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(54) A mailbox provided with means for processing correspondence

(57) Weighing means (L1) for a letter posted in a slot (2) and a display (6) in the mailbox (1) make a user to read the amount of due postage calculated by a microprocessor (B1); key boards (3, 4) enable the user to compose the pertinent zip code and the type of letter he desires to send so that said details are printed on the letter; adapted means (7, 8, 9) anable the user to pay the amount by a magnetic card or bank notes or coins; a printing device (10) delivers to the user a receipt for the amount paid.

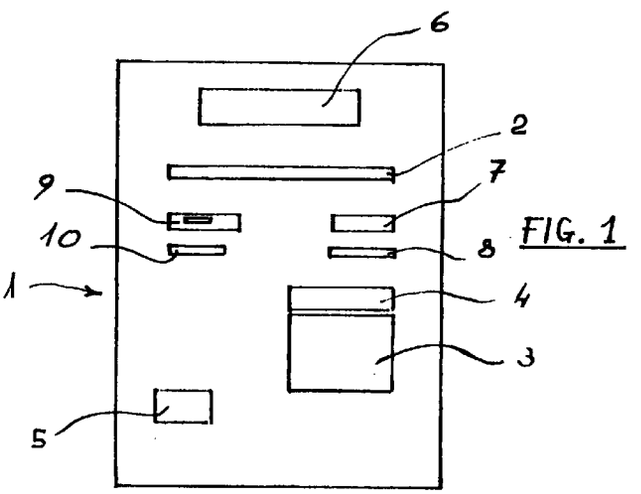

FIG. 1

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Description

The present invention relates to a mailbox provided with means for processing correspondence.

The invention falls within the field of correspondence processing in mailboxes and, more particularly, concerns improvements to the mailbox described in European patent application 95110857.02303.

The said mailbox comprises a microprocessor that controls: a) a first optical means capable of seeing whether a letter has been posted correctly as far as its positioning within the slot of the mailbox is concerned; b) if this is the case, an electric motor of a means that transports the posted letter to a device that stamps the postage stamps affixed to letter with the date and the time at which the letter is posted; c) a second optical means that sees whether the postage stamps affixed to the letter are of the correct amount and, if so, causes the said motor to restart in such a way as to let the letter drop to the bottom of the box, whereas in the contrary case it restarts the motor in such a way as to represent the letter at the slot of the mailbox; c) a third optical means that checks that the heap of letters at the bottom of the box does not exceed a predetermined value and, as soon as this is the case, any further letters posted will be refused by means of an acoustic signal and the stopping of the motor.

The limitations of the said mailbox derive from the fact that it is not capable of either writing the address or weighing each posted letter to check the stamps that may have been applied by the user, and accepts only normal letters to which stamps have already been applied and does not accept registered letters, insured letters or express mail.

The present invention overcomes these limitations and offers other advantages that will become evident in the further course of the description, including that of making it possible for the user to read on a display the amount of postage due for the forwarding of the letter and to pay the said amount either by means of a magnetic card or in cash; this mailbox is particularly suitable for being installed inside a post office. It comprises the parts envisaged in the aforesaid patent application and, as set out in the characterizing parts of the claims, comprises also the following, all associated with and controlled by the microprocessor:

a) a magnetic card reader capable of checking the credit present on a card that a user introduces into an appropriate slot;
b) a first alphanumerical keyboard for:

- composing the pertinent zip code number (a binary codification system that avoids the first and second phase for the data processing centres of the post office);

c) a second alphanumerical keyboard for writing the type of letter it is desired to send (for example, normal without pre-applied postage stamps, registered, insured, express, or similar);
d) a device for weighing the letter posted in an appropriate slot, so that the microprocessor may calculate the price to be paid and show it on the display;
e) a pushbutton that the user presses after having operated the aforesaid means to get under way a second series of operations performed by:
f) a first printing device for affixing a bar code corresponding to the previously typed zip code, the said device being driven by the motor;
g) a second printing device for compiling a receipt that is consigned to the user through an appropriate slot (receipt valid for all postal and legal purposes);
h) a stamping device for impressing the posting details (place and time of posting, type of forwarding and the price therefor).

At this point a roller operated by the motor causes the letter to drop to the bottom of the mailbox and the microprocessor collects the appropriate price from the magnetic card.

