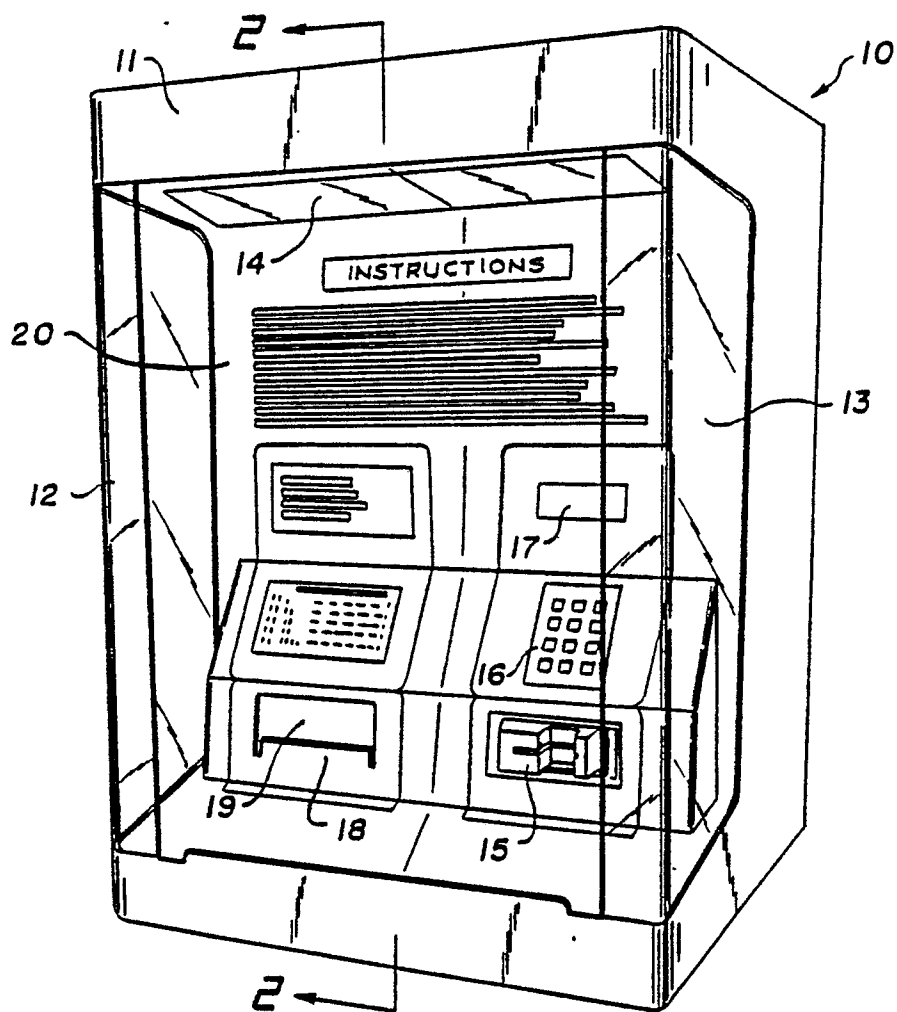


Fig. 3.

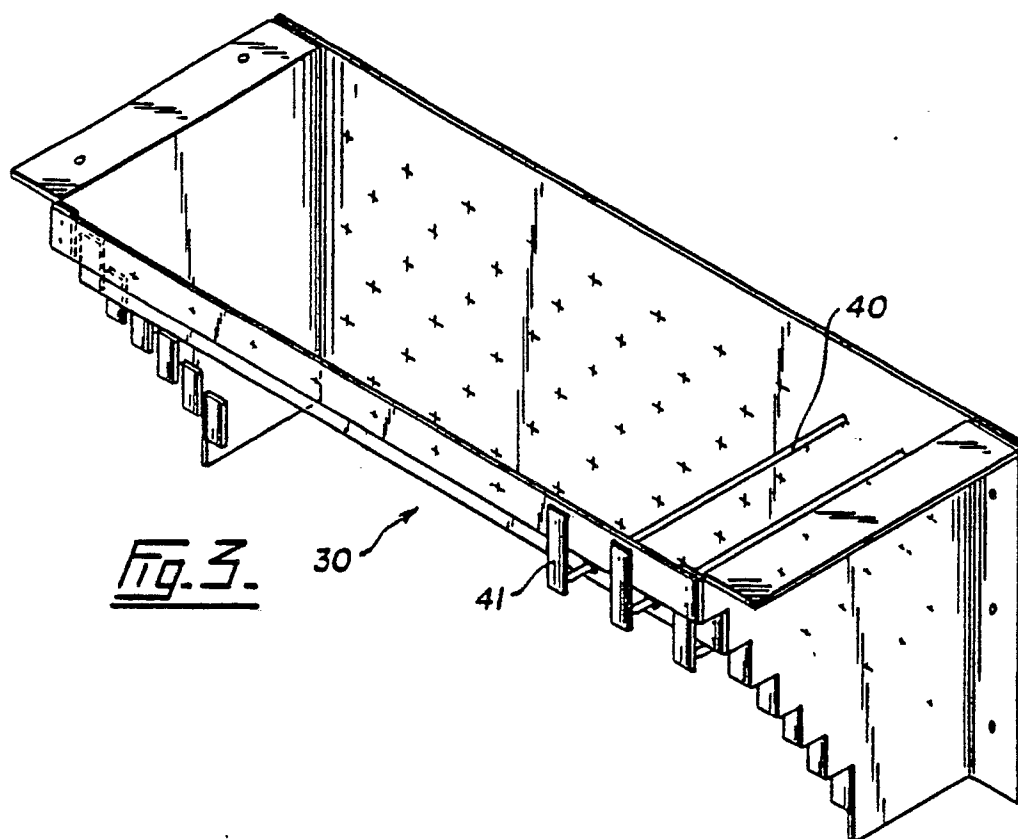


Fig. 2.

