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# RECORDING MEDIUM HOLDER, RECORDING MEDIUM PROCESSING APPARATUS, AND CARD-TYPE RECORDING-MEDIUM FEEDING METHOD

Detailed Description of the Invention:

[Field of the invention]

The present invention relates to a method and apparatus for feeding a storage medium and a holder used for the method for processings such as reading, writing, and printing of a storage medium, particularly to a method and mechanism for processing a magnetic card by a passbook printer, and more particularly to a method, a system, and its exclusive holder for processing a magnetic card by a passbook printer after setting the magnetic card to the exclusive holder.

[Background art]

In a financial system widely spread at present, a magnetic card such as a cash card, credit card, or ID card of a bank clerk and a passbook having a magnetic stripe such as a deposit passbook are simultaneously processed in many cases. These magnetic cards are mainly inserted into an exclusive magnetic card reader and a magnetic stripe is read. However, a passbook is inserted into an exclusive passbook printer and read/write of a magnetic stripe located on the surface of the passbook is performed, and characters or numerals are printed on the print surface.

Therefore, a processing apparatus capable of reading a magnetic stripe of a magnetic card, read/write of a magnetic stripe of a passbook, and printing of characters and numerals on the passbook has a mechanism for processing a magnetic card and a mechanism for processing a passbook and each mechanism requires a head for reading a magnetic stripe and a mechanism for feeding a magnetic card or passbook. This causes the problems that the cost increases and the processing apparatus cannot be decreased in size and weight. Moreover, a control program is redundant because an independent mechanism must be controlled.

To solve the above problems, PR50 of OLIVETTI Inc. ("OLIVETTI" and "PR50" are trademarks of OLIVETTI Inc.) uses an art of reading a magnetic stripe of a magnetic card, reading a magnetic stripe of a passbook, and printing characters and numerals on the passbook by one mechanism.

However, this art also has various problems.

The first problem is a problem on design that it is necessary to arrange feed rollers 311, 313, and 315 on a roller setting member 310 at a density higher than that of a conventional passbook printer (see Figure 14) because it is necessary to directly insert and carry a magnetic card with a width of 85.6 mm and a length of 54.0 mm and make a magnetic stripe of the magnetic card approach a magnetic head and it is necessary to arrange a roller setting member at a density higher than that of the conventional passbook printer. These restrictions on design result in the fact that the cost increases due to increase of the number of parts and the printer cannot be decreased in size and weight.

The second problem is a problem that the probability of skew of a magnetic card is increased due to the irregular shape of embossment which is formed on most magnetic cards when the magnetic card is directly inserted and fed. The embossment of the magnetic card is not always formed at a constant position. When a plurality of feed rollers are provided on a roller setting member, the moment for making a magnetic card skew works because the resistance value received by each feed roller is not uniform. To prevent the skew of the

magnetic card, special consideration of design and addition of a special structure are necessary. This also results in the fact that costs are increased and a printer cannot be decreased in size and weight. Moreover, because the embossment on the magnetic card may interrupt the close contact between a magnetic head and a magnetic stripe, it may restrict the design.

The third problem is a problem that design must be made so as to raise the pressure applied to each feed roller. A magnetic card is designed in accordance with the standard of ISO or the like (e.g., ISO 7811) and has a width of 85.6 mm and a length of 54.0mm. Therefore, it cannot be avoided to decrease the number of feed rollers for holding the magnetic card when reading a magnetic stripe by a magnetic head. To withstand the force produced when the magnetic head rubs a magnetic stripe by a decreased number of feed rollers at the time of read, design must be made so as to increase the pressure to be applied to each feed roller. However, when design is made so as to increase the pressure to be applied to each feed roller, a piece of copying pressure-sensitive paper such as carbon reacts when printing a document and thereby, a roller trace may be transferred.

Moreover, the probability increases that a phenomenon (generally called a "bird's footprint" by those skilled in the art) in which the ink attached to a feed roller attaches to a print portion again every rotation of the feed roller when printing a passbook or document and transferring the print portion. Moreover, to improve the feed accuracy while increasing the pressure to be applied to a feed roller, it is necessary to design the feed roller so that it has a large diameter. Therefore, the third problem results in the fact that the printing capacity and the transfer capacity of a passbook printer are deteriorated, the cost is increased, and the printer cannot be decreased in size and weight.

The fourth problem is a problem that a passbook printer may malfunction or the frequency of malfunction may increase. At present, most passbook printers use a reflection-

type optical sensor in order to detect insertion and length of a document or passbook. In the case of a transmission-type optical sensor, a light source and the optical sensor must be arranged so as to hold a document in the normal direction of an document to be inserted. Because a passbook is normally inserted horizontally to the ground, the light source and the optical sensor are vertically arranged. Therefore, dust is collected on the light source or optical sensor arranged at the lower side and its function cannot be executed. In the case of a reflection-type optical sensor, however, a light source and the optical sensor can be arranged above a document and therefore, dust is hardly collected on it. Therefore, a reflection-type optical sensor is used for detection of insertion and length of a document or the like. In the case of this reflection-type optical sensor, a detection range is set because malfunction or erroneous operation occurs when the sensitivity is set to an excessive high value. Because the range is set on the basis of the color of a document or passbook (color close to white) to be normally inserted, a problem occurs that it is difficult to detect all magnetic cards or optical cards which are formed with various colors (for example, when a card is matt black, it is difficult to detect the reflected light). Therefore, to adopt a direct magnetic-card insertion method, it is necessary to select whether to increase the probability of malfunction or erroneous operation of a passbook printer, use a transmission-type optical sensor which is easily influenced by dust, or design a system so that a card with a less-reflection color cannot be used.

