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(54) **Automatic mailbox**

(57) Mail-box including means for collecting or accumulating the mail, characterized in that it includes means for moving said mail from an inlet section to said collecting or accumulating means and means for post-marking and printing a sorting code onto the mail inserted through said inlet section, the mail-box also comprising means for moving the mail, between said inlet section and said postmarking and code printing means, and processing means for automatically driving said mail moving means and said postmarking and code printing means according to data coming from an external interface and according to enabling signals coming from sensors connected with the above mentioned means.

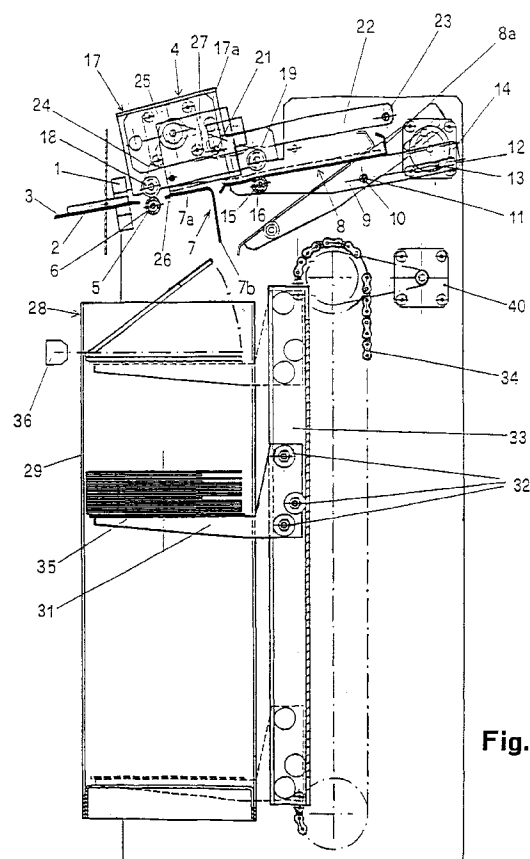


Fig. 1

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Description

The present invention relates to an automatic mail-box.

It is known that a conventional mail-box is only apt to collect the correspondence to be subsequently removed, collected into suitable mailbags and conveyed to a postal sorting center. Hereinafter, the operations are as follows. The mailbags are manually hitched to a monorail conveyer to be moved towards a so-called "courier preparation line", which is the starting point of the sorting cycle. At this point, the mailbags are manually unloaded and the correspondence is then conveyed to a classification station by means of a conveyer. In the said station, the operators manually provide for a first classification of the correspondence, as well as for the separation of the envelopes having unadmitted size, to be treated separately.

Thereafter the correspondence is conveyed to an apparatus apt to arrange the envelopes and postcards in a vertical position, to allow for their correct entering in the postmarking device, that is to say a device which provides for printing a sign onto the stamps to avoid a subsequent use of the same. The next step includes the coding of the correspondence, each envelope or postcard being coded by printing a suitable sorting code.

A well known coding system includes the coding by means of a linear code. The address appearing onto each missive is displayed by a monitor and the operators enter the corresponding postal code through a keyboard connected with the system. A suitable device then provides for converting the thus entered postal code into a linear code which is to be printed onto the envelopes or postcards. The correspondence is finally conveyed to an automatic sorting device by means of which the correspondence is selected on the basis of the address appearing on the missives, that is to say, for example, northern, central or southern Italy, region, province, city and city zone.

It is quite evident that the procedure described above is too complex and time-consuming. It also requires an excessive labor turnover. It is also clear that the complexity of such a procedure may be cause for a delayed delivery of the correspondence and for high maintenance costs. Furthermore, the machines now in use are correspondingly structured in a complex manner and, as a consequence, are often out of order and may damage the envelopes and postcards.

The object of the present invention is to provide a mail-box by means of which it is possible to eliminate the above described procedure and is further possible to provide for carrying out all the operative steps, in an automatic manner, in a single operative station, so that it is possible to significantly reduce the time required, as well as the labor turnover, and furnish a more efficient service.

A mail-box according to the present invention includes means for collecting or accumulating the mail

and is characterized in that it includes means for moving said mail from an inlet section to said collecting or accumulating means and means for postmarking and printing a sorting code onto the mail inserted through said inlet section, the mail-box also comprising means for moving the mail, between said inlet section and said postmarking and code printing means, and processing means for automatically driving said mail moving means and said postmarking and code printing means according to data coming from an external interface and according to enabling signals coming from sensors connected with the above mentioned means.

In the present specification the words "mail", "postcard", "envelope" and "correspondence" have the same meaning.