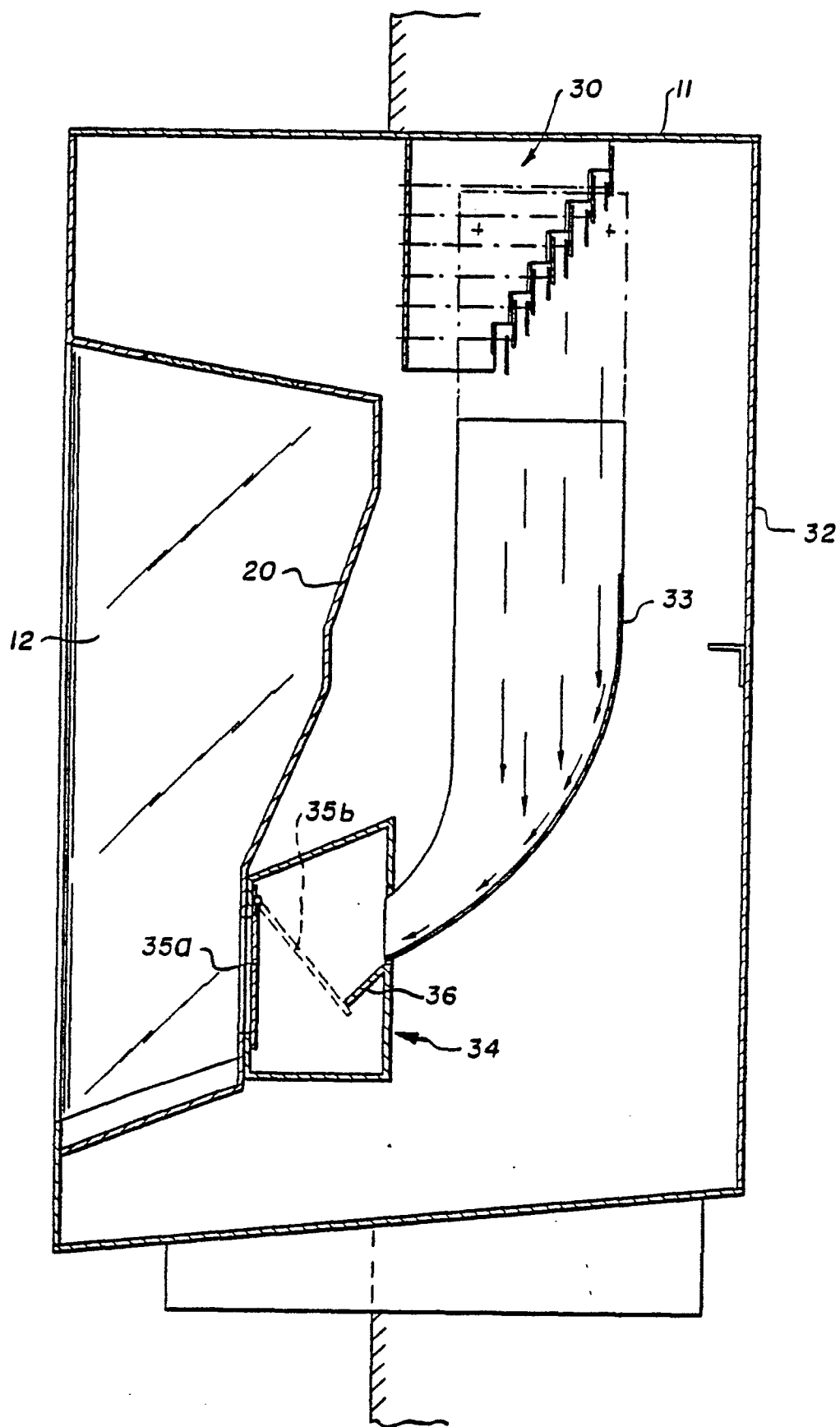
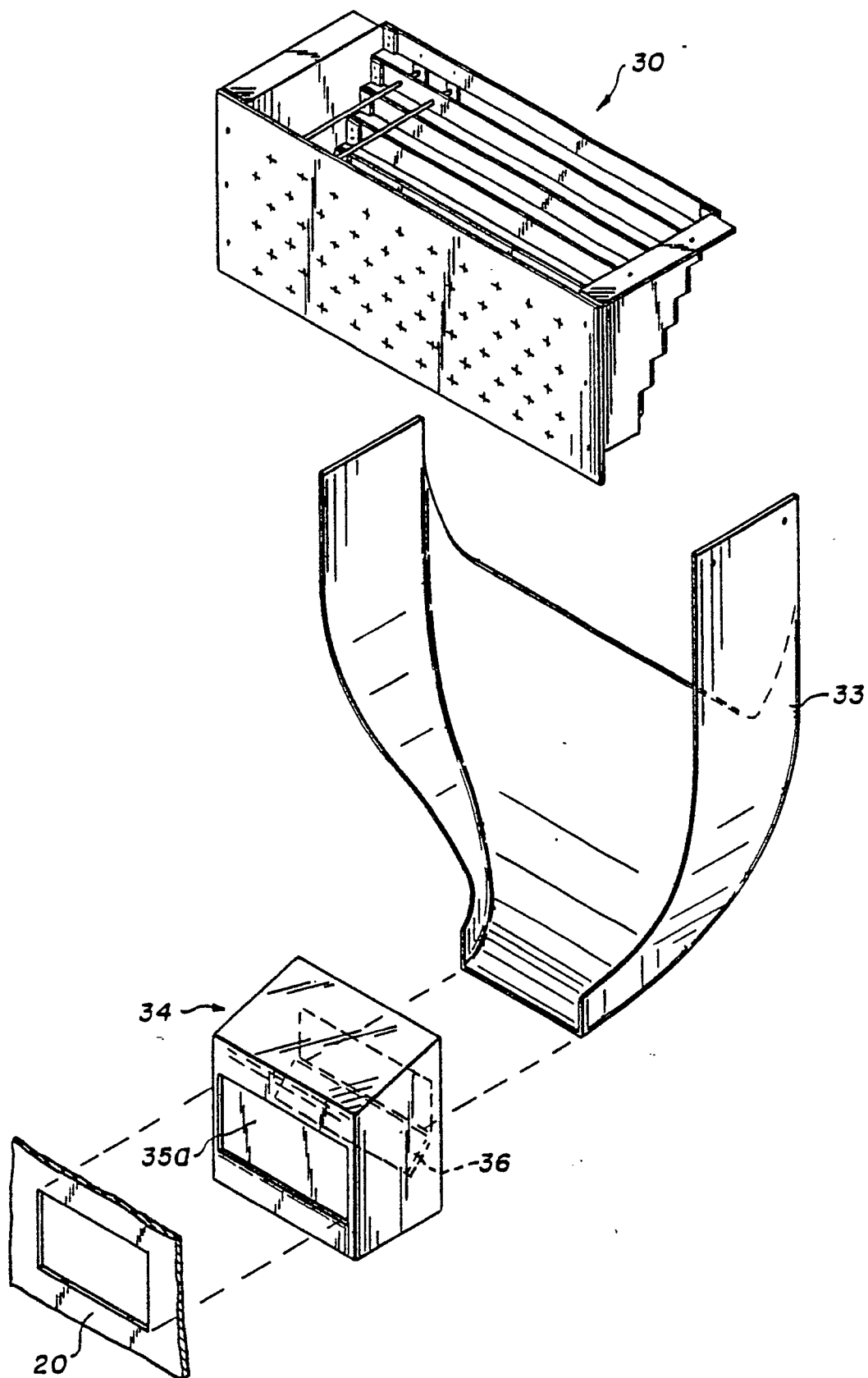


Fig. 4.