The fifth problem is a problem that design must be made so as to increase the movable range of a magnetic head. The data writing width of a magnetic stripe specified in the ISO standard is at least 85 mm from an end of a passbook. However, when the minimum width of a passbook is specified as 120 mm, it is unnecessary to make a magnetic head movable in a range of 35 mm at the left of the passbook. Therefore, in the case of the left alignment method (method for printing a medium such as a passbook or document by left-aligning (left justifying), which is used by PR50 of OLIVETTI, 9055 of IBM and 4772 of IBM) used for

many passbook printers at present, it is unnecessary to make a magnetic head movable in a range of 35 mm from a left guide of a feed path of a passbook printer. However, to read a magnetic stripe of a magnetic card by the left alignment method by directly inserting the magnetic card, it is necessary to entirely move a magnetic head to a left guide because the width c is up to 2.92 mm and the position where data is actually written is 7.44 mm (ISO standard 7811/4) separate from the right end (strip is read by turning it downward), as shown in Figure 2. Moreover, to read a passbook and a magnetic card by the same method, the magnetic head contact-moves (reads no data) in an unnecessary range of 35 mm at the left side of the passbook and this causes the magnetic head to deteriorate (This range may be in the area of the cloth rather than that of the magnetic stripe). To avoid the above mentioned, it is necessary to distinguish between a passbook and a magnetic card before reading a magnetic stripe by a magnetic head. Therefore, the fifth problem results in the fact that a magnetic head of a passbook printer is deteriorated, costs are increased by an additional mechanism, and the printer cannot be decreased in size and weight.

The sixth problem is a problem that the probability for a magnetic card not to react to a skew correction sensor increases. In particular, the center-insertion-type printer under development at the time of application of the present application (this description does not correspond to the confession that the printer of this type is already known to the public at the time of application) has a large problem because of correcting skew when a fed medium is skew (is skewed). As the premise, whether the medium is skew or not is decided by two optical sensors set to a roller setting member at a certain interval in parallel. When both of the optical sensors are turned on within a predetermined time, it is decided that the medium is not skew. However, when either sensor is turned but the other sensor is not turned on within a certain time, it is decided that the medium is skew. In this case, if a magnetic card is directly inserted and fed, the magnetic card may not pass the position of either sensor or positions of

both sensors because the magnetic card normally has a width of 85.6 mm. Moreover, when the interval between two sensors is too small, the detection sensitivity is lowered.

These problems of a passbook printer also occur in an ID card printer requiring a mechanism for feeding an ID card to print the surface of the ID card, an ID card encoder for writing data in a magnetic stripe of an ID card, and an ID card fabrication system for printing the surface of an ID card and writing data in a magnetic stripe.

[Problems to be solved by the invention]

The present invention solves the above problems by setting a record holding medium to a holder and thereafter processing the medium. A preferred embodiment of the present invention is applied to a passbook printer capable of reading magnetic stripes of a magnetic card and a passbook having a magnetic stripe (hereafter referred to as a magnetic-card compatible passbook printer). The magnetic card is set to an exclusive card holder and thereafter inserted into and processed by the magnetic-card compatible passbook printer.

A preferred embodiment of the present invention makes it possible to design a magnetic-card compatible passbook printer having less restrictions on design and decreased in size and weight by the exclusive magnetic card holder.

A preferred embodiment of the present invention provides a storage medium holder for moderating the influence of the shape of a storage medium to be read.

A preferred embodiment of the present invention provides a magnetic-card compatible passbook printer without deteriorating the printing capacity and feeding capacity of the passbook printer.

A preferred embodiment of the present invention provides a magnetic-card compatible passbook printer not being subject to increasing malfunction or the frequency of malfunction.

A preferred embodiment of the present invention provides a magnetic-card compatible passbook printer not to be influenced by the type of a magnetic card.

A preferred embodiment of the present invention provides a magnetic-card compatible passbook printer having less restrictions on the design of the movable range of a magnetic head.

A preferred embodiment of the present invention provides a magnetic-card compatible passbook printer without influencing a skew correction sensor.