The first keyboard is also capable of cancelling the zip code whenever the user happens to have made a typing error.

Alternatively,

- when the posted letter is a normal one with pre-applied stamps, the plane supporting the letters at the level of the appropriate slot is associated with an optical means capable seeing the applied postage stamps, so that the microprocessor may establish whether or not they correspond to the postal rate due in respect of the weight of the posted letter and the typed zip code;
- when payment is made in cash, the user - after reading the requested price on the display - inserts coins or bank notes into appropriate slots, the coins and the bank notes being checked by the respective readers associated with the microprocessor.

The display is also programmed in such a way that whenever the mailbox is not actually being used, it will put messages of public utility or publicity prepared by the Post Office on view for users and passers-by.

Over and above this, a magnetic card reader codified for accessing a third keyboard is provided to enable Post Office personnel, after duly typing their identity code on the said third keyboard, to start the motor for opening the mailbox and collecting the mail.

Furthermore, an electric resistance, appropriately protected and supplied with a suitable current, is installed in an appropriate position inside the mailbox and, controlled by a thermostat, ensures that the mailbox environment will be maintained at a constant temperature.

The invention will now be described in greater detail with the help of an embodiment example and a series of drawings, where

- Figure 1 shows a front view of the mailbox,
- Figure 2 shows a block diagramme, and
- Figure 3 shows a function diagramme.

Figure 1 shows the external appearance of the mailbox 1, while the other reference numbers are assigned as follows: 2 indicates the slot for posting the letters, 3 the first alphanumerical keyboard, 4 the second alpha-numerical keyboard, 5 the third alphanumerical keyboard, 6 the display unit, 7 the slot for the magnetic card reader, 8 the slot for bank notes, 9 the slot for coins, and 10 the slot corresponding to a device for printing and delivering a receipt.

Figure 2 is the block diagramme of the principal parts; its reference numbers have the following meanings: 3 is the first alphanumerical keyboard, B1 is the microprocessor, 6 is the display, F1 is the printing device, F2 is the stamping device, L1 is the weighing device and 7 stands for the magnetic reader.

The functioning of these parts can be explained in detail by referring to Figure 3.

Figure 3 shows the association of the codification and printing block with the motor control card and the other parts. The figure is self-explanatory, but we shall nevertheless list its principal parts below, namely:

3 -the hexadecimal keyboard, 4 columns, 4 lines (first keyboard)
B1 -the PIC 16C54 microprocessor
6 - a Sharp 40x2 alphanumerical display
7 -the magnetic reader
L1 -the letter weighing device
F1 -the matrix printing device
F2 - the stampimg device
G1 -the motor control card
K1 -a Drift 12V 10Amp buffer battery
R1 -a 1000 Ohm resistor
R2 -a 1000 Ohm resistor
R3 -a 1MOhm resistor
R4 -a 400 Ohm resistor
R5 -a 10,000 Ohm resistor
R6 -a 100,000 Ohm resistor
R7, R8 1000 Ohm resistors
R9 -a 100 Ohm resistor
C1, C2, C3 -1 microfarad condensers
U1 -an integrated FLIP/FLOP circuit 4013
U2 -a monostable integrated circuit 74C221
Q1, Q2, Q3 -BC547 transistors
FT1 -a photodiode
TU -a phototransistor
D1 -a 1N4001 diode
D2 -a 2N4001 diode
D3 -a 1N4002 diode
RL1 -a 12 Volt relay, 1 point
P1 -(+12 Volts) positive pole to be connected to the electrical parts forming part of the mailbox described in the previous patent application
P2 -the test pin of the printer
P3 -the negative (earth) pole of the system.

Now, the addition of the binary coding device alters the functioning of the mailbox described in the said patent application, mainly because the system now requires the input of the zip code, the type of letter it is desired to send and payment of the price therefor.

The photocell made up of the diodic light detectors (FT1 - TU) detects the passage of a letter before it reaches the stamping zone and the letter, after having been recognized by the optical means that sees the stamp, moves forward and thus interrupts the infrared light beam of the optical means, thereby causes a negative pulse at the input of the monostable integrated circuit U2 (74C221), which serves to lengthen the time of the pulse in such a way as not to have false reading errors.