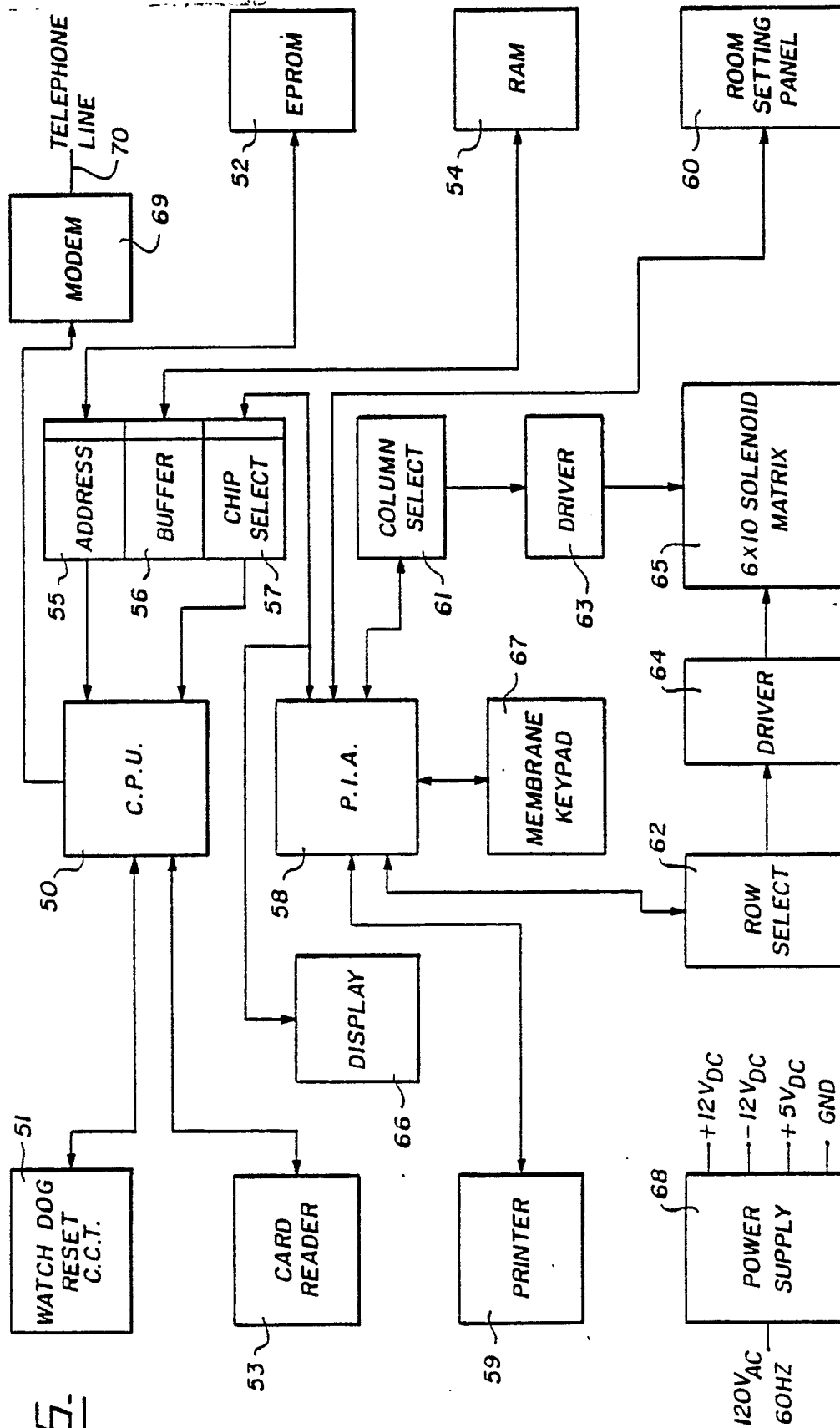


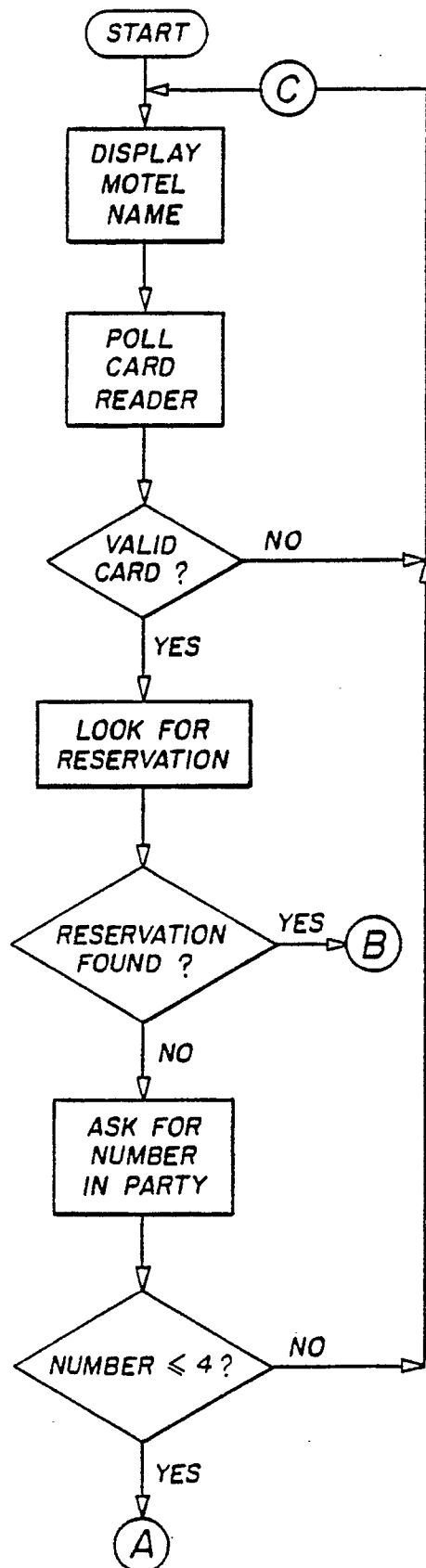
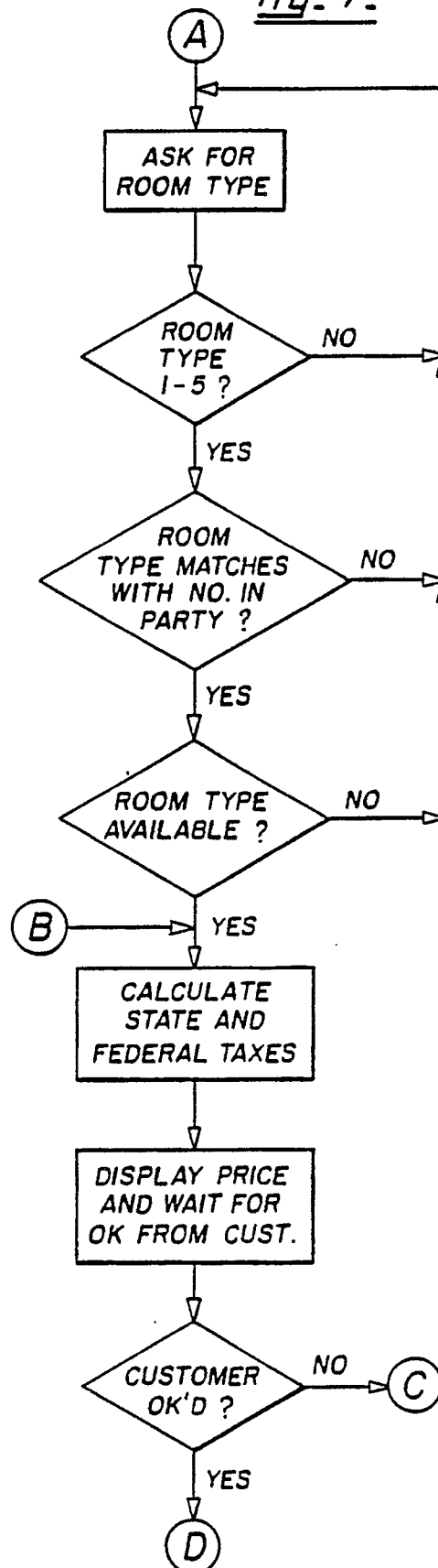
Fig. 6.Fig. 7.