These and other advantages and characteristics of the present invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings, given as a practical exemplification of the invention but not to be considered in a limitative sense, wherein:

- Fig.1 is a schematic longitudinal section view of a mail-box according to the invention;
- Fig.2 is a cross section view of the mail-box inlet area;
- Fig.3 is a plan view of the removable container inside the mail-box;
- Fig.4 is a perspective view of a possible arrangement of the mail-box; and
- Figs.5a to 5c are, in conjunction, a flow chart of the software for managing the operation of the mail-box.

With reference to Figs. 1 to 3, the mail-box according to the present invention has a box-type frame, which will be also denoted as "main frame" throughout the description, not shown in the drawings. This frame has a front opening constituting the inlet through which the correspondence is inserted into the mail-box. An optical sensor 1 is provided in the area of the inlet 2, from which a substantially horizontal plate 3 projects towards the outside. The outer portion of said plate 3 constitutes a support for the correspondence to be mailed.

A postmarking and code-printing unit 4 is provided downstream the inlet 2. A detailed description of said unit 4 will follow.

A shaft 5 is provided just below the unit 4 in a position adjacent to the inlet 2. Said shaft 5 is supported, freely rotatable about its own axis, by the main frame of the mail-box. A predetermined number, for example five, of rolls 6 are fitted onto the said shaft 5. A plate 7 is provided downstream the shaft 5. The plate 7 is suitably bent to provide a sliding plane 7a for the correspondence and a retaining wing 7b whose function will be described in detail in a following paragraph of this description.

Provision is made for a platform 8 which is in the

same plane of the plate 3 and of the sliding portion 7a of the plate 7. Said platform 8 is arranged partially below the unit 4 and is provided with a rear ledge 8a. Furthermore, the platform 8 is provided with two side wings 9 each of which has a corresponding hole 10, a shaft 11 being perpendicularly engaged with said wings 9 of the platform 8 through the holes 10 which are coaxial. The shaft 11 is also engaged, free to rotate about its own axis, with the main frame of the mail-box, so that the platform 8 is free to rotate about the axis of the shaft 11.

One of said wings 9 is provided, in proximity of the edge of the platform 8 opposite to the unit 4, with a slot 12 through which a pin 13 is engaged. Said pin 13 eccentrically projects from a sprocket 14 driven by an electric motor - not shown in the drawings for sake of clarity - so that the platform 8 is driven by a crank and slotted link.

Each of said wings of the platform 8 is also provided, on its end opposite to the slot 12, with a corresponding hole through which a shaft 15 is engaged free to rotate about its own axis. A predetermined number, for example five, of rolls 16 are fitted onto said shaft 15.

The above mentioned unit 4 is arranged within a corresponding frame 17 made of a plate having two side wings 17a. This frame 17 has therefore the shape of an overturned U. Each wing 17a of said frame 17 has two holes, so that the frame has two couples of coaxial holes, through which are respectively arranged a feeding shaft 18, adjacent to the inlet 2 and superimposed to the shaft 5, and an unloading shaft 19 which is in a superimposed position with respect to the shaft 15. Two rolls 20 are fitted onto the shafts 18 and 19.

The frame 17 is supported by the rolls 6 and 16 through the rolls 20 and is connected, free to rotate about two coaxial pins 21 which are received in corresponding holes of the wings 17a, to the free ends of two corresponding arms 22 extending inside the mail-box. Said arms 22 are connected to the main frame of the mail-box by means of two coaxial pins 23. The shafts 18 and 19 are connected to an electric motor 25 by means of a belt 24 which is arranged on the outer side of the frame 17, on the same side of the sprocket 14. Said electric motor 25 is fixed to the outer side of the frame 17.

A printer 27 is provided, housed in the frame 17, arranged in a position between the shafts 18 and 19. The printer 17 is rotatively supported by a corresponding shaft 26 which is parallel to said shafts 18 and 19. Said printer 27 has a postmarking function and is also apt to print the SORTING code onto the correspondence. The printer is only schematically shown in Fig.1 and will not be described in further details since it is of a conventional type.

A correspondence collecting means is arranged below the platform 8, generically denoted by the reference 28 and including a removable container 29 which is open on the upper side, the upper side of said container 29 facing the lower face of the plate 7 and having a box-

type shape. The container 29 is provided, on the side opposite to that of the inlet 2, with a longitudinal slit 30 which, on its lower end, has enlarged profile.

An arm 31 is arranged passing through the slit 30 of the container 29, perpendicularly in relation to the relevant wall. Said arm 31 is slidably associated to a vertical guide 33 by means of corresponding rolls 32, the arm 31 being connected to a transmission chain 34 which is driven by a corresponding electric motor 40. The arm 31 extends perpendicularly inside the container 29 and supports a platform 35 which is, therefore, movable downwardly as the correspondence accumulates thereon. An optical sensor 36 is provided, to sense the loading level of the container 29, fixed in a predetermined position on a side wall thereof. A mechanical sensor, not shown in the drawings, is associated to the bottom wall of the container 29 so as to act as a limit stop for the platform 35.

