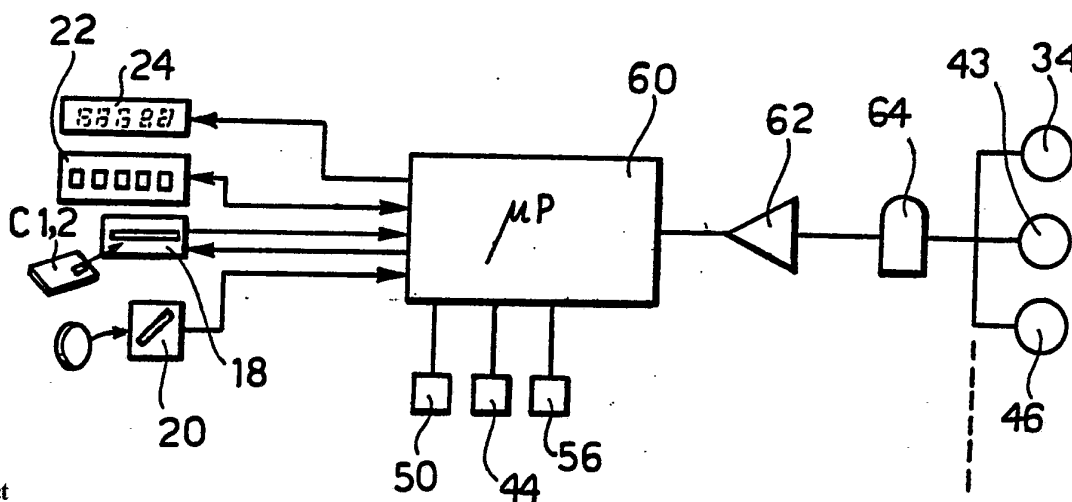




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/EP89/01479 (22) International Filing Date: 4 December 1989 (04.12.89) (30) Priority data: 68093 A/88 7 December 1988 (07.12.88) IT (71)(72) Applicant and Inventor: PIANA, Giuseppe, Stefano [IT/IT]; Via Novara, 136, I-28078 Romagnano Sesia (IT). (74) Agents: JACOBACCI, Filippo et al.; Jacobacci-Casetta & Perani S.p.A., Via Alfieri, 17, I-10121 Torino (IT). (81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.</p>		<p>Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>

(54) Title: A SYSTEM FOR DISPENSING MEASURED AMOUNTS OR PACKAGES OF PRODUCTS BY MEANS OF AUTOMATIC VENDING MACHINES



(57) Abstract

The system comprises, on the one hand, at least one automatic vending machine (10) which in turn includes means (26) for dispensing successive individual product units (measured amounts or packages), enabling means which can be freed to enable the operation of the dispensing means for each individual product unit to be dispensed, and collection means (18, 20) sensitive to the payment of a payment unit corresponding to a product unit in order to free the enabling means (64), and, on the other hand, user payment devices (C₂) (for example, credit cards and/or tokens and/or coins) each of which includes one or more payment unit. According to the invention, the system also includes, on the one hand, at least one personal recognition device (C₁), such as a personal card available to a manager; on the other hand, the machine includes programmable means (24), for setting a predetermined number of product units to be dispensed by the machine, means (56) for counting the number of product units dispensed, means (60) for comparing the two above numbers and for preventing the freeing of the enabling means (64) when the number of product units dispensed exceeds the predetermined number, and identification means (18) sensitive to the presence of the personal recognition device and adapted to enable access to the programmable means (60) by a manager.

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A system for dispensing measured amounts or packages of products by means of automatic vending machines

The present invention relates to automatic vending machines and is particularly concerned with a system for dispensing product units (measured amounts or separate packages) according to the preamble of Claim 1.

The definition given in the preamble of Claim 1 corresponds to any dispensing system including automatic vending machines which operate with coins and/or tokens and/or cards (credit cards).