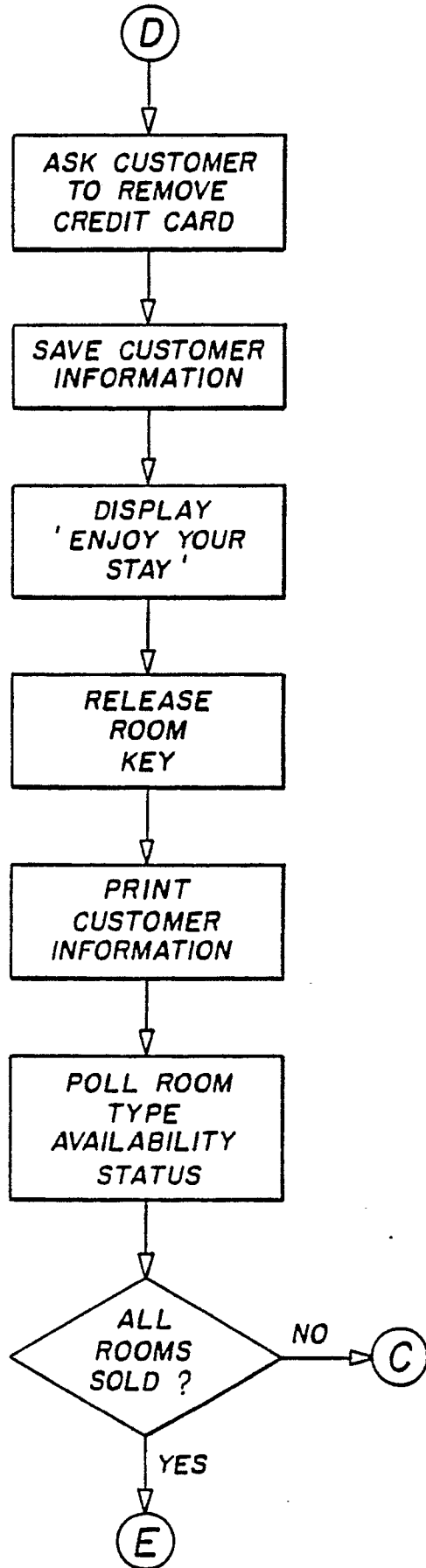
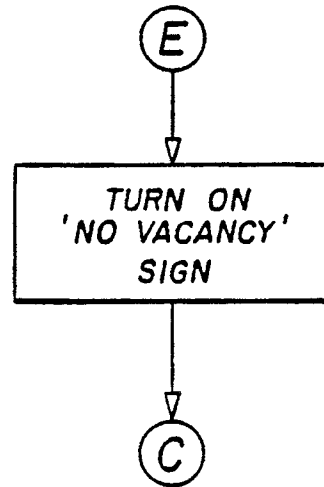
Fig. 8.Fig. 9.

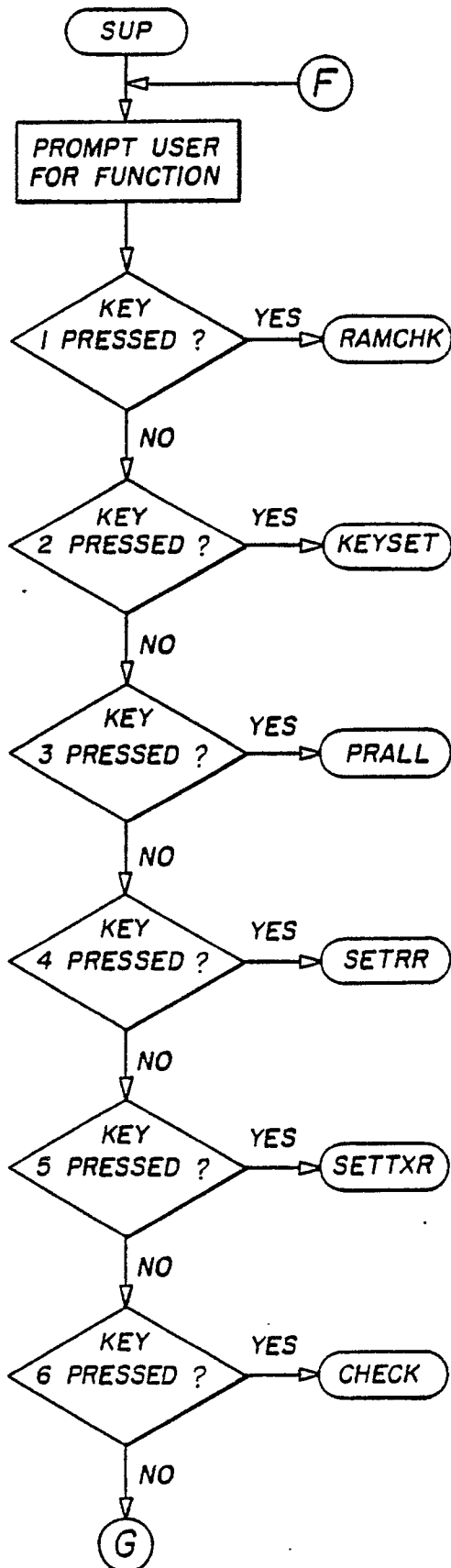
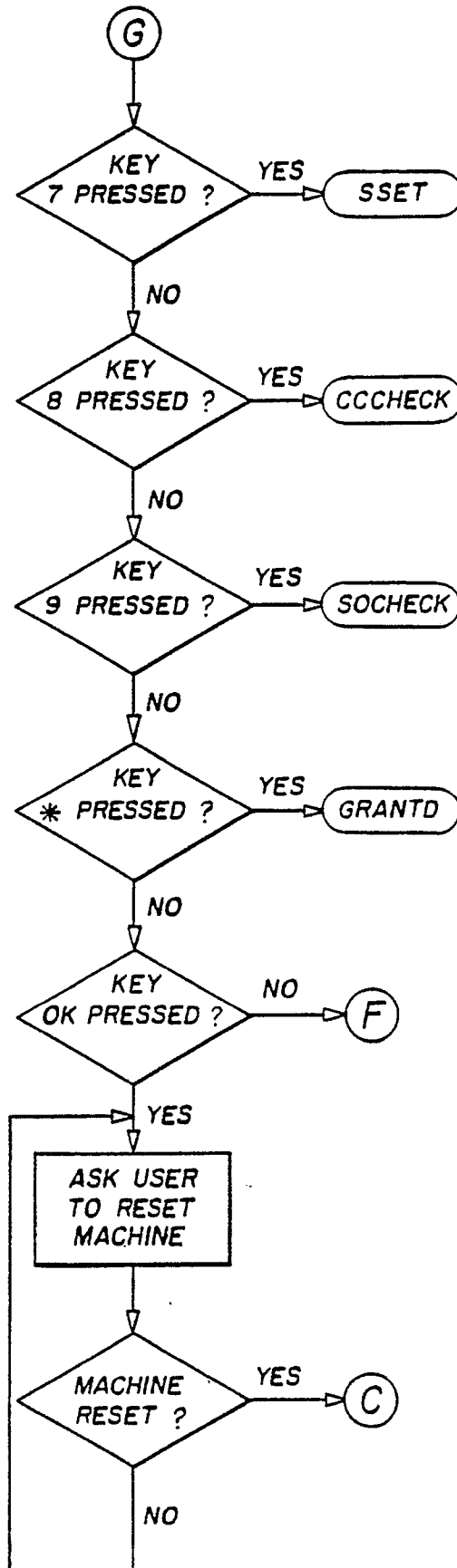
Fig. 10.Fig. 11.