[Summary of the invention]

To solve the above problems, the present invention provides an almost rectangular flat card holder having a first opening for holding a magnetic card provided with a magnetic stripe and embossment, a second opening for housing the embossment formed at the bottom of the first opening, and a dropping-out preventive sheet for preventing a magnetic card from dropping out from the first opening and having a leading edge larger than the long-side length of the magnetic card but smaller than that of a feed path of a magnetic recording medium reading unit, a side edge larger than the short-side length of the magnetic card, and a thickness smaller than that of the feed path. The recording medium reading unit has a concept including a magnetic card reading unit, a magnetic card reading and writing unit, an optical card reading unit, an optical card reading and writing unit, and a magnetic- card compatible passbook printer. For the length of a card holder of the present invention, only "larger than the long-side length of a magnetic card" is described but the upper limit of the length is not described because an apparatus capable of processing a medium theoretically having unlimited length such as a printer for printing continuous paper is also present. In the case of the printer for printing continuous paper, the continuous paper to be printed can be assumed as a medium with unlimited length by forming it like a loop.

This card holder is inserted into a feed path of a magnetic recording medium reading unit having a magnetic head for reading a magnetic recording medium and feed rollers for feeding the magnetic recording medium and fed by the feed roller.

According to another aspect of the present invention, a card holder is rectangular, and the diagonal length of the card holder is larger than the leading edge of a feed path and the leading edge of the card holder is smaller than that of the feed path. This shape makes it possible to prevent the card holder from skewing in the feed path.

According to still another aspect of the present invention, a dropping-out preventive sheet is provided so that the top of a magnetic card is exposed when the magnetic card is set at a width of 11.0 to 20.0 mm. Thereby, it is prevented that a magnetic stripe is exposed from the dropping-out preventive sheet and the dropping-out preventive sheet prevents a magnetic head from travelling. Moreover, it is possible to protect the signature entry portion of the magnetic card.

According to still another aspect of the present invention, a card holder has an optical notch having a light reflectance of 15% or less to adjust a length of a fed medium to be recognized by an optical sensor for detecting the length of the medium. Thereby, it is possible to adjust a length of a card holder to be recognized by a magnetic recording medium reading unit.

Still another aspect of the present invention provides a card holder having an opening for holding a card-type recording medium and having a leading edge larger than the short-side length of the card-type recording medium but smaller than that of a feed path of a reading unit, a side edge being larger than the long-side length of the card-type recording medium, and a thickness smaller than that of the feed path. The card holder is inserted into a feed path of a

recording medium processing apparatus and fed by feed rollers of the recording medium processing apparatus. The card holder is mainly used for a recording medium processing apparatus in which a recording medium is read or written in parallel with a feeding direction. Moreover, the recording medium processing apparatus has a concept including a magnetic card reading unit, a magnetic card writing unit, an optical card reading unit, an optical card writing unit, a magnetic-card compatible passbook printer, a card printer for printing the surface of a magnetic card or optical card, a magnetic card fabrication system, and an optical card fabrication system.

Still another aspect of the present invention provides a card holder having an opening for holding a card-type recording medium and having a leading edge larger than the long-side length of the card-type recording medium but smaller than that of a feed path of a reading unit, a side edge being larger than the short-side length of the card-type recording medium, and a thickness smaller than that of the feed path. The card holder is inserted into a feed path of a recording medium processing apparatus and fed by feed rollers of the recording medium processing apparatus.

Still another aspect of the present invention provides a method for reading data from a magnetic stripe of a magnetic card having embossment by using a magnetic head in a passbook printer which is provided with a magnetic head and a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts, and includes the step of detecting that a flat card holder holding a magnetic card at its first opening, housing the embossment of the magnetic card with a second opening formed at the bottom of the first opening, having a dropping-out preventive sheet for preventing the magnetic card from dropping out from the first opening, and having a leading edge larger than the long-side length of the magnetic card but smaller than that of a feed path of the passbook printer, a side edge being larger than the short-side length of the magnetic card, and a thickness smaller than the feed path is inserted

into the feed path of the passbook printer, the step of starting the rotation of feed rollers of the passbook printer when it is detected that the holder is inserted into the feed path, the step of feeding the card holder by feed rollers of a reading unit, the step of adjusting a track in which data stored in the magnetic stripe of the magnetic card held by the card holder is recorded to the position of the magnetic head, and the step of moving the magnetic head to read data from the magnetic stripe.

According to still another aspect of the present invention, the method of the present invention further includes the step of deciding whether read data is the data recorded in a magnetic stripe of a magnetic card or the data recorded in a magnetic stripe of a passbook.

Specifically, it can be decided whether the read data is the former data or the latter data by detecting the length or width of an inserted medium and comparing it with a preset value or by detecting the format of the read data.

Still another aspect of the present invention provides a method for feeding a card-type recording medium in a recording medium processing apparatus provided with a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts and including the step of feeding a flat card holder by using feed rollers of the recording medium processing apparatus and the step of stopping the card-type recording medium held by the card holder at a recording medium processing position when it is detected that the flat card holder holding the card-type recording medium in its opening and having a leading edge larger than the long-side length of the card-type recording medium but smaller than that of a feed path of a reading unit, a side edge being larger than the short-side length of the card- type recording medium, and a thickness smaller than that of the feed path is inserted into the feed path of the recording medium processing apparatus. The recording medium processing apparatus has a concept including a magnetic card reading position, a magnetic card writing position, an

optical card reading position, an optical card writing position, and a position for printing the surface of a magnetic card or optical card.