The invention has been developed for application to automatic vending machines for bulk beverages, particularly espresso coffee, but is applicable to systems which include automatic vending machines for packaged products of any type, amongst which may be cited, by way of example, drinks in cans or small bottles, packaged confectionery products, cigarettes, and condoms.

One very common form of management for automatic vending machines is that in which the machines are not the property of a keeper who occupies the locations in which they are installed (workshops, offices, etc.) but are the property of a management organisation. Usually, in a system of this type, the vending machines are installed free of charge and the management organisation benefits only from the sale of the products supplied.

As a result, the management organisation is concerned that the vending machine should not be reloaded with products of a different origin from those supplied by

the organisation itself.

In a known solution to this problem, the vending machine is provided with a lock which enables it to be reloaded only by a manager in possession of the key, with the simultaneous collection of the takings in coins and/or tokens and, where appropriate, with the checking of the units paid for by means of credit card.

However, normal automatic vending machines have a limited capacity and require very frequent reloading with corresponding high costs due to the frequent visits of the managers and the frequent transportation of small quantities of goods from the management organisation's store to the various automatic vending points.

The particular object of the invention is to provide a vending system as defined in the preamble of Claim 1, which involves much lower management costs than conventional systems but at the same time offers a complete guarantee against the use of the vending machines for the sale of unauthorised products.

According to the invention, this object is achieved by means of a system as defined in the characterising part of Claim 1 and in the subsequent claims.

In order to explain the advantages of the invention, two examples are given below.

A machine for vending canned drinks to be consumed cold is considered.

In this case, the automatic vending machine will be of

the refrigerating type and may contain, for example, 100 cans. The removal of each can by a consumer after payment (with coins, tokens or cards) will give rise to the counting of the product unit supplied.

It will be assumed that the expected consumption of cans is 100 per day. In agreement with the keeper of the machine, the manager, expecting a fortnightly consumption of 1000 cans (100 items x 5 working days x 2 weeks), will send this quantity to the keeper of the machine which will initially be loaded with 100 cans, whilst the other 900 will be kept at ambient temperature in another location by the keeper.

Upon the delivery of the 1000 cans, the manager will set the machine to the predetermined number of 1000 product units to be dispensed. These 1000 units will at the same time be debited to the keeper.

The keeper can have access to the inside of the machine and can reload it whenever necessary. However, if his fortnightly supply of 1000 cans is used up early and he reloads the machine with cans from a different source, the machine will refuse to supply them.

Clearly, the keeper of the machine could load the machine prematurely with cans from a different source, whilst still holding a stock of authorised cans, but in this case the management organisation would not suffer damages, given that the authorised cans will already have been debited to him.

An automatic vending machine for espresso coffee provided with a coffee grinder will now be considered. In this case, the storage capacity of the machine will

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be the limited capacity of the reloadable hopper situated above the grinder (e.g. 300 g).

Experience shows that 1kg of coffee beans normally corresponds to 150 small cups of espresso coffee (6-7 g of coffee beans per cup). It can therefore be established that a cup corresponds to a given number of revolutions of the shaft of the coffee grinder or of the shaft of a screw which transports the ground coffee to the infusion chamber. One dispensed product unit can therefore be indicated each time, by counting the number of revolutions which corresponds to one cup, for example, 20 revolutions.

Again, if it is assumed that the weekly consumption is expected to be 450 cups, this is equal to 3 kg of coffee which is equal to $20 \times 450 = 9000$ revolutions of the shaft. In agreement with the keeper of the machine, the manager, envisaging a weekly re-supply, sends the keeper 3 kg of coffee beans each week which he will store in a suitable place.

Upon delivery of the 3 kg, the manager, if necessary, sets the machine to the predetermined number of 450 cups (that is, in the example given, 9000 revolutions of the shaft).

The keeper of the machine can reload the hopper of the coffee grinder whenever necessary. However, if, as in the case of the can vendor, he uses up his weekly supply of coffee early and reloads the hopper with coffee from a different source, the machine will refuse to function.