The operation of the present mail-box is controlled by means of a microcontroller, not shown in the drawings, which is intended to manage the correspondence movements into the mail-box, and the postmarking and code printing steps. Provision is made for a keyboard 37 and a display 38 by means of which the users may enter and display the data pertaining to the correspondence to be inserted into the mail-box. Said keyboard 37 and display 38 are received in a corresponding seat of the mail-box carter 39, as shown in Fig.4. On the front upper part of said carter 9, laterally with respect to the keyboard and display group, there are the feeding opening 2 and the plate 3.

The operation of the mail-box according to the invention is the following.

Each envelope or postcard to be mailed is inserted into the mail-box by positioning it onto the plate 3, with the stamped face upwardly oriented, and in such a manner that the stamped area be positioned in the right upper corner. The missive is then to be pushed by the user through the inlet 2 so that the sensor 1 senses its presence. A corresponding signal is transmitted by said sensor to the microcontroller which activates the display 38 and the keyboard 37. It is then displayed a stored message requesting the user to digit the ZIP code pertaining to the address which appears onto the envelope or postcard. The thus entered ZIP code is then displayed and the user is requested to confirm that the displayed code is correct. The microcontroller then operates a control about the existence of the entered ZIP code by comparing it with the codes stored in a memory. After that, the keyboard is deactivated, a message is displayed requesting the user to wait for the end of the operation and the motor of shafts 18 and 19 is activated. The shaft 18, due to the entrainment action given by the rolls 20 and 6, provide for the advancement of the envelope or postcard, so that the latter is positioned on the sliding portion 7a of the plate 7 within the postmarking and code printing unit. If the missive is of an unadmitted size, then the microcontroller operates the motor of the above men-

tioned shafts to eject the missive, the size of the latter being sensed by a group of sensors located in the inlet area.

If the missive is of an admitted size, then the printer 27 provides for its postmarking. By means of a further rotation of the shafts 18 and 19, the rollers 20 and 16 engage the envelope or postcard which is then conveyed to the platform 8, in such a manner that the rear portion of the missive be in the printing area of the unit 4, and the printer 27 prints a code, that is a linear or complex code, onto said portion of the envelope or postcard. The code printed by the printer 27 is provided by the microcontroller which previously provides for processing the ZIP code entered by the user, according to a predetermined processing protocol. Thereafter, the microcontroller activates the crank and slotted link to obtain the rotation of the above mentioned platform, so that the missive falls down onto the platform 35 of the underlying container 29. The wing 7b of the plate 7 acts as an upper datum plane for the correspondence unloaded by the platform 8, in such a manner to obtain its correct positioning into the container 29.

In order to reduce at the minimum the falling path of the envelopes and postcards, provision is made for moving the platform 35 in such a manner to have the upper portion of the pile of missives at the highest possible level inside the container. When the sensor 36 senses an augmentation of the pile level caused by the falling of a further missive, a corresponding signal is transmitted to the microcontroller which, in turn, drives a corresponding lowering of the platform 35.

When the container 29 is full, the platform 35 is positioned in correspondence of container bottom and a corresponding signal is transmitted from the relevant limit stop sensor to the microcontroller which, in turn, deactivates the system. The system is then activated only upon substitution of the container 29 with an empty container. In order to remove the full container 29, it is sufficient to pull the container thus extracting the platform 35 through the enlarged section of the slot 30. The correspondence is therefore orderly impiled and ready to be delivered to a sorting device.

The flowchart of Figs. 5a-5c is self-explanatory and will not be described in further details. It is to be noted that provision is made for allowing the user to insert more missives having the same ZIP code. In this case, the user must simply reply in the affirmative sense to the corresponding displayed request of the system and the microcontroller will drive the printing of the last processed code onto the missives.

Finally, in order to provide for the printer maintenance and the ink cartridge substitution, it is sufficient pull upwardly the frame 17, by lifting the same, thus causing the rotation of the arms 22 about the pins 23 and the rotation of the same frame about the pins 21. The printer may be rotated about the shaft 26 to gain access to the ink cartridge seat, which is located in the rear portion of the printer.

It is clear from the above that by employing the present mail-box, it is possible to increase the efficiency of the procedure and decrease the relevant costs, since the most part of the procedure is carried out automatically, quickly with a reduction of labor turnover.