Still another aspect of the present invention provides a method for reading data from a card-type recording medium or writing data in the card-type recording medium in a recording medium processing apparatus provided with a head for performing read or write operation and a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts and including the step of feeding a flat card holder by using feed rollers of the recording medium processing apparatus, the step of adjusting a data storage position of the card-type recording medium held by the card holder to the position of the head, and the step of reading data from the card-type recording medium or writing data in the card-type recording medium by using the head when it is detected that the flat card holder holding the card-type recording medium in its opening and having a leading edge larger than the long-side length of the card-type recording medium but smaller than that of a feed path of a recording medium processing apparatus, a side edge being larger than the short-side length of the card-type recording medium, and a thickness smaller than that of the feed path is inserted into the feed path of the recording medium processing apparatus.

Still another aspect of the present invention provides a method for reading data from a magnetic stripe of a magnetic card by using a magnetic head in a passbook printer provided with the magnetic head and a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts and including the step of detecting that a card holder holding the magnetic card in its opening and having a leading edge larger than the long-side length of the magnetic card but smaller than that of a feed path of the passbook printer, a side edge being larger than the short-side length of the magnetic card, and a thickness smaller than the feed path is inserted into the feed path of the passbook printer, the step of starting the rotation of feed rollers of the passbook printer when it is detected that the card holder is

inserted into the feed path of the passbook, the step of feeding the card holder by using feed rollers of a reading unit, the step of adjusting a track in which the data in the magnetic stripe of the magnetic card held by the card holder is recorded to the position of the magnetic head, and the step of moving the magnetic head to read data from the magnetic card.

Still another aspect of the present invention provides a passbook printer capable of reading data from a magnetic stripe of a passbook by a magnetic head, which comprises a flat card holder holding a magnetic card with a magnetic stripe on its surface at the holder opening and having a leading edge larger than the long-side length of the magnetic card but smaller than that of a feed path of the passbook printer, a side edge being larger than the short-side length of the magnetic card, and a thickness smaller than that of the feed path; an optical sensor capable of detecting that a passbook with a magnetic stripe on its front cover is inserted into the feed path of the passbook printer;

feed roller control means for adjusting a track in which the data in the magnetic stripe of the magnetic card held by the card holder is recorded to the position of the magnetic head by controlling a plurality of feed rollers capable of feeding the passbook and the card holder jointly with a plurality of roller setting members each of which has the feed rollers on their roller shafts and which are arranged at an interval longer than a short side of the magnetic card; a magnetic head for reading data from the magnetic card; a magnetic head moving motor for moving the magnetic head; and means for deciding whether the data read by the magnetic head is the data recorded in the magnetic card or the data recorded in the passbook.

According to still another aspect of the present invention, whether data read by a magnetic head is the data recorded in the magnetic card or the data recorded in the passbook is decided in accordance with the format of the read data.

Still another aspect of the present invention provides a passbook printer capable of printing a passbook with a print head and reading a magnetic stripe provided on the front cover of the passbook with the magnetic head, which comprises a flat card holder holding a magnetic card with a magnetic stripe on its surface at the holder opening and having a leading edge larger than the long-side length of the magnetic card but smaller than that of a feed path of a passbook printer, a side edge being larger than the short-side length of the magnetic card, and a thickness smaller than that of the feed path; an optical sensor capable of respectively detecting that a passbook with a magnetic stripe on its front cover and three types of media of a document are inserted into the passbook printer; means for detecting a user input for deciding whether a medium inserted into the feed path is the card holder, passbook, or document; feed roller control means for controlling the feed rollers capable of feeding the passbook and the card holder jointly with a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts and which are arranged at an interval longer than the short-side length of the magnetic card and adjusting a track saving the data of the magnetic stripe stored in the magnetic card held by the card holder to the position of the magnetic head when the user input is a signal showing any one of the card holder and the passbook; a magnetic head moving motor for moving the magnetic head to read data from the magnetic card; and means for deciding whether the data read by the magnetic head is the data stored in the magnetic stripe of the magnetic card or the data stored in the magnetic stripe of the passbook.

[Brief Description of the Drawings]:

Figure 1 is an illustration showing the surface of a magnetic card to be processed by a preferred embodiment of the present invention;

Figure 2 is an illustration showing the back of a magnetic card to be processed by a preferred embodiment of the present invention;

Figure 3 is an illustration showing an embodiment of a card holder of the present invention;

Figure 4 is an illustration showing an embodiment of a card holder of the present invention;

Figure 5 is an illustration showing an embodiment of a component part of a card holder of the present invention;

Figure 6 is an illustration showing an embodiment of a component part of a card holder of the present invention;

Figure 7 is an illustration showing an embodiment of a dropping-out preventive sheet used for a card holder of the present invention;

Figure 8 is an illustration showing a procedure for setting a magnetic card to a card holder which is a preferred embodiment of the present invention;

Figure 9 is a sectional view of a magnetic card set to a card holder which is a preferred embodiment of the present invention;

Figure 10 is an illustration showing a passbook to be processed by a preferred embodiment of the present invention;

Figure 11 is an illustration showing an embodiment of a card holder of the present invention;

Figure 12 is an illustration showing an embodiment of a passbook printer of the present invention;

Figure 13 is an illustration showing an embodiment of a passbook printer of the present invention;

Figure 14 is an illustration showing a roller setting member used for a passbook printer which is a preferred embodiment of the present invention;

Figure 15 is an illustration showing a part of a passbook printer which is a preferred embodiment of the present invention;

Figure 16 is an illustration showing an embodiment of a magnetic card reading method of the present invention; and

Figure 17 is a block diagram showing an embodiment of a passbook printer of the present invention.