The U2 output pulse constitutes the setting input of U2 (an integrated flip/flop 4013), which in its turn activates the relay RL1 via the transistor Q2, so that the relay cuts the current supply to the motor.

The shutdown of the motor ensure that the letter will come to a halt before arriving at the stamping point. This interruption serves to activate the sequence for the binary coding and the stamping.

When the motor stops, the microprocessor asks the user via the display unit to type the zip code or the name of the locality to which the letter is to be sent.

At this point it should added that what is shown on the display can also be of the menu type, that is to say, all the operations that the user has to perform can be guided by instructions that appear on the display.

By way of example, let us suppose that - after the motor has come to a halt in the binary stamping position - the display asks the user to type the name of the place of destination. The user will then type MILAN, for example, and on the display there will appear the zip code 20100 followed by any other words or phrase that the designer may choose when programming the microprocessor.

Once this has happened, the microprocessor program will quickly activate the printer, which - always acting via the microprocessor - will then print the zip code in the binary code used by the mail services.

As soon as the binary code has been printed, the microprocessor sends a resetting pulse to the integrated flip/flop circuit U1, which via one of the transistors will then give its new consent for the closure of the relay.

Following the closure consent, the motor will start up again and activate the normal procedure of the mechanical device of the mailbox, thus causing the letter to be stamped and then inserted in the storage space.

Claims

1. A mailbox (1) provided with means for processing correspondence in which a microprocessor (B1) is associated with and controls an optical means (FT1-TU) capable of seeing whether a letter has been posted correctly as far as its position in the slot of the mailbox is concerned and, if this is the case, starts up an electric motor that drives a means that transports the posted letter to a device (F2) that stamps the postage stamps affixed to the letter with the date and the time at which the letter is posted, and another optical means capable of seeing whether the postage stamps affixed to the letter are of the correct amount and, if this is the case, causes the motor to be restarted, so that the letter will be allowed to drop to the bottom of the mailbox, while in the contrary case it will restart the motor in such a way as to return the letter to the entry slot (2), and yet another optical means capable of checking that the heap of letters at the bottom of the mailbox does not exceed a predetermined height, characterized in that it also comprises, associated with and controlled by the microprocessor

   a) a magnetic card reader (7) capable of checking the credit present on a card that a user introduces into an appropriate slot (2);
   b) a first alphanumerical keyboard (3) for:

   - composing the pertinent zip code number;

   c) a second alphanumerical keyboard (4) for writing the type of letter it is desired to send;
   d) a device (L1) for weighing the letter posted in an appropriate slot, so that the microprocessor (B1) may calculate the price to be paid and show it on the display (6);
   e) a pushbutton that the user presses after having operated the aforesaid means to get under way a second series of operations performed by:

   - a first printing device (F1) for affixing a bar code corresponding to the previously typed zip code, the said device being driven by the motor;
   - a second printing device (10) for compiling a receipt that is consigned to the user through an appropriate slot;
   - a stamping device (F2) for impressing the posting details,

   at which point a roller operated by the motor causes the letter to drop to the bottom of the mailbox and the microprocessor (B1) collects the appropriate price from the magnetic card.

2. A mailbox in accordance with claim 1, characterized in that the first keyboard (3) is also habilitated for cancelling the zip code whenever the user happens to have made a typing error.

3. A mailbox in accordance with claims 1 and 2, characterized in that:

   - when the posted letter is a normal one with pre-applied postage stamps, the plane supporting the letters at the level of the appropriate slot (2) is associated with an optical means capable seeing the applied postage stamps, so that the microprocessor (B1) may establish whether or not they correspond to the postal rate due in respect of the weight of the posted letter and the typed zip code;
   - when payment is made in cash, the user, after reading the requested price on the display (6), inserts coins or bank notes into appropriate slots (9,10), the coins and the bank notes being checked by the respective readers associated with the microprocessor.

4. A mailbox in accordance with claims 1, 2 and 3, characterized in that a third keyboard (5) is provided for accessing a codified magnetic card reader is provided to enable Post Office personnel, after duly typing their identity code on the said third keyboard, to start the motor for opening the mailbox and collecting the mail.

5. A mailbox in accordance with claims 1, 2, 3 and 4 characterized in that the display (6) is programmed in such a way that whenever the mailbox is not actually being used, it will put messages of public utility or publicity prepared by the Post Office on view for users and passers-by.