According to an alternative embodiment, the mail-box is not provided with the postmarking and code printing unit. It has the advantage of orderly collecting the correspondence, which therefore results in a suitable arrangement to allow for a subsequent treatment to be carried out according to the conventional postmarking, code printing and sorting mechanized protocol.

15 Claims

1. Mail-box including means for collecting or accumulating the mail, characterized in that it includes means for moving said mail from an inlet section to said collecting or accumulating means and means for postmarking and printing a sorting code onto the mail inserted through said inlet section, the mail-box also comprising means for moving the mail, between said inlet section and said postmarking and code printing means, and processing means for automatically driving said mail moving means and said postmarking and code printing means according to data coming from an external interface and according to enabling signals coming from sensors connected with the above mentioned means.
2. Mail-box according to claim 1 wherein said means for moving the mail include, upstream and above the mail collecting means, a mail feeding plane, a mail sliding plane, which is located below the postmarking and code printing means, an oscillating plane by means of which the mail is discharged into the mail collecting means, the mail being driven from said feeding plane to said sliding plane and from said sliding plane to said oscillating plane by means of a plurality of rolls.
3. Mail-box according to the preceding claims, wherein said oscillating plane is driven by a crank and slotted link which drives the oscillating plane from and to a position in which it is co-planar with the sliding plane and a position in which it is canted over the mail collecting means.
4. Mail-box according to claim 1 wherein said mail collecting means include a removable container.
5. Mail-box according to claim 4, wherein a side wall of said container is provided with a longitudinal slit having an enlarged lower portion, through which slit it is engaged an arm extending perpendicularly in relation to said wall, said arm being mounted free to slide along said slit under the control of said mi-

crocontroller according to the amount of mail present in the container and supporting a platform located inside the container.

6. Mail-box according to the preceding claims, wherein said interface includes a keyboard and a display. 5
7. Mail-box according to the preceding claims, wherein said postmarking and code printing means include a printer which is rotatably connected with a frame. 10
8. Mail-box including an inlet and mail collecting or accumulating means, characterized in that said mail collecting or accumulating means include a removable container and means for moving the mail from said inlet to said container, said mail moving means being driven by processing means according to enabling signals coming from sensors connected with the processing means. 15 20
9. Mail-box according to claim 8, wherein a side wall of said container is provided with a longitudinal slit featuring an enlarged lower section, through which slit it is engaged an arm extending perpendicularly in relation to said wall, free to slide along the slit and supporting a platform inside the container, said arm being driven by said microcontroller according to enabling signals coming from one of said sensors. 25 30