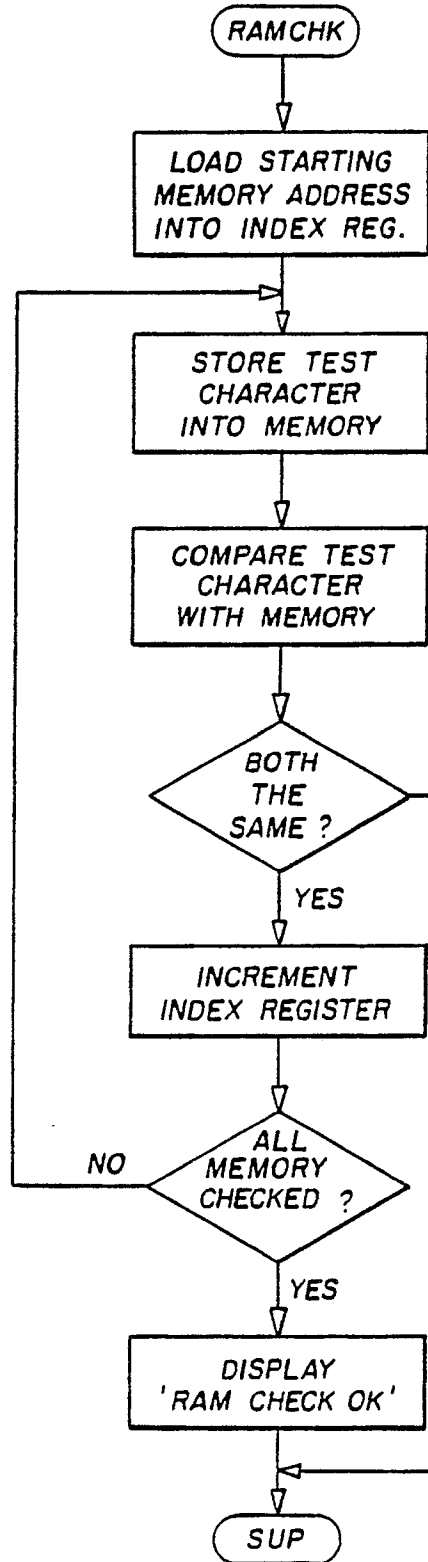
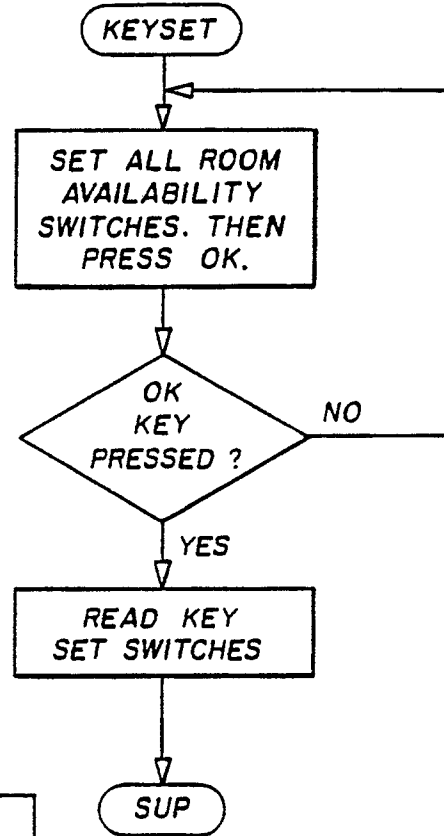
Fig. 12.Fig. 13.

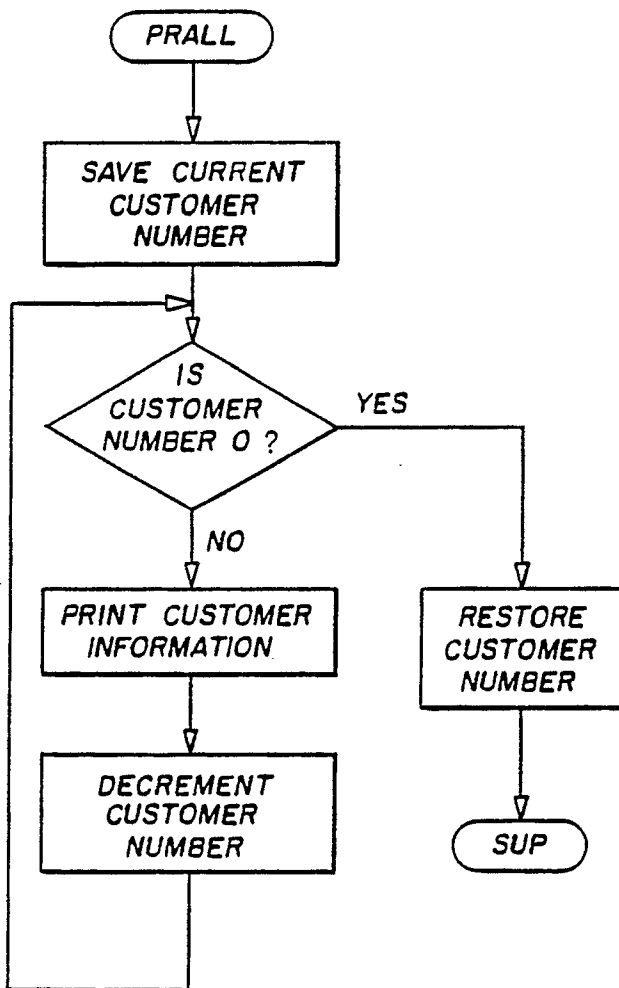
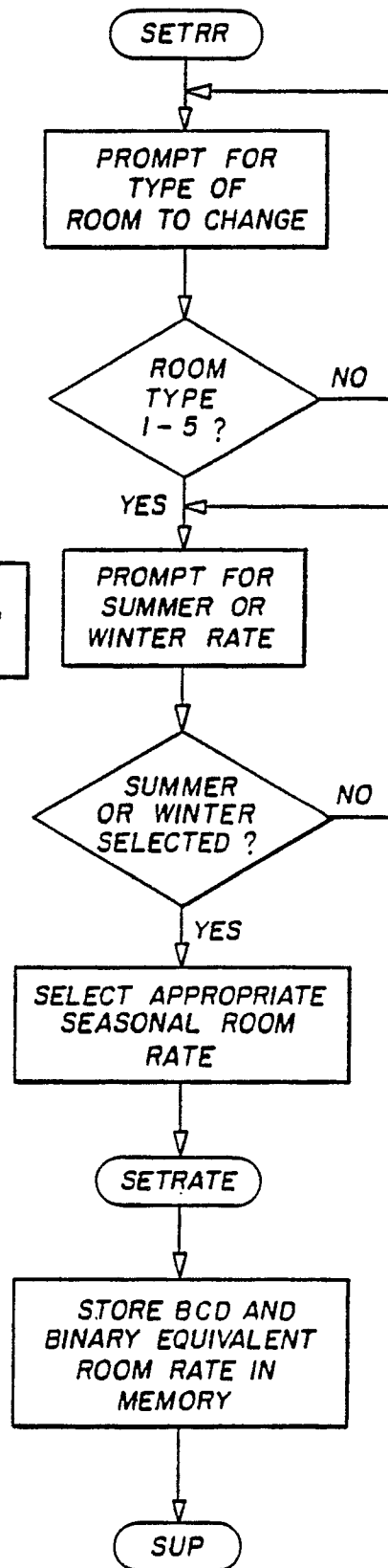
Fig. 14.Fig. 15.