[Description of symbols]

100 ... Magnetic card
101 ... Embossment
105 ... Magnetic stripe
201 ... Item 1
203 ... Item 2
205 ... Item 3 (Dropping-out preventive sheet)
235 ... Opening for embossment

255 ... Opening for holding card

300 ... Passbook printer

301 ... Frame

303 ... Tray

305 ... Magnetic head

307 ... Insertion slot

309 ... Feed path

310, 320, 330, 360, 370, 380 ... Roller setting member

311, 321, 331, 361, 371, 381 ... Feed roller

312, 322, 332, 362, 372, 382 ... Roller shaft

341 ... Insertion-slot sensor

343 ... Top sensor

345 ... Alignment sensor

353 ... Print head

353 ... Printing mechanism

355 ... Platen

357 ... Feeding motor

400 ... Passbook

405 ... Magnetic stripe

407 ... Front cover

409 ... Print surface

601 ... Power supply

603 ... Main card

605 ... Operator panel card

607 ... Insertion-slot sensor

609 ... Top sensor

611 ... Alignment sensor

613 ... Jam detection sensor

615 ... Carrier motor

617 ... Feed motor

619 ... Connector card

621 ... Print head

623 ... REMS card

625 ... Magnetic head (REMS head)

627 ... Magnetic head motor

[Preferred embodiment]

Figures 1 and 2 show an embodiment of an information recording medium processed by the present invention. A card-type information recording medium includes a magnetic card having a magnetic stripe capable of magnetically recording/reproducing information, an optical card having an optical recording/reproducing section capable of optically recording/reproducing information and an optical and magnetic card having a magnetic stripe section capable of magnetically recording/reproducing information and an optical recording/reproducing section capable of optically recording/reproducing information. Moreover, the card-type information recording medium includes a flat medium on which a bar code is printed and a flat medium on which a bar code seal is attached. Furthermore, it is possible to apply the present invention not only to a rectangular medium but also to media having various shapes (including changes in the thickness direction). However, the information recording medium is described below only for a magnetic card so that readers can easily understand the present invention.

The standard for a magnetic card includes the ISO standard used for a credit card and the like and the JISII-type standard used by Japanese city banks and the like. The magnetic card

100 shown in Figures 1 and 2 conforms to the ISO standard. The magnetic card conforming to the ISO standard has an embossed area 101 for displaying a card number, owner's name, and effective period at the lower side on its surface as shown in Figure 1. The magnetic card 100 conforming to the ISO standard is almost rectangular and has a width of 85.47 to 85.72 mm, a length of 53.92 to 54.03 mm, a thickness of 0.76 ñ0.08 mm, and a corner edge with R of 3.18 mm. The height of the embossment is up to 0.48mm.

Moreover, as shown in Figure 2, a magnetic stripe 105 is present on the back of the card (in the case of the JISII-type standard, a magnetic stripe and an embossed area are present on the surface of a card). Figure 2 shows size information in the ISO standard.

Figure 3 is an illustration showing an embodiment of a card holder of the present invention. The card holder 200 holds a magnetic card conforming to the ISO standard and has a feed path with a width of 236 mm, which is inserted into a magnetic-card compatible passbook printer whose roller setting members are arranged at an interval of 69 mm. A preferred embodiment of the present invention, as shown in Figure 4, makes it possible to easily form the card holder 200 by bonding three card-holder forming members 201, 203, and 205 each other. In the case of this embodiment, the card-holder forming members 201 and 203 are bonded each other by a bonding adhesive tape with a thickness of 0.2 mm. It is easily understood by those skilled in the art that the card holder 200 can also be formed by molding or etching.

The card holder has a width of 235.5 mm which is slightly smaller than the width of the above feed path. Therefore, it is possible to prevent the card holder from deviating or skewing to right or left in the feed path. The card holder has a length of 90.0 mm which is longer than the interval between the roller setting members. Therefore, it is possible to prevent the holder from not being fed in the feed path. It is easily understood from the sample

of a conventional passbook printer shown below that the size of the card holder 20 is larger than the minimum processing size of the conventional passbook printer.