6. A mailbox in accordance with any one of the preceding claims, characterized in that an electric resistance, appropriately protected and supplied with a suitable current, is installed in an appropriate position inside the mailbox and, controlled by a thermostat, ensures that the mailbox environment will be maintained at a constant temperature.

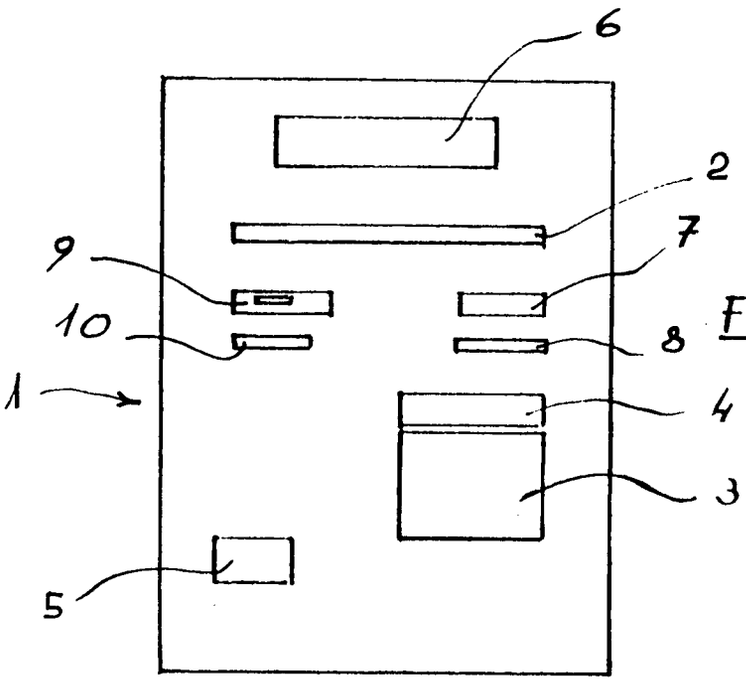

FIG. 1

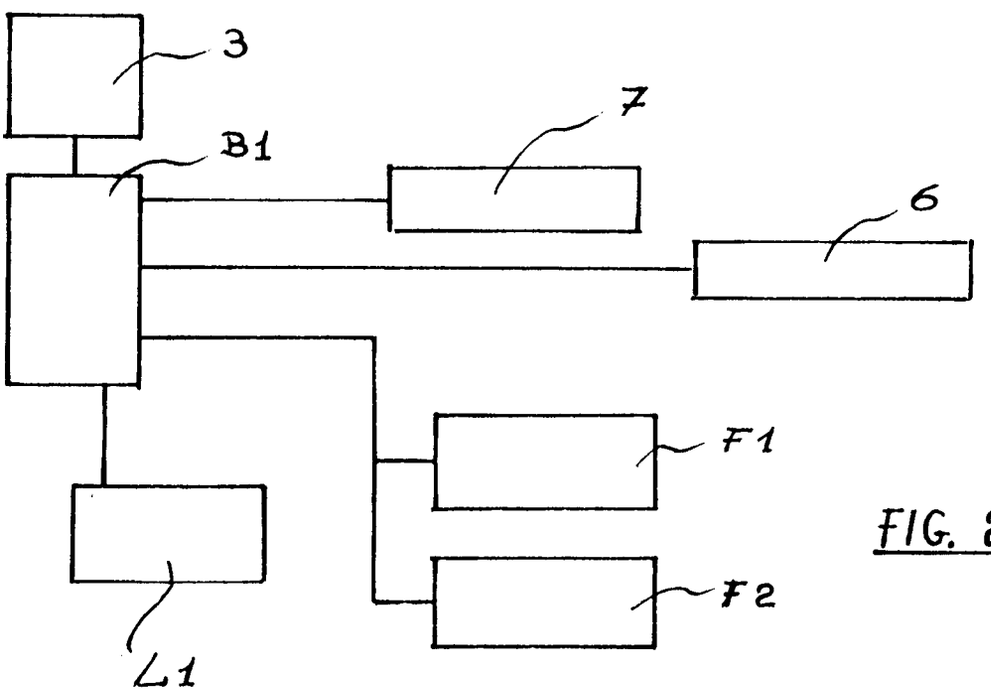

FIG. 2

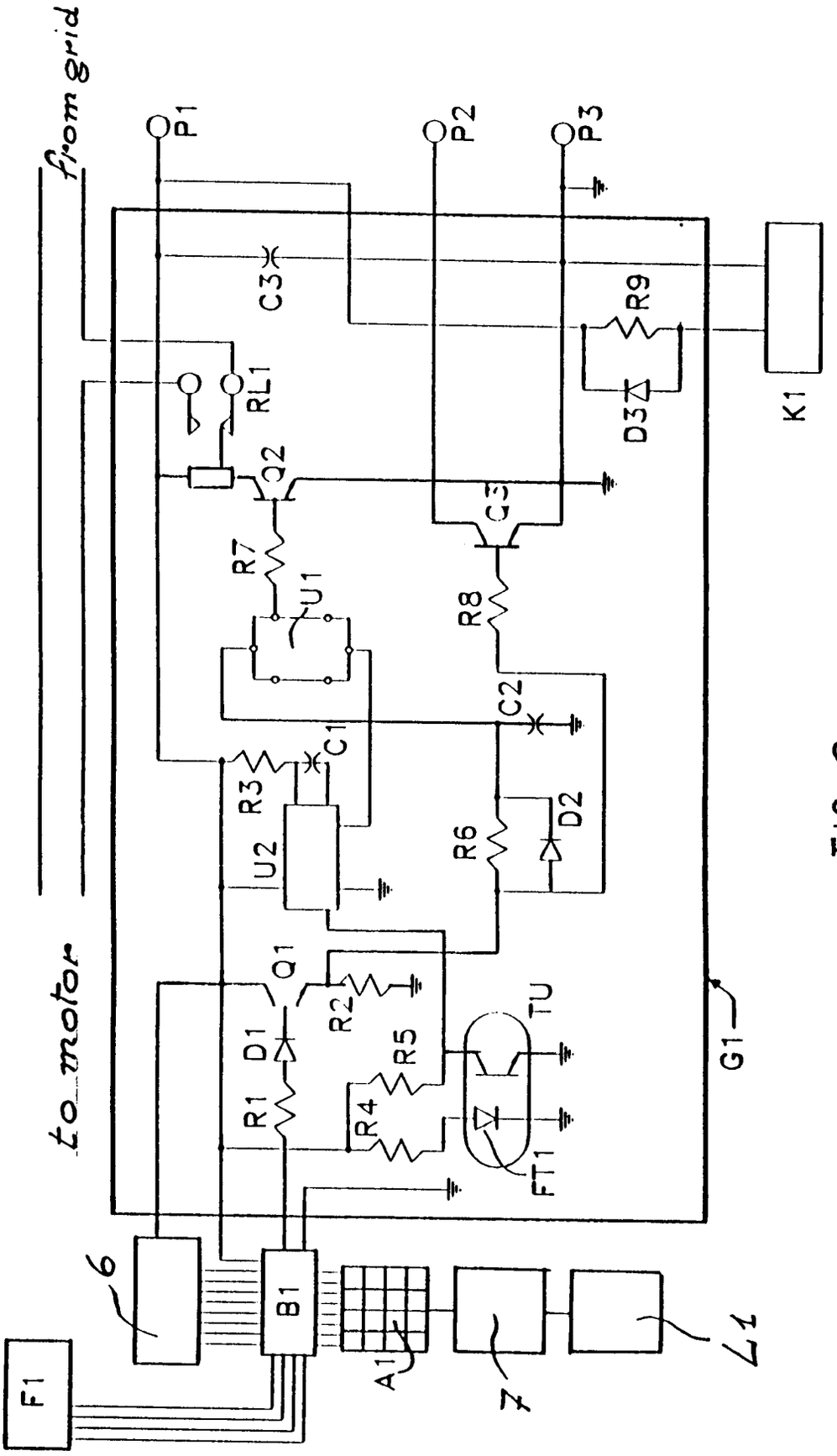
from grid
to motor
P1
P2
P3
C3
R9
D3
K1
RL1
Q2
R7
U1
R8
C2
C1
R3
U2
R6
D2
Q1
R2
D1
R5
TU
R1
R4
FT1
G1
6
B1
A1
7
11
F1

FIG. 3