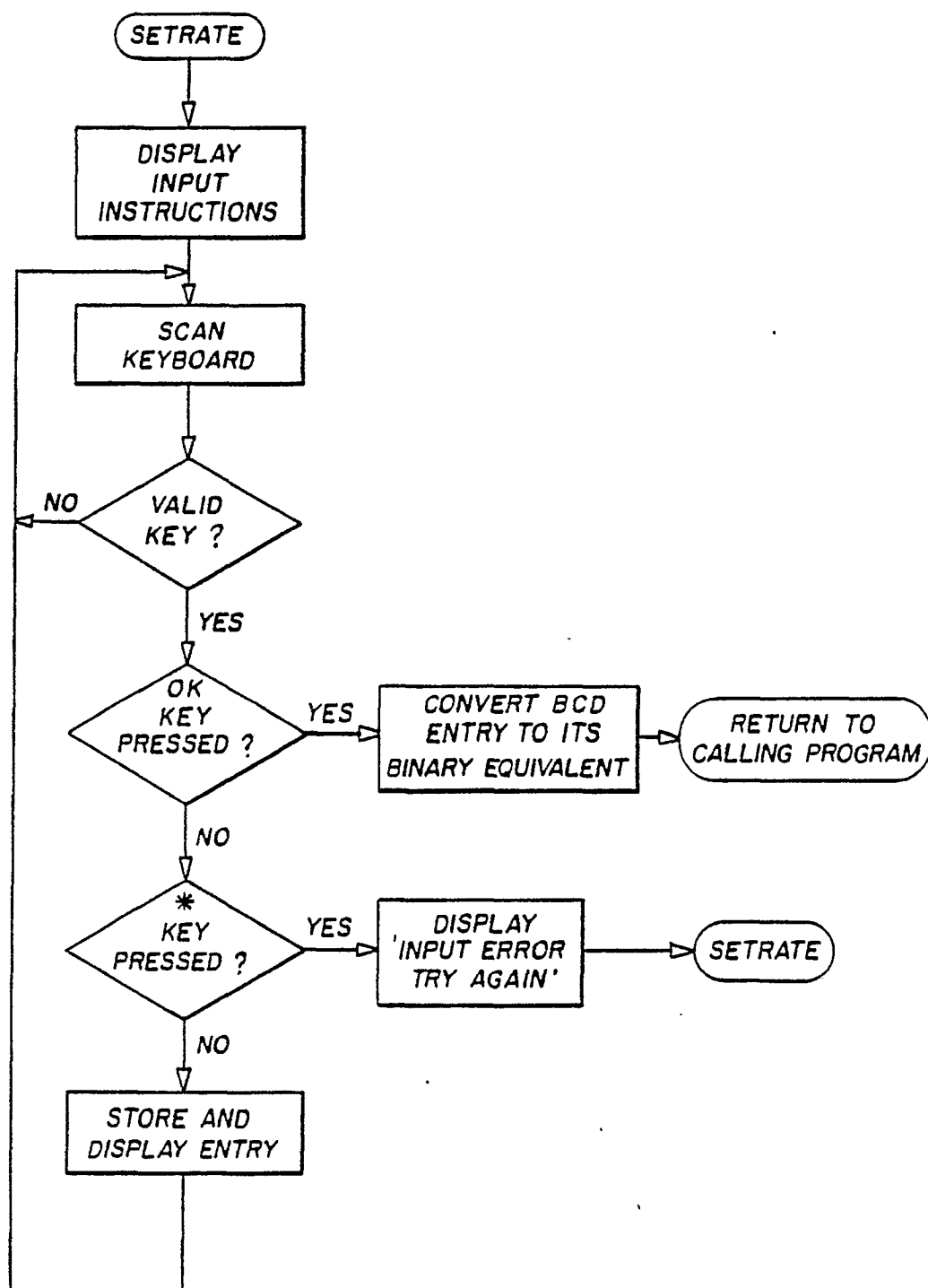
Fig. 16.

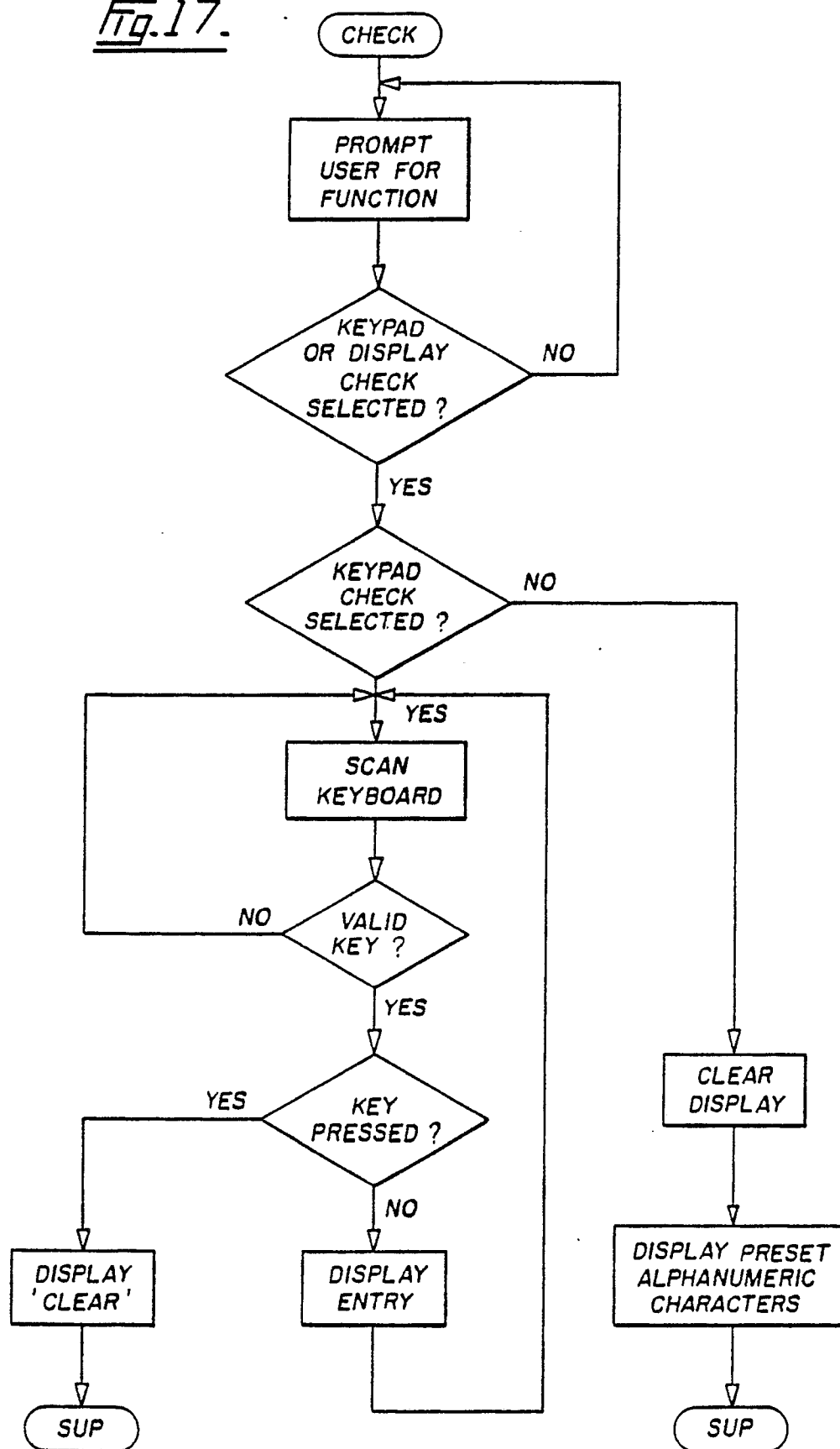
Fig. 17.