[Table 1]

| Type of machine | Minimum passbook size (mm) | | | | Minimum document size (mm) | |
|---|---|---|---|---|---|---|
| | With no REMS | | With REMS | | | |
| | W | L | W | L | W | L |
| 9055 | 102.0 | 99.0 | 120.0 | 99.0 | 98.0 | 68.6 |
| 4772 | 101.6 | 99.0 | 127.0 | 99.0 | 98.0 | 68.6 |
| 4009 | 102.0 | 99.0 | 127.0 | 99.0 | 99.0 | 68.5 |

This table shows the minimum processing size of documents and passbooks of IBM9055 passbook printer, IBM4772 passbook printer, and IBM4009 passbook printer. In this table, the minimum size of documents and passbooks which can be processed by the passbook printers is large in any direction compared to a width of 85.6 mm and a length of 54.0 mm of an ID card. Particularly, the minimum processing size of a passbook capable of processing a magnetic stripe is larger than the ID card size by 34 to 41 mm in width and by 45 mm in length. Therefore, when an ID card is directly inserted into one of these passbook printers, it may remain in its feed path.

The minimum processing size (width) in the case of "with REMS" is larger than that in the case of "with REMS (READ/ENCODE MAGNETIC STRIPE: magnetic stripe read/write)" because the landing point of a magnetic head 305 is not made very close to a left guide. If it cannot be avoided that the head 305 lands nearby the left guide, it is necessary to

form a notch on the left guide surface and this prevents a medium from being smoothly guided.

In Figure 3, the card holder 200 is provided with an opening 255 for holding the magnetic card 100. The card holder 200 which is a preferred embodiment of the present invention shown in Figure 4 is designed so as to be used by the center-insertion-type printer previously described. In Figure 4, because the opening 255 is applied to a passbook printer (see Figure 12) for driving a magnetic head transversely to a feed path, the magnetic card 100 is set transversely to the holder 200. However, to read a magnetic stripe longitudinally to the feed path, the opening 255 is formed so that the magnetic card 100 is set longitudinally to the card holder 200.

An opening 235 covers the embossed area 101 of the magnetic card 100. A card-holder forming member 205 is a dropping-out preventive sheet to prevent the magnetic card 100 from dropping out from the opening 255.

Figures 5 and 6 show holer forming members 201 and 203 respectively. In the case of a preferred embodiment of the present invention, the holder forming members 201 and 203 are made of white polycarbonate. This is because white has a high reflectance and it is easily detected by a reflection-type optical sensor (in the case of a preferred embodiment of the present invention, however, the holder forming member 201 need not be white because a reflection-type optical sensor is present only at the holder forming member 203 side). Therefore, to carry a magnetic card, it is impossible to provide a high reflectance (for example, 60% or more) same as that of other media (document and passbook) for the surface of the magnetic card (because the magnetic card already exists, it is impossible to provide a high reflectance for the magnetic card in view of a pattern and design). However, by using a card holder of the present invention, a reflection-type optical sensor detects the surface of the card holder and therefore, accurate detection is realized. Moreover, the reflectance of paper is

normally set to 60% or more and its printing portion is made to be 15% or more by considering that the paper may previously slightly be printed.

The holder forming members 201 and 203 can be made of not only polycarbonate but also various types of synthetic resins, paper, and wood. However, it is not preferable to use a material which affects a magnetic head when it is rubbed by the head.

Therefore, it is preferable to use a material capable of withstanding repetitive feeding and rubbing by a magnetic head.

The holder forming member 201 covers the embossed area 101 of the magnetic card 100 to protect the area 101 from influences while the magnetic card 100 is fed. Because the thickness of the holder forming member 201 is designed so as to be approx. 0.5 mm which is larger than the maximum height 0.48 mm of embossment, it is possible to decrease influences on the embossment while the magnetic card is fed. However, it is not always necessary to set the thickness of the holder forming member 201 larger than the height of embossment. Even if the thickness of the member 201 is smaller than the height of embossment, it is possible to decrease influences on the embossment while the magnetic card is fed because a level difference where a feed roller passes is decreased.

The holder forming member 203 has the opening 255 for holding the magnetic card 100. Because the opening has a size slightly larger than the magnetic card 100, the magnetic card 100 does not greatly move when a magnetic head reads data. The thickness of the holder forming member 203 is set to approx. 0.5 mm. Because the thickness of a bonding adhesive tape is approx. 0.2 mm, the member 203 has a total thickness of approx. 0.7 mm which is almost equal to or slightly smaller than the magnetic card thickness of 0.76ñ0.08 mm specified in the ISO standard. This is because the holder forming member 203 may interrupt the travelling of a magnetic head when the member 203 is thicker enough than a magnetic card.

However, when the holder forming member 203 does not have a sufficient thickness, it cannot withstand the abrasion due to a magnetic head when the magnetic head reads data and the probability for the magnetic card 100 to drop out from a card holder increases.

In the case of a preferred embodiment of the present invention, the opening 255 is formed at a position 74.8 mm separate from the left end of a card holder. This is designed by considering the driving position of a magnetic head. It is preferable to design the distance between the opening 255 and the left end of the card holder 200 by considering the magnetic-head driving state when a magnetic stripe of a passbook shown below is read.

[Table 2]

(1) In the case of IBM9055 passbook printer (Left alignment method)

| Minimum distance from left guide to right end of passbook | Minimum storage area from right end of passbook | Minimum distance from left guide to magnetic data reading position |
|---|---|---|
| 120 mm (Note 1) | 85 mm (Note 2) | 35 mm (120-85) |

Note 1: This size is the same as the minimum passbook width.

Note 2: This is based on the ISO8484 standard.