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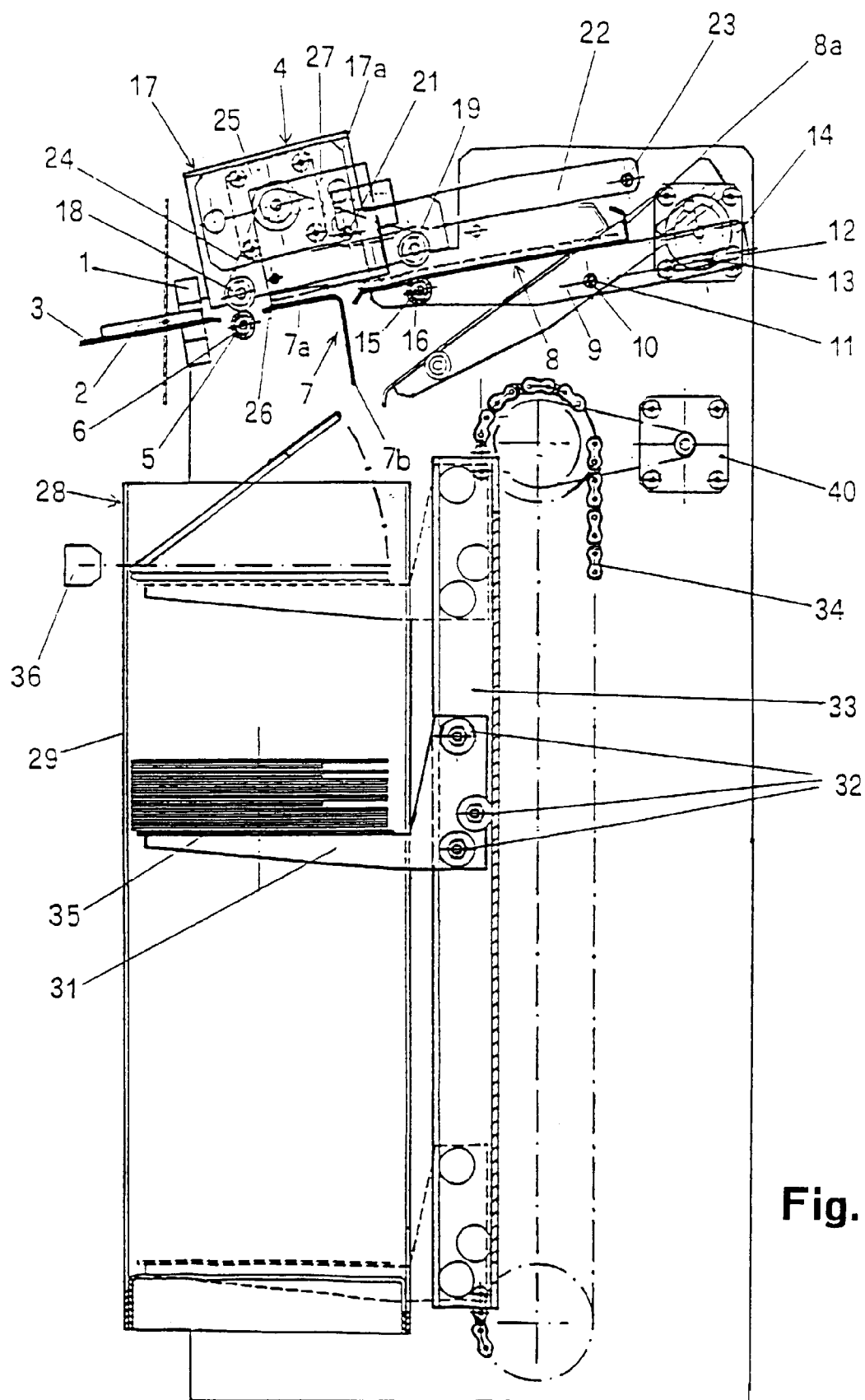