An automatic espresso coffee machine is normally

provided with a hot-water supply spout, which can be used, for example, to prepare tea from teabags. In this case, the system according to the invention also provides for the metering of the hot water necessary for a certain number of additional measures of hot water, as well as for the preparation of the predetermined number of cups of coffee. For example, the preparation of a cup of espresso coffee requires, on average, 35 cc of hot water, so the 450 cups of the case in question correspond to approximately 160 litres of water. Since the consumption of coffee in countries like Italy is much greater than that of tea, the manager can programme the machine so that it stops when a total of 200 litres of water have been supplied. The additional 40 litres of water could correspond to the number of teabags supplied to the keeper of the machine by the management organisation. In this connection, it should be noted that it may not be convenient to allow the free supply of hot water by the machine, in order to prevent excessive consumption of competing products such as, for example, freeze-dried coffee.

The types of machines considered in the examples are not limiting. Thus, a system according to the invention could be applied to automatic machines for dispensing several selectable hot and cold drinks, including coffee and drinks prepared from freeze-dried products or at any rate soluble products supplied by the management organisation and reloadable into the machine by the keeper. Examples of these machines are described in Italian patent application No. 68094-A/88 filed December 7, 1988 and a corresponding EP Application.

The invention will become clearer from a reading of the detailed description which follows with reference to the appended drawings which show, purely by way of example, the simple case of a system comprising an automatic espresso coffee machine.

In the drawings:

Figure 1 is a schematic external view of the machine,

Figure 2 is a schematic view showing the main internal components concerned in the system according to the invention,

Figure 3 is a block diagram of the control system of the machine, and

Figure 4 is a flow chart which shows a simplified version of the operation of the system.

With reference to Figures 1 and 2, an automatic vending machine for espresso coffee includes a cabinet-shaped casing 10 having a front wall 12 with a compartment for housing a cup 16 or a glass.

There are also collection means in the form of a card-reader 18 and a coin acceptor 20 in the front wall 12.

Finally, the front wall 12 has a keypad 22 and a display unit 24.

Within the vending machine are dispensing means in the form of an espresso machine proper, generally indicated 26. This machine may be of the type described and

illustrated in the document WO 87/01570.

The machine 26 includes an infusion unit 28 which is supplied on the one hand with ground coffee and on the other hand with pressurised hot water.

The coffee is supplied from a transparent reloadable hopper 30 situated at the top of the machine. The hopper 30 is adapted to hold a certain quantity of coffee beans and has a coffee grinder 32 driven by an electric motor 34 at its base. The shaft of the motor 34 is indicated 36.

As well as the coffee grinder 32, the shaft 36 drives, through a gear train, a screw 38 for conveying the ground coffee to the unit 28. In this connection, reference should be made to the document WO 87/01570.

The water is supplied to the unit 28 from a refillable water tank 40 housed in the machine. An electric pump 42, whose electric motor is indicated 43, draws water from the tank 40 and sends it to the unit 28 through a flow meter 44, an instantaneous heater 46, and a three-way solenoid valve 48, in succession. The heater 46 is provided with a temperature sensor 50 for its regulation.

The unit 28 is provided with a spout 52 for discharging the espresso coffee into the cup 16.

The solenoid valve has the function of diverting the hot-water supply, upon demand, to an auxiliary spout 54 for the preparation of another drink, for example, tea in a cup or glass.

For the purposes which will be made clear below, the shaft 36 of the motor 34 of the coffee grinder 32 has associated counting means in the form of a light-sensitive diode 56 which constitutes a revolution sensor. The shaft 36 has a diametral slot. Opposite the diode 56 is a light source 58 which illuminates the diode through the slot at every half-revolution of the shaft 36.

With reference to Figure 3, the machine incorporates a processing and control logic circuit, preferably in the form of a microprocessor 60. The various functional components, including those mentioned with reference to Figures 1 and 2, are connected to the microprocessor 60.

On the one hand, the card-reader 18, the coin acceptor 20, the keypad 22 and the display unit 24 are connected to the microprocessor 60.

On the other hand, the flow meter 44, the temperature sensor 50 and the revolution sensor 56 are connected to the microprocessor 60.