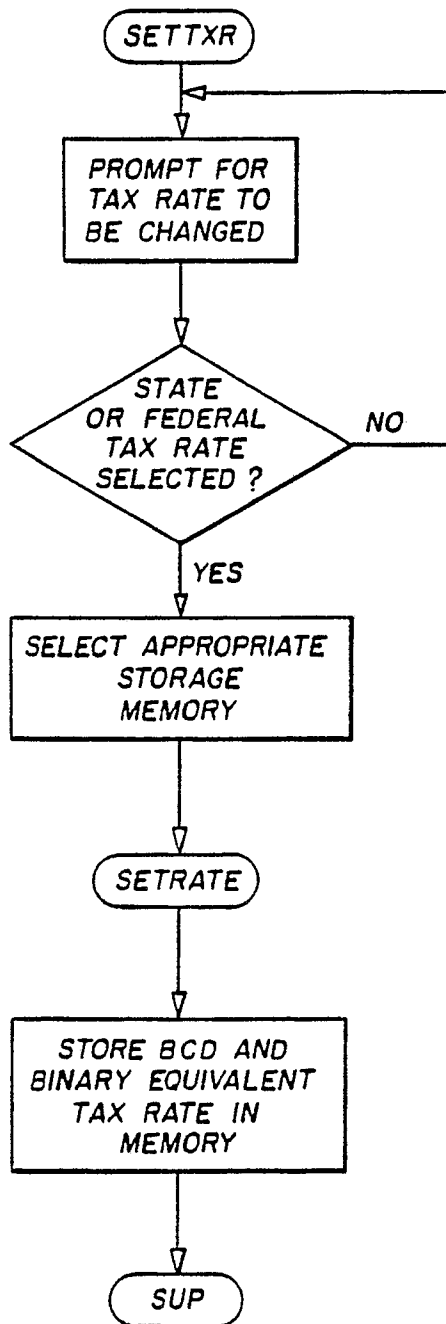
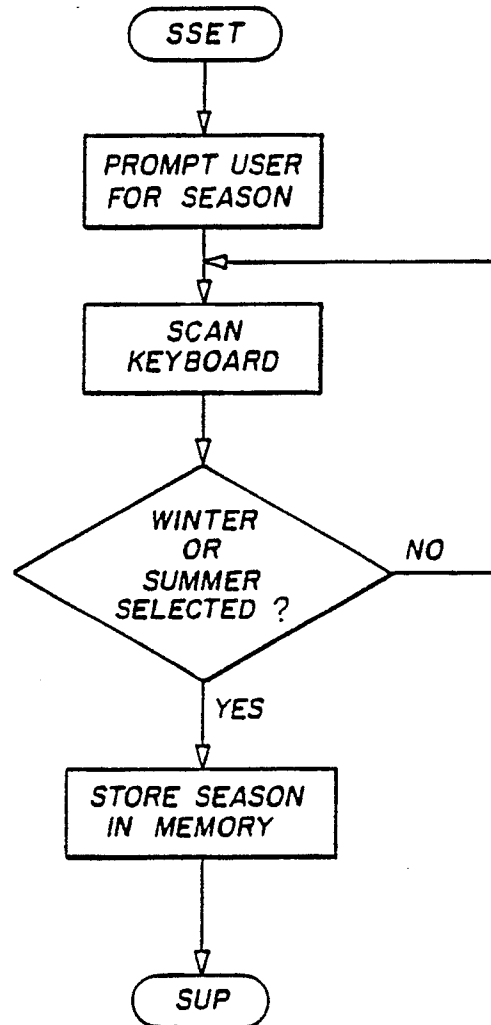
Fig. 18.Fig. 19.

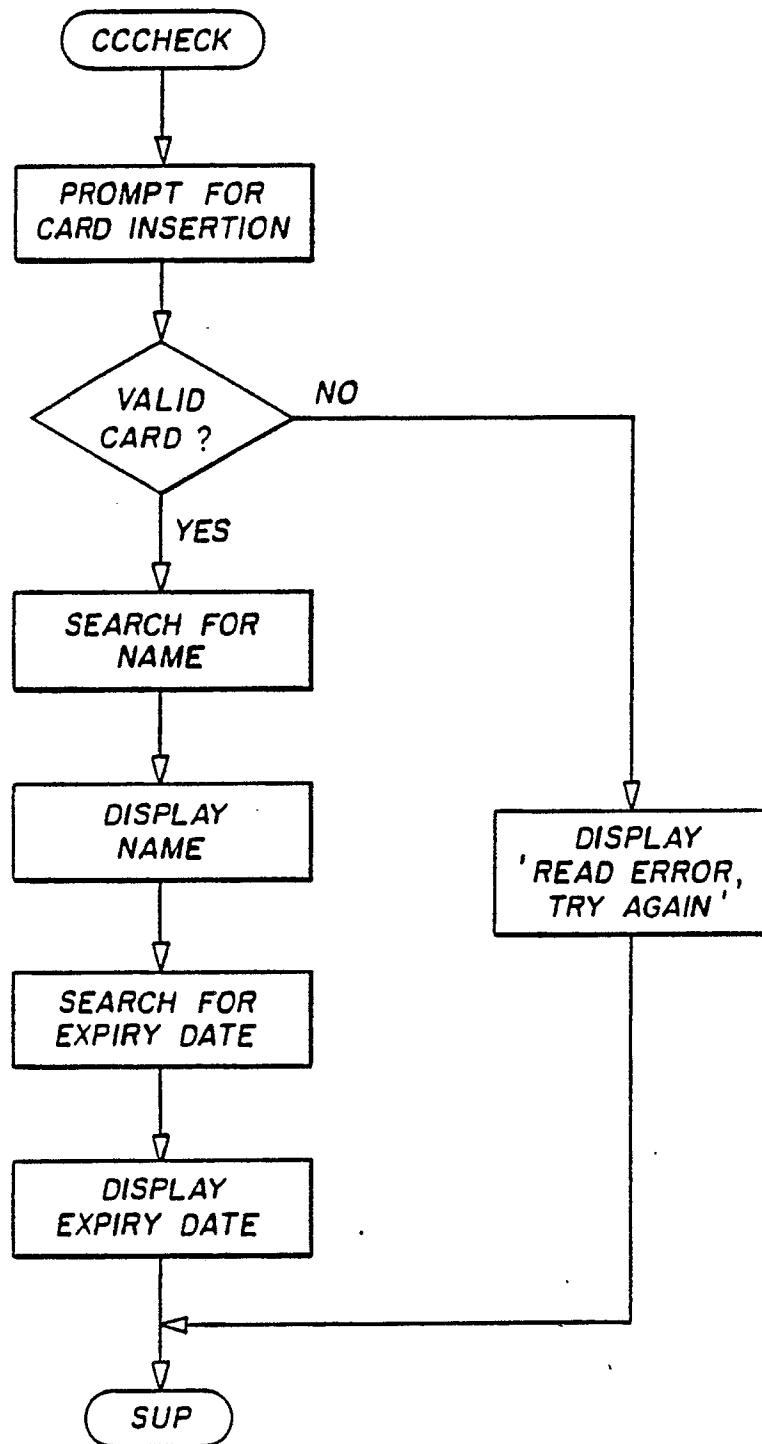
Fig. 20.

Fig. 21.