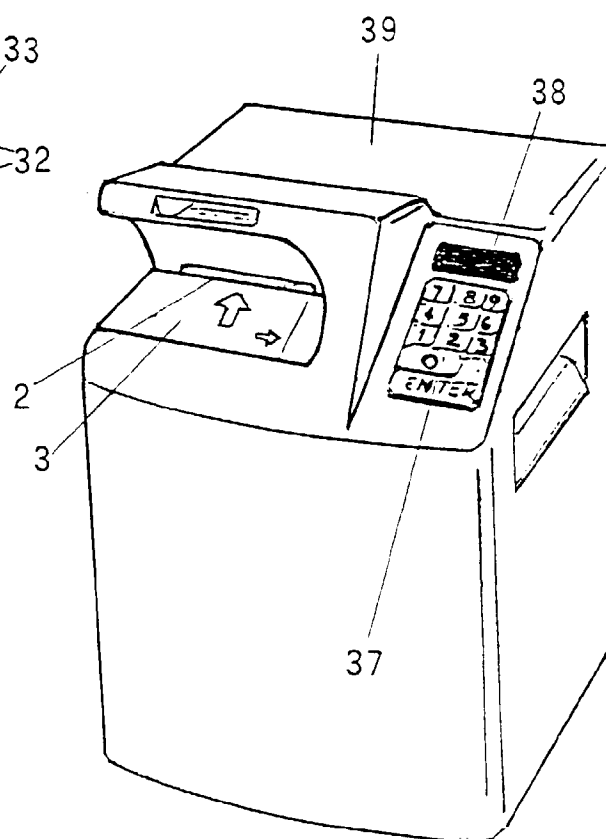
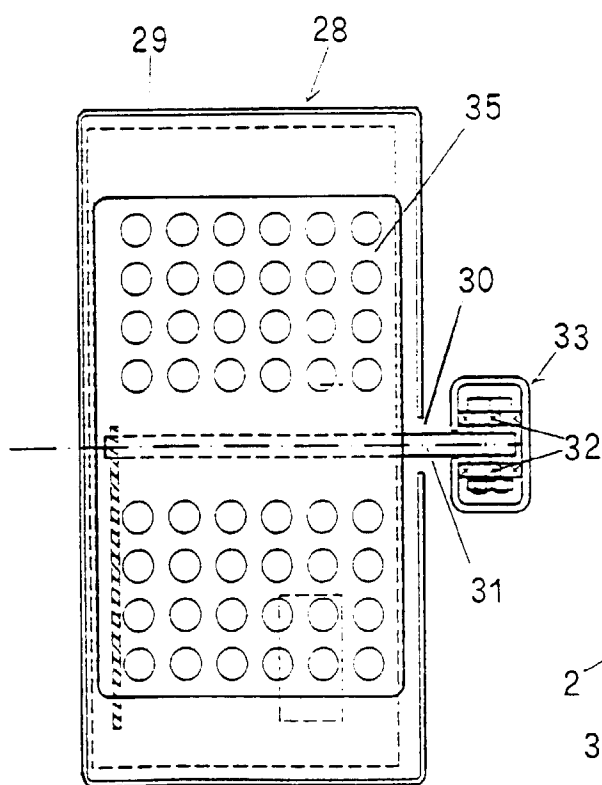
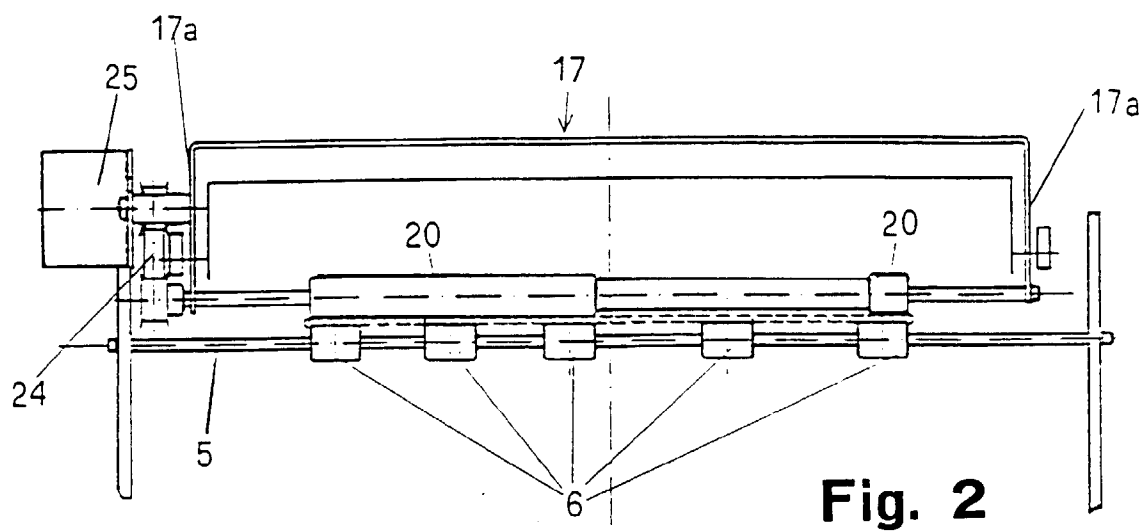