[Table 3]

(2) In the case of center-insertion-type passbook printer

| Minimum distance from left guide to right end of passbook | Minimum storage area from right end of passbook | Minimum distance from left guide to magnetic data reading position |
|---|---|---|
| 153 mm (Note 3) | 85 mm (Note 4) | 68 mm (153-85) |

Note 3: In the case of this printer, a top sensor 343 to be mentioned later is set at a position 83 mm separate from the left guide and an alignment sensor 345 to be mentioned later is set at a position 153 mm separate from the left guide.

Note 4: This is based on the ISO8484 standard.

The opening 255 of the card holder 200 shown in Figure 3 is formed at a position 13.5 mm separate from the bottom end of the card holder 200. This distance is designed by considering the data storage position (track position) of a magnetic stripe 405 of a passbook 400 shown in Figure 10.

The following table shows the data storage position used for many magnetic cards and passbooks at present.

[Table 4]

| Track No. | Medium | Distance from bottom end to the center of track |
|---|---|---|
| Track - 1 | ID Card (Read-only) | 7.1 |
| Track - 2 | ID Card (Read-only) | |
| | Passbook - IBM Format | 10.4 |
| Track - 3 | Passbook - ISO/DIN Format | 13.9 |
| N/A | Passbook - IBM 10-mm shift | 20.4 |
| N/A | Passbook - ISO/DIN 10-mm shift | 23.9 |

Many magnetic cards conforming to the ISO standard has a magnetic stripe in a range for covering track-1 and track-2. In the case of such credit cards as Diners and VISA ("Diners" is a trademark of Diners International Inc. and "VISA" is a trademark of VISA International Inc.), different data is written in both tracks respectively. In the case of a passbook, however, one type of data is written in a track of either IBM (track-2) or ISO/DIN (track-3). A conventional passbook printer prepares a track 10mm deviated from a normal position for convenience' sake of users.

It is possible to adjust the reading position of the magnetic stripe 405 of the passbook 400 to the position of the magnetic head 305 because a track to be used of the magnetic stripe 405 of the passbook 400 is previously set to the passbook printer 300 (or a user changes setting). To automatically stop the magnetic card 100 held by the card holder 200 at a normal position, there are following methods.

(a) Method for distinguishing between passbook and magnetic card before it is inserted

A user inputs whether a medium to be inserted is a passbook or magnetic card before inserting the medium. In this case, the size of a card holder is previously set, a passbook printer recognizes the size, and the card holder can be stopped in accordance with a passbook reading position. For example, when a magnetic card reading position is track-2 and track-3 is used for the passbook and the opening 255 of the card holder is set at a position 13.5 mm separate from the bottom end of the card holder, there is a difference of 10 mm because the passbook reading position is 13.9 mm separate from the bottom end and the magnetic card reading position is 23.9 (13.5+10.4) mm separate from the bottom end. Therefore, when the card holder is inserted, a sensor detects the bottom end of the card holder and thereafter, the card holder 200 is stopped at a position 10 mm before.

(b) Method for distinguishing between passbook and magnetic card until magnetic stripe is read after passbook or magnetic card is inserted.

(b-1) It is possible to distinguish between a passbook and a magnetic card by setting the length of a card holder to a value smaller than the minimum passbook length, or by setting the length of a card holder to a value larger than the maximum passbook length, measuring the length of a medium by a sensor after the medium is inserted, and comparing the length with a preset threshold value. When the passbook is distinguished from the magnetic card, it is possible to stop the card holder at a position previously designated by application. When the physical length of a card holder is not made smaller than the minimum passbook length, it is also possible to intentionally decrease a decision length of the sensor by attaching a label with a low reflectance such as a black label to the front end or bottom end of the card holder 200 or applying a pigment to the front end or bottom end of it. Moreover, it is possible to make a user input whether to make decision with the minimum or maximum passbook length through an input panel.

(b-2) A passbook printer having a sensor capable of detecting the transverse position or width of a medium distinguishes between a passbook and a magnetic card by setting the width of a card holder to a value smaller than the minimum passbook width or larger than the maximum passbook width. When the width of the card holder is set to a value smaller than the minimum passbook width, it is better to attach a label with a low reflectance such as a black label or applying a pigment with a low reflectance to portions reacting to a sensor such as portions 287 and 289 because the decreased width of the card holder influences feeding. Moreover, it is possible to make a user input whether to make decision with the minimum or maximum passbook width through an input panel.

(c) Method for working on bottom end of card holder in accordance with track of passbook.

When it is previously input that a medium is not a passbook but a magnetic card or when there is a mechanism for deciding whether a fed medium is a magnetic card holder or passbook, there is no problem because another stop control can be used. However, it is better to perform stop control without performing previous input or using any special mechanism for making decision. A medium (passbook or magnetic card) is normally stopped at a magnetic stripe reading position by detecting the bottom end of the medium by an optical sensor. However, when the card holder 200 is used, the bottom end of the opening 255 holding the magnetic card 100 and the card holder 200 located at the bottom end of the card holder 200 are trimmed. Therefore, a passbook is recognized by being extended by the trimmed dimension. For example, when the card holder 200 is inserted into the passbook printer 300 at the same setting as the passbook 400 (when it is assumed that the magnetic card 100 and the passbook 400 use track-2), the stop position overruns by a trimmed dimension (13.5 mm) because the lower part of the card holder 200 is trimmed. To solve the above problem, there are following methods.