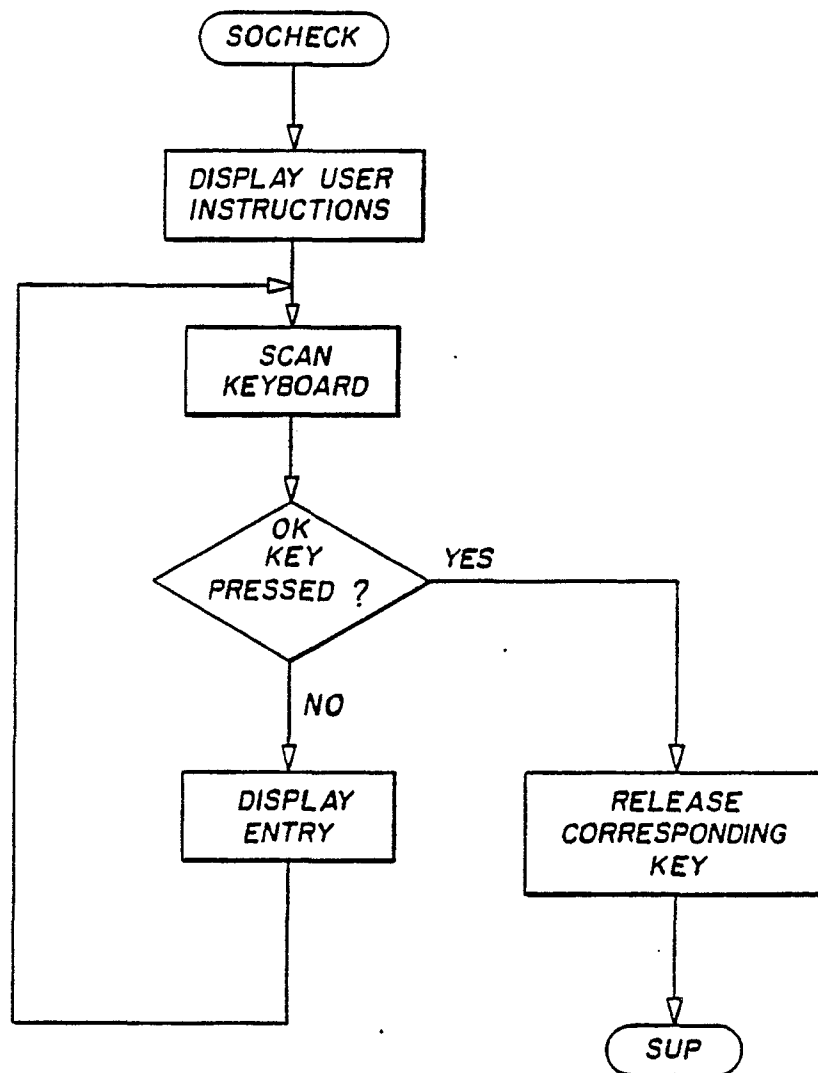
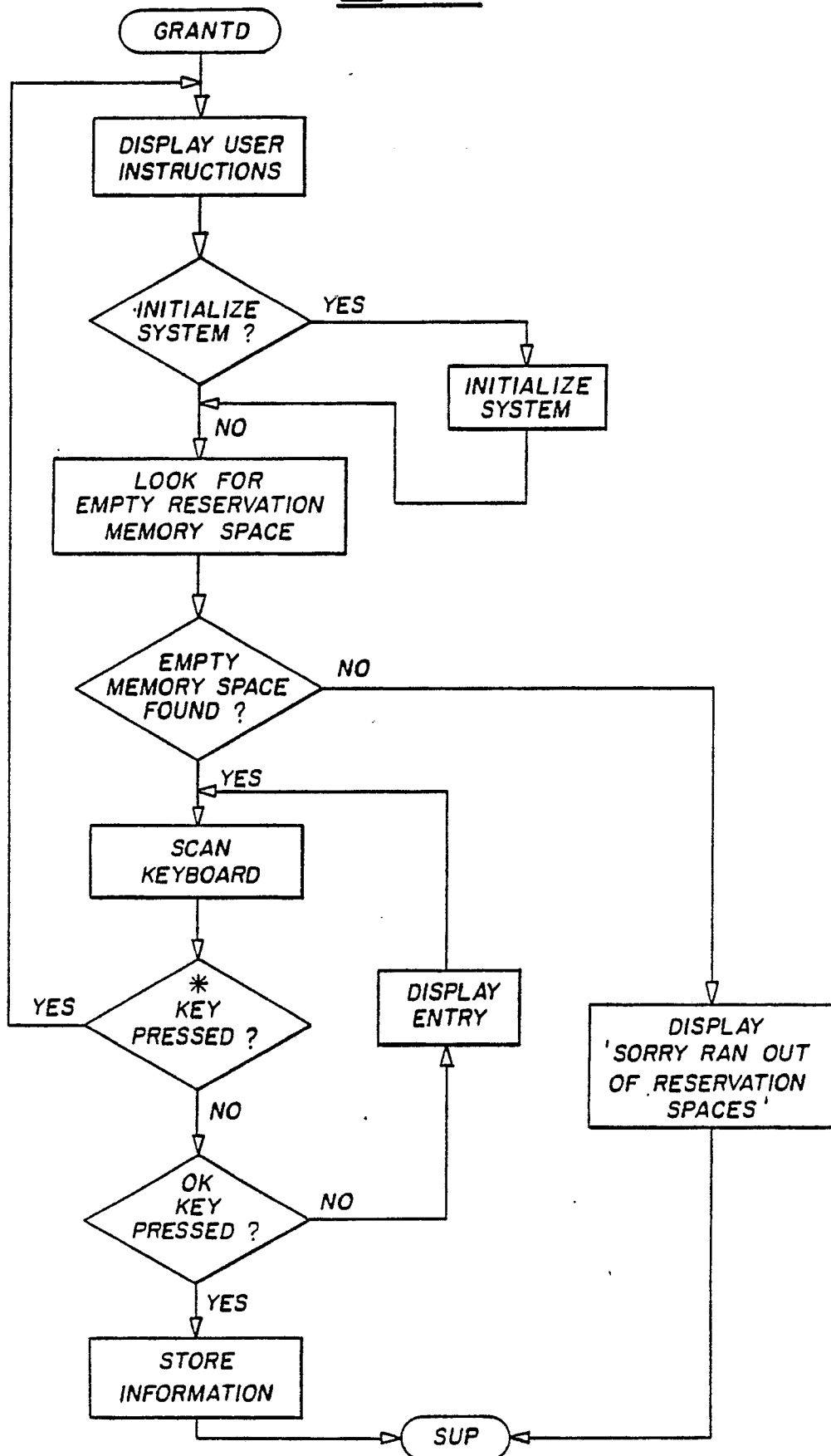


Fig. 22.



European  
Patent Office

## EUROPEAN SEARCH REPORT

Application Number

EP 87 30 2008

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.5)
Y,A	FR-A-2 405 524 (TRINDEL) * claims ; figures * - - -	1,5,9,6-8, 11-14	G 07 C 9/00 G 07 F 7/00
Y,A	US-A-3 742 453 (M.C. POYLO) * abstract; figures ** column 1, line 43 - column 3, line 34 * - - -	1,5,9,2-4, 10	
X,P	EP-A-0 206 639 (IBM) * abstract; figures 1-4, 8, 9 ** column 5, line 29 - column 9, line 19 * - - -	1-5,7-10, 12,13	
A	PATENT ABSTRACTS OF JAPAN vol. 8, no. 223 (P-307)(1660) 12 October 1984, & JP-A-59 105171 (YUU ESU ESU HOUSHIKI JIDOU HOKIYUU KOUJI) 18 June 1984, * the whole document * - - - - -	1,5,9	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G 07 F G 07 C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 09 November 90	Examiner DAVID J.Y.H.
<div>CATEGORY OF CITED DOCUMENTS</div> <div>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</div> <div>E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &amp;: member of the same patent family, corresponding document</div>			