The microprocessor 60 also has an output which enables the operation of various electromechanical components of the machine, including the motor 34 of the coffee grinder and the solenoid valve 46, by means of an amplifier circuit 62 and an enabling power relay 64.

The manner in which the components of Figure 3 interact with the microprocessor will be described with reference to the flow chart of Figure 4.

First of all, the case of a reloading of the machine by

a permitted manager will be considered.

The manager has a personal identification card (C_1 , Figure 4) compatible with the reader 18. The card C_1 and the reader 18 may be of the magnetic-strip type, but cards of known type including "EEPROM" memories are preferably used. These are rechargeable cards in the sense that a manager's personal card, on the one hand, contains the modifiable or fixed data which identify the manager and enable him to perform all or some of the operations described below and, on the other hand, can store in its memory management data from one or more vending machines for insertion into a main management computer by means of a suitable card-reader of the computer itself.

When the manager inserts his card C_1 in the reader 18 as a personal recognition device, the microprocessor 60 recognises that it is a manager's card (box 100) and then checks whether this card is valid (box 102). If not, the operation does not proceed, that is to say, the microprocessor 60 refuses to carry out the orders of the supposed manager (box 104).

In a non-limiting manner, managers of two levels are envisaged: managers authorised only to resupply the machine and managers authorised partially to reprogram the machine, and their cards C_1 will therefore be coded correspondingly.

After it has checked that the card C_1 corresponds to an authorised manager, the microprocessor evaluates the level of authorisation (box 106): if the manager can only resupply the keeper of the machine with coffee, the microprocessor 60 sends to the reader 18 signals

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which register on the card C_1 the replenishment which has taken place. If the manager is authorised to alter the parameters of the machine, however, the microprocessor 60 enables the keypad for partial reprogramming (box 108).

The reprogramming consists basically of the alteration, upwards or downwards, of the predetermined number of product units (cups of coffee) which can be dispensed by the machine. In practice, the number of pulses (revolutions or half revolutions) of the shaft 36 at which it is supposed that the supply of coffee provided by the manager will be exhausted is set by means of the keypad 22.

A manager authorised for partial reprogramming can thus also alter the quantity of water which the machine can supply for the preparation of coffee, plus a certain quantity for the preparation of tea or other infusions. In practice, the manager can reprogram on the keypad 22 the number of revolutions of the flow meter 44 corresponding to the total quantity which can be supplied between one replenishment of coffee beans and another.

Finally, the manager can reprogram the supply temperature of the coffee and of the hot water according to the wishes expressed by the user. In this case, the reprogramming is translated into a modification of the calibration in relation to the sensor 50.

Upon completion of the reprogramming, the reprogrammed data, which may even be left unchanged, are registered on the card C_1 for further processing by the central

management computer.

The taking of a cup of coffee by a user will now be described.

Provision is also made for the machine to be operated solely by means of coins (or tokens), through the coin acceptor 20. This cycle is not shown in the flow chart of Figure 4 but it is intended that the cups of coffee dispensed will be counted in the form of pulses sent to the microprocessor by the revolution sensor 56 on the one hand, and in the form of pulses applied to the microprocessor by the flow meter 44 on the other hand.

Only the supply of hot-water is not subject to payment since the separate sale of teabags or the like is envisaged, but the microprocessor 60 will register the pulses applied to it by the flow meter 44 in this case also.

On the assumption that the user has a card C_2 , he introduces it into the reader 18 and the microprocessor then recognises it as such (box 100) and examines its contents (box 110).

To advantage, the system provides for the recharging of the user cards C_2 , which in this case are also to advantage of the "EEPROM" type.

If the user card C_2 is void, the user can recharge it by means of the reader 62 by inserting coins into the coin acceptor 20. The microprocessor then increases the credit (box 112) and the card is brought up-to-date (box 114) by the recording of the increase.