Fig. 1



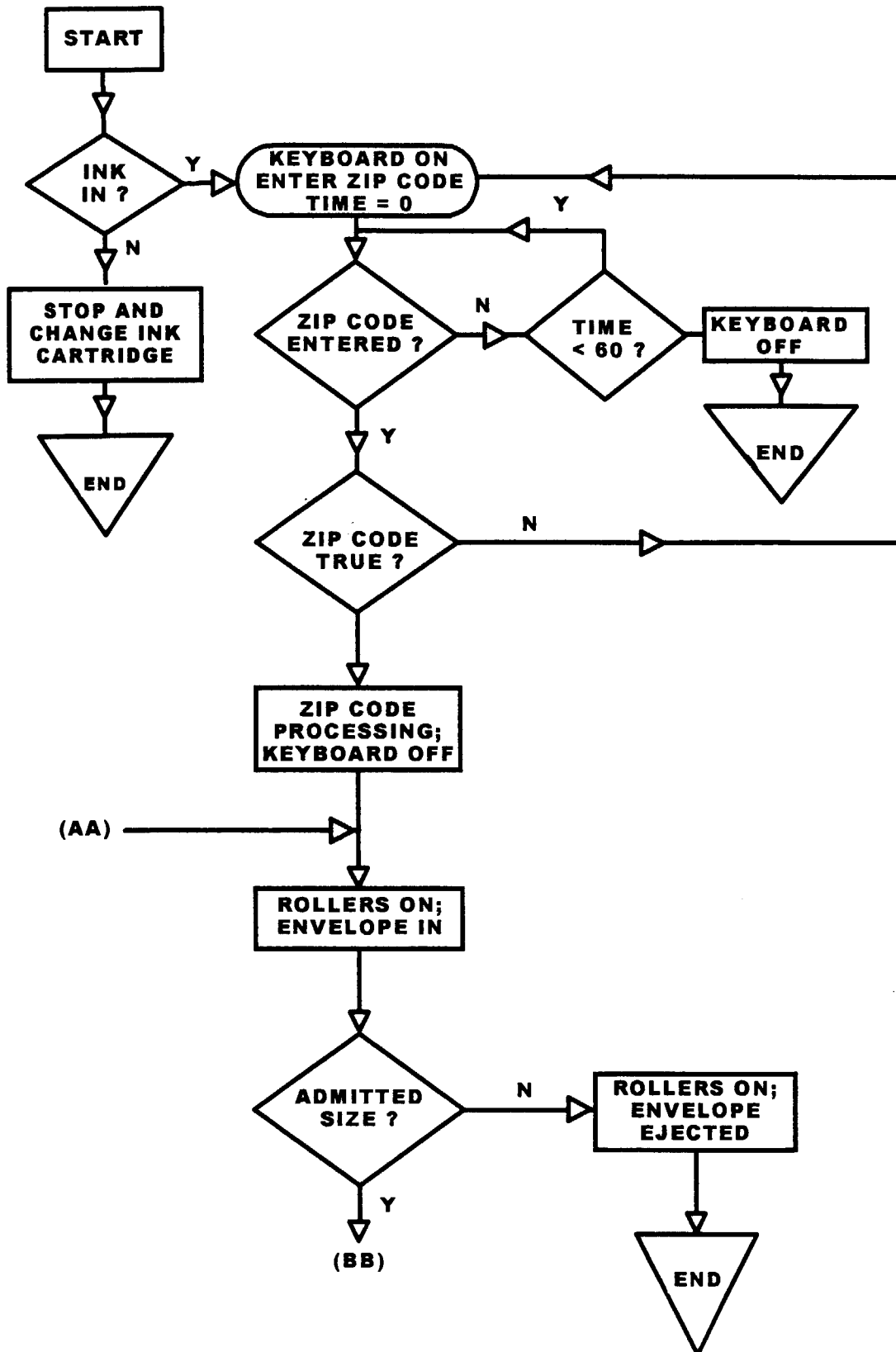
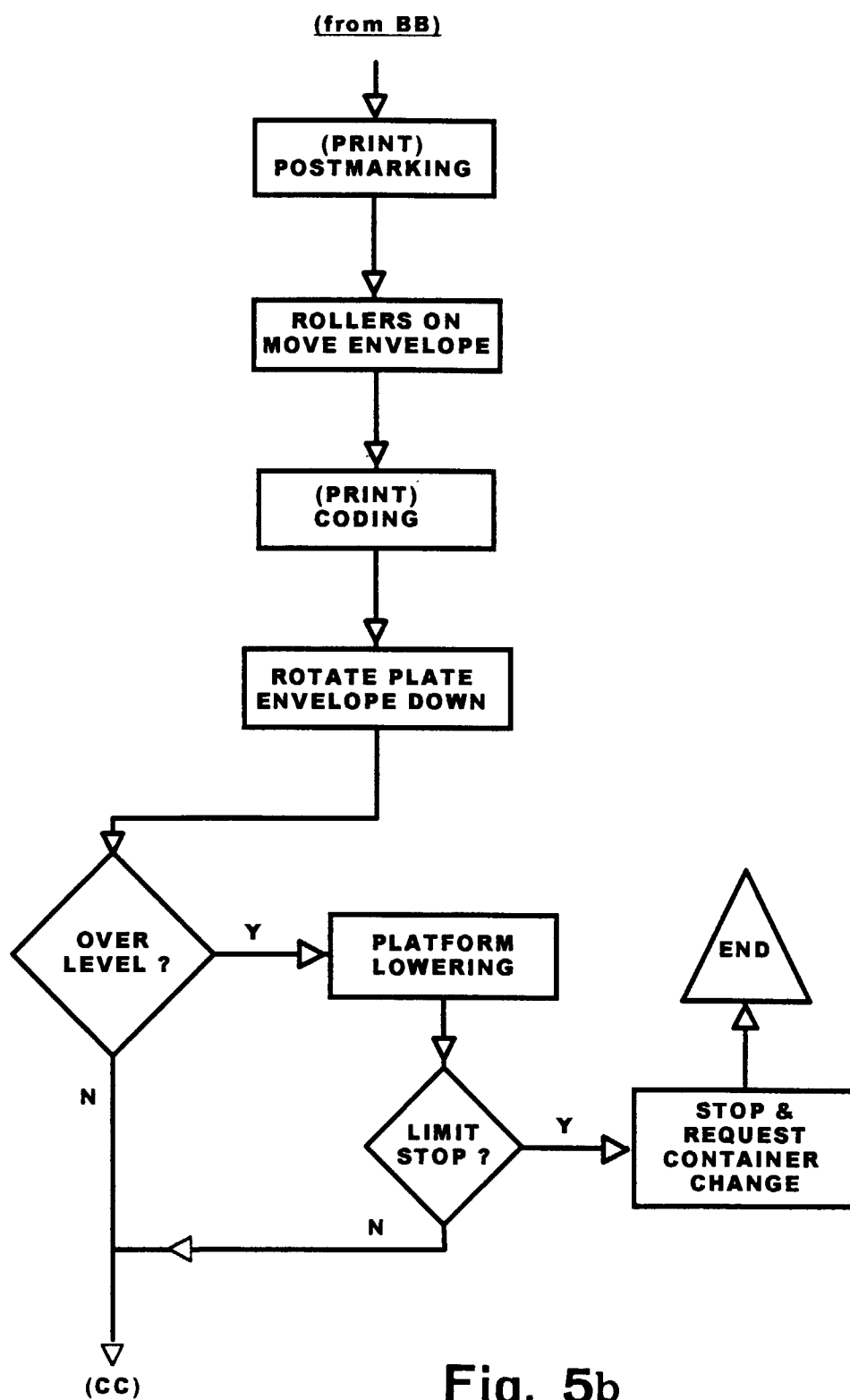