A user card C_2 , full or void, gives rise to a further decision in the microprocessor 60 (box 118): if the machine is not enabled because the quantity of coffee provided and/or the quantity of the water for are exhausted, the microprocessor 60 does not enable the operation and it ends (box 104); if the machine is enabled, however, the user can set the keypad 22 for the supply of one or more successive cups. At this point, the microprocessor 60 evaluates the credit read from the card C_2 (box 120) and, if it is less than the value of the order, does not allow the order to be carried out and the operation ends.

If the credit is greater than the value of the order, however, the microprocessor 60 deducts the credit used from the card C_2 by means of the reader 18, that is, it cancels the corresponding units registered on the card (box 112) and enables the order to be fulfilled (box 124).

In this connection, by operating the keypad 22, the user can himself program the type of coffee he requires, that is, strong or weak, small or large.

In order to fulfil the order, the microprocessor 60 enables the operation, among other things, of the coffee grinder 34, the motor 43, the pump 44 and the solenoid valve 46 which are thus supplied by the power relay 68 in a sequence which may be controlled by the microprocessor itself or by a separate logic system.

The cycle for the preparation of an espresso coffee may be that described in the document WO 87/01570 to which reference should be made.

For each product unit (in this case an espresso coffee) dispensed, the revolution sensor 56 and the flow meter 44 apply their pulses to the microprocessor 60 which adds them to those previously stored, holds them in its memory, and compares the totals with the number of product units to be dispensed, as predetermined by the manager, and the quantity of water to be supplied, also as predetermined by the manager, respectively.

A preferred embodiment has been described in which the microprocessor performs the functions of the comparison means and of the authorisation means of Claim 1, but it is intended that these means could assume different forms, such as those of separate electronic or electromechanical components.

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CLAIMS

1. A system for dispensing product units (measured amounts or separate packages) comprising, on the one hand, at least one automatic vending machine (10) which in turn includes means (26) for dispensing successive individual product units, enabling means which can be freed to enable or cause the operation of the dispensing means (26) for each individual product unit to be dispensed, and collection means (18, 20) sensitive to the payment of a payment unit corresponding to a product unit in order to free the enabling means (64), and, on the other hand, user payment devices (C_2) each of which includes one or more payment units, characterised in that, on the one hand, it also includes at least one personal recognition device (C_1) and in that, on the other hand, the machine (10) includes programmable means (24) for setting a predetermined number of product units to be dispensed by the machine, means (56) for counting the number of product units dispensed, means (60) for comparing the two above numbers and for preventing the freeing of the enabling means (64) when the number of product units dispensed exceeds the predetermined number, means (18) for identifying the personal recognition device (C_1), and authorisation means (60) controlled by the identification means (18) and adapted to enable access to the programmable setting means (60) by a manager in possession of the recognition device (C_1).

2. A system according to Claim 1, characterised in that the machine includes electronic processing means (60) incorporating the comparison means and the authorisation means, and having inputs connected to the collection means (18, 20), the setting means (22), the

counting means, and the identification means (18), and outputs connected to the enabling means (64).

3. A system according to Claim 2, characterised in that at least some of the payment devices consist of user cards (C_2) on which payment units are stored and can be cancelled progressively, and the or each recognition device (C_1) consists of a similar card on which data characteristic of the manager are stored, and in that the machine includes card-reading means (18) connected to respective inputs and outputs of the processing means (60) and adapted to read the cards of the one type (C_1) and of the other type (C_2) and adapted progressively to cancel the payment units from the user cards (C_1).

4. A system according to Claim 3, characterised in that the reading means consist of a single card-reader (18) and the processing means comprise a card discriminator (60) for recognising the users' cards (C_2) and the managers' cards (C_1), and adapted to enable the supply means (26) in the presence of a user's card (C_2) and to enable access to the programmable setting means (22) in the presence of a manager's card (C_1).

5. A system according to Claim 3 or Claim 4, characterised in that the managers' cards (C_1) are adapted to store retrievable data relating to the management of one or more vending machines, the reading means (18) are adapted to load the data from the machine onto the managers' cards (C_1), and the processing means (60) include means for storing the managers' data.

6. A system according to Claim 3 or Claim 4,

characterised in that the machine (10) also includes a coin or token acceptor (20), the users' cards (C₂) are of the rechargeable type, and the processing means (60) are adapted to receive from the acceptor (20) signals corresponding to the amount inserted into the acceptor and to provide the reader (18) with corresponding signals for recharging the user cards (C₂).

7. A system according to any one of Claims 2 to 6, characterised in that the processing means are constituted at least in part by a microprocessor (60).

8. A system according to any one of the preceding claims, in which the or each vending machine is an automatic vending machine (10) for a drink produced from one or more solid particulate products, such as ground coffee or water-soluble products, characterised in that the counting means (56) are adapted to monitor a parameter proportional to the amount of the or each particulate product supplied and to apply to the comparison means (60) pulses proportional in number to that parameter.

9. A system according to Claim 8, of the type in which the or each particulate product is supplied by means of a device provided with a rotary member (36), characterised in that the counting means (56) are adapted to detect the number of revolutions of the rotary member (36).

10. A system according to Claim 8 or Claim 9, characterised in that it also includes means (44) for monitoring a parameter proportional to the amount of water or other liquid supplied for the preparation of the drink and for applying to the comparison means (60)

pulses proportional in number to that parameter.

10. A system according to Claim 9, characterised in that the programmable setting means (24) are adapted to enable the setting, on the one hand, of a predetermined number of charges of particulate product and, on the other hand, of a predetermined quantity of liquid to be supplied, and the comparison means (60) are adapted to prevent the freeing of the enabling means (64) when, on the one hand, the number of charges dispensed exceeds the predetermined number of charges and, on the other hand, when the quantity of liquid supplied exceeds the predetermined quantity of liquid.