Fig. 5a



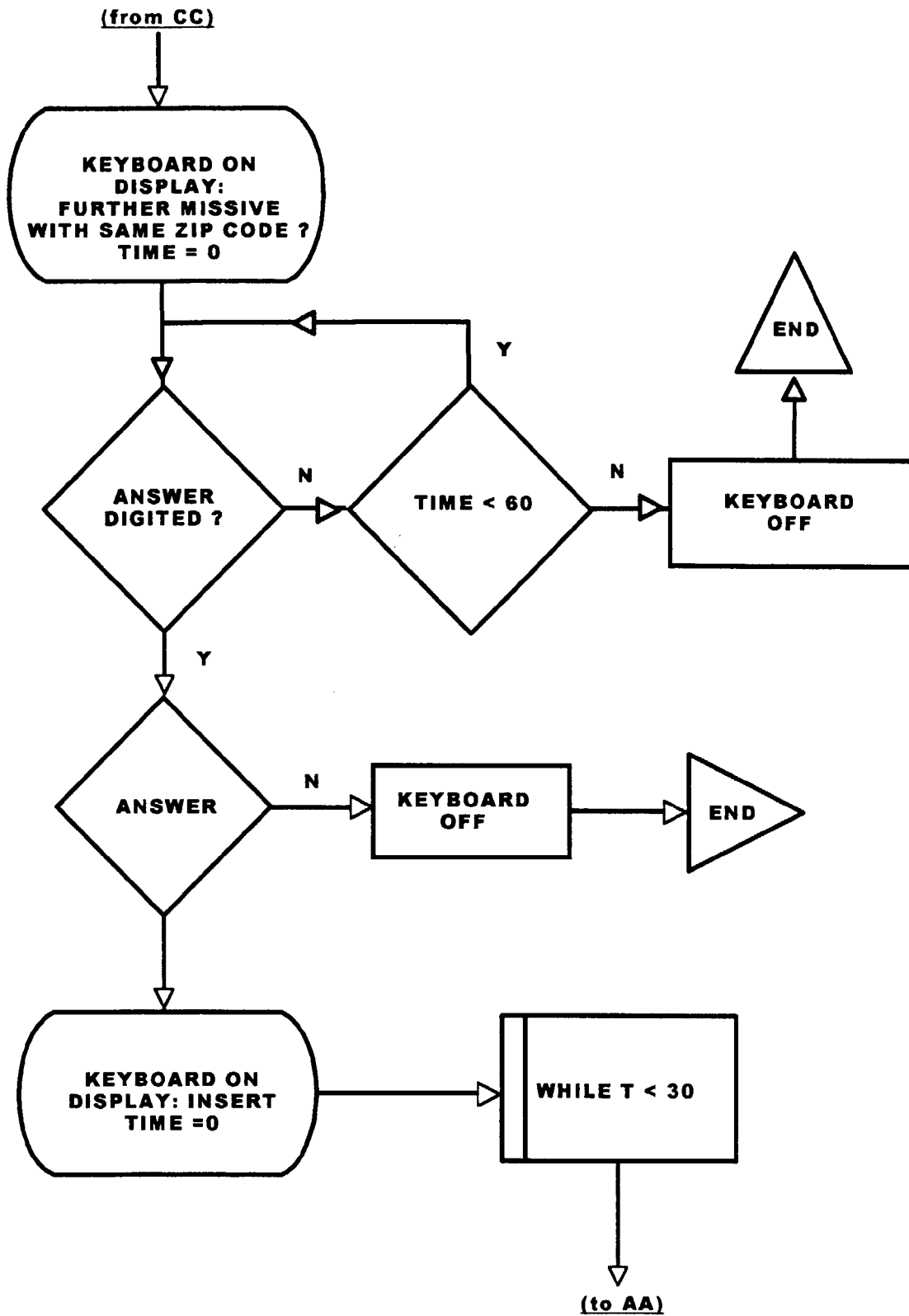


Fig. 5c