FIG. 1

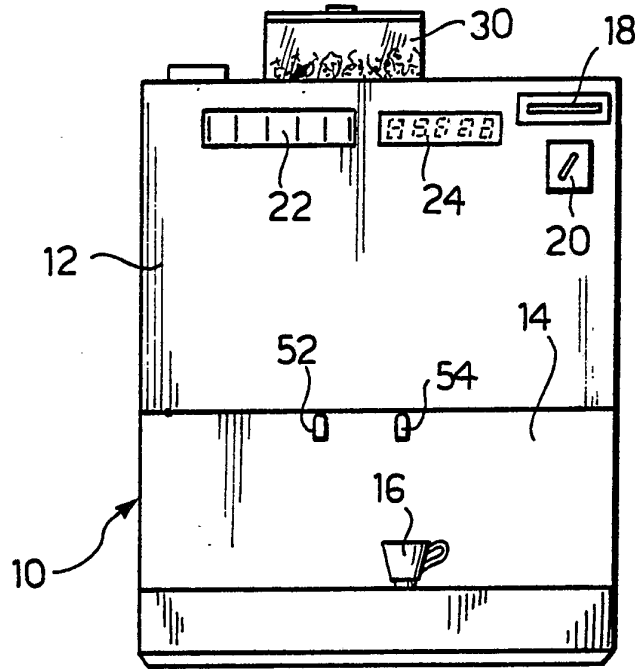


FIG. 2

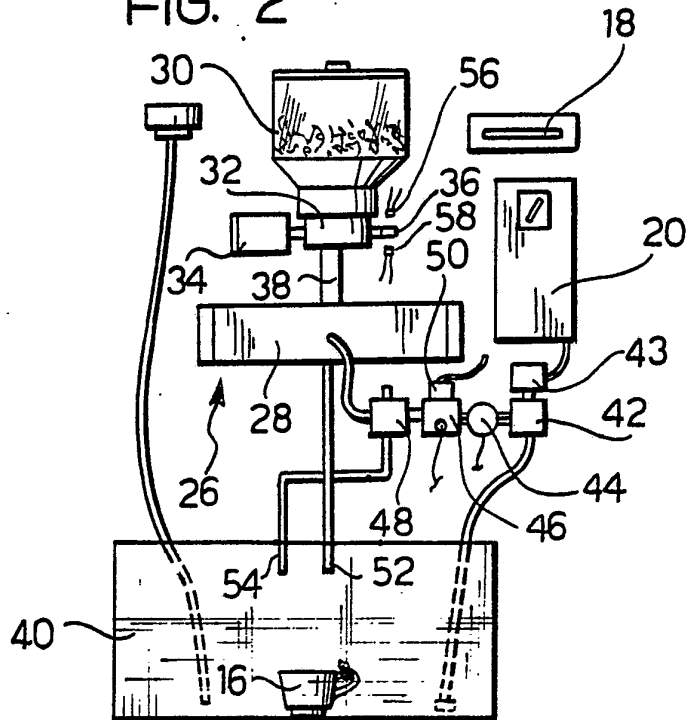


FIG. 3

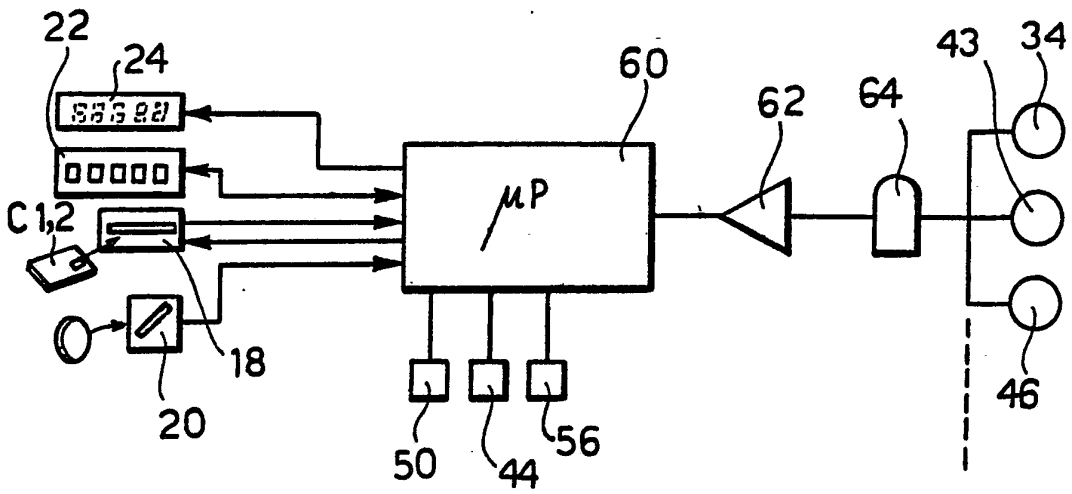
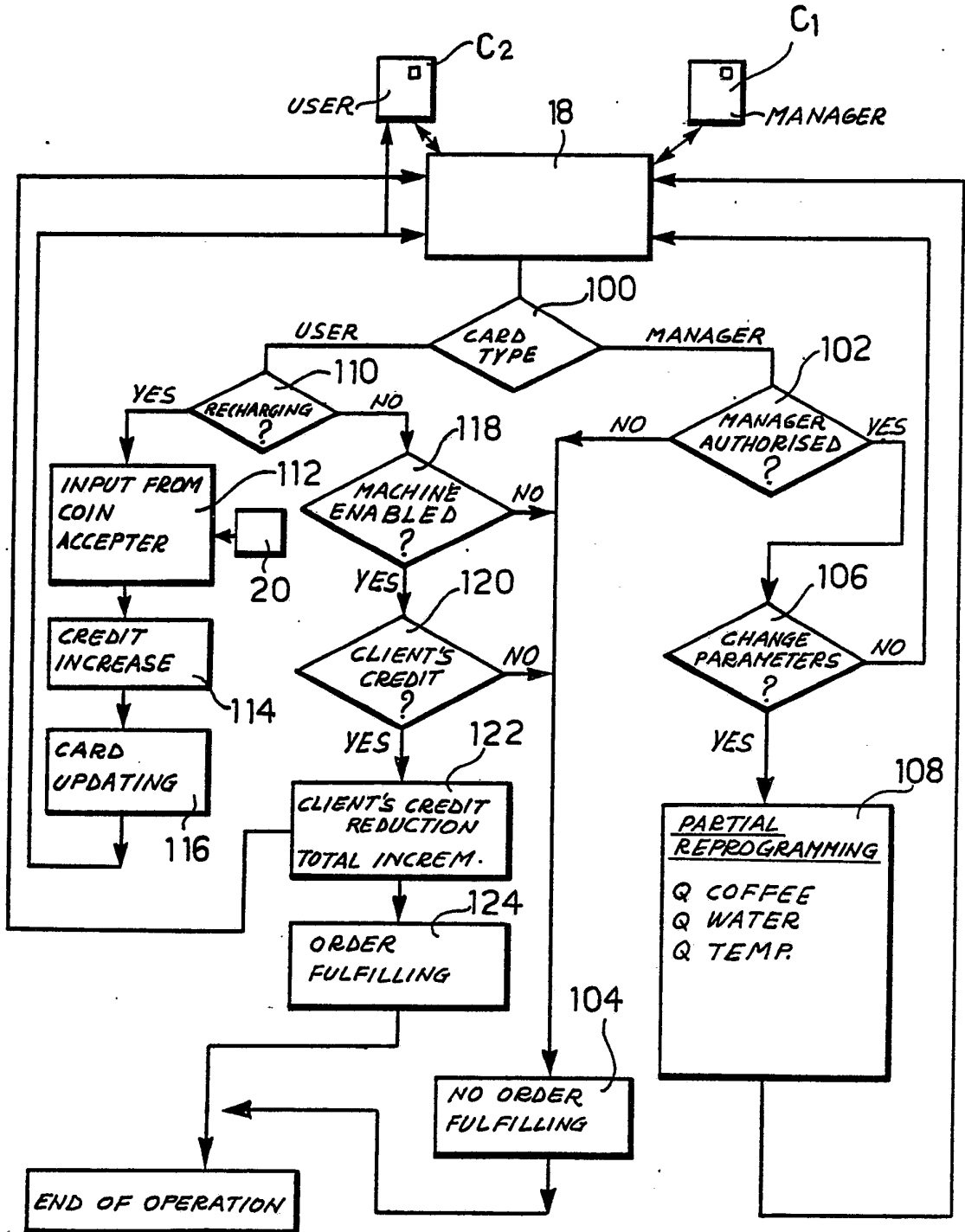


FIG. 4



INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 89/01479

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 G07F9/02 ; G07F7/02 ; G07F7/08 ; G07F13/06

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System

Classification Symbols

Int.Cl. 5

G07F

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸

III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y A	DE,A,3435697 (ROBERT BOSCH) 03 April 1986 see the whole document ---	1, 2, 7 3-5
Y A	WO,A,8304447 (SUTCLIFFE CATERING GROUP) 22 December 1983 see abstract; figures 1-3 see page 3, lines 2 - 19 see page 15, lines 15 - 33 ---	1, 2, 7 8-11
Y	WO,A,8800741 (BAR VENDER) 28 January 1988 see abstract see page 4, line 24 - page 5, line 24; figure 1 ---	1, 2, 7
	-/--	

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IV. CERTIFICATION

Date of the Actual Completion of the International Search

14 MARCH 1990

Date of Mailing of this International Search Report

10. 04. 90

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Signature of Authorized Officer

DAVID J. Y. H.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,4669596 (J.G.CAPERS) 02 June 1987 see abstract; figures 1-7 see column 4, lines 32 - 57 see column 6, lines 26 - 64 see column 7, lines 14 - 29 ---	1, 6
A	GB,A,2154563 (MAYFAIR GROUP) 11 September 1985 ---	
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ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.

PCT/EP 89/01479

SA 32751

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14/03/90

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WO-A-8304447	22-12-83	EP-A- 0110947	20-06-84
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US-A-4038525	26-07-77	None	
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