(c-1) Method for trimming card holder at passbook reading position - magnetic card reading position

For example, when a passbook uses track-3 and a magnetic card uses track-2, it is possible to stop the card holder 200 at a magnetic card reading position without setting that a medium is a magnetic card by setting a trimming dimension to 3.5 mm (13.9 - 10.4). This is effective when a reading position from the bottom end of a passbook is farther than a reading position from the bottom end of a magnetic card.

(c-2) Method for forming an optical notch on card holder

As described above, a medium is normally stopped at a magnetic stripe reading position by detecting the bottom end of the medium by an optical sensor. Therefore, by forming a portion which is not recognized by an optical sensor on the card holder 200, it is possible to adjust an apparent medium length. That is, by cutting the bottom end at a position corresponding to a detection position by a sensor (this is also effective for a transmission- type optical sensor) or applying a black label (Matte treatment is preferable), the portion is not detected by a reflection-type optical sensor. In the case of the card holder 200 shown in Figure 3 whose width is adjusted to the width of a feed path or a left-alignment-type passbook printer, the bottom end treatment shown in Figure 11 can be applied because a detection position is already known. In the case of the center-insertion method, however, it is preferable to apply a black label or the like to the whole width of the bottom end because a detection position by a sensor is not determined.

Figure 11 shows an embodiment of the card holder 200 designed by assuming that the magnetic card 100 uses track-2. When the passbook 400 uses track-3, 10-mm shift (23.9 mm), the rear end of the magnetic card 100 is not cut because the difference with track-2 (10.4 mm) of the magnetic card 100 is 13.5 mm. When the passbook 400 uses track-2, 10-mm shift (20.4 mm), a portion 281 is cut because the difference with track-2 (10.4 mm)

of the magnetic card 100 is 10.0 mm. Moreover, when the passbook 400 uses track-3 (13.9 mm), portions 281 and 283 are cut because the difference with track-2 (10.4 mm) of the magnetic card 100 is 3.5 mm. Furthermore, when the passbook 400 uses track-2 (10.4 mm), portions 281, 283, and 285 are cut because the difference with track-2 (10.4 mm) of the magnetic card 100 is 0 mm.

To adjust an apparent medium length by forming a portion not recognized by an optical sensor, following methods are considered: a method of cutting the medium, a method of applying a label with a low reflectance such as a black label to the medium, a method of applying a pigment to the medium, a method of forming the portions 281, 283, and 285 in black (or with a transmission material) and applying a seal with a high reflectance such as a white seal to the portion 285 (or forming the portions 281, 283, and 285 in black, applying a white seal to the portions 281, 283, and 285, and removing the seal from only the portion 281), and a method of reflecting received light in a direction different from a sensor. Thus, a portion which cannot be detected by an optical sensor is hereafter referred to as an optical notch. An optical notch formed by a black label or the like is effective compared to a method of cutting the bottom end when a reading position from the bottom end of a passbook is nearer than a reading position from the bottom end of a magnetic card. This is because a reflection-type optical sensor detects an object from the back of the card holder 200 shown in Figure 11 and thereby, it is possible to form an optical notch also at a portion reaching the opening 255. By using this optical notch, it is possible to stop a medium at a position required each time even if a track used for a passbook is different from a track used for a magnetic card without distinguishing between the passbook and the magnetic card before inserting the passbook or magnetic card into a machine when reading a magnetic stripe.

Therefore, to read a passbook or a magnetic card without distinguishing between the passbook and the magnetic card, it is possible to decide the passbook or magnetic card from

the format of read data. This decision method is already known to those skilled in the art because it is disclosed in the official gazette of Published Unexamined Patent Application No. 1-154217.

Figure 7 is an illustration showing the holder forming member 205 which functions as a dropping-out preventive sheet of the magnetic card 100 by being bonded to the holder forming member 203. The dropping-out preventive sheet prevents the magnetic card 100 from dropping out from the card holder 200. However, because the card holder 200 is fed along a head plate of a feed path 309, the magnetic card 100 does not always drop out from the opening 255 of the card holder 200 even if the dropping-out preventive sheet is not used. Moreover, when a lower feed roller 365 (see Figure 13) greatly protrudes, the magnetic card 100 does not always drop out from the opening 255 of the card holder 200 while it is fed by setting an elastic body (not illustrated) under the feed path 309 so as to press the magnetic card 100 against the card holder 200. Furthermore, by setting a magnetic head to the upside of a feed path, the probability of dropping- out of the magnetic card 100 due to the weight of its own is decreased. Therefore, the dropping-out preventive sheet 205 is not an indispensable component of the present invention and it is not always necessary to set the sheet 205 as shown in Figure 3. For example, it is also possible to form a structure for preventing the magnetic card from easily dropping out by forming a bonding layer at the bottom of the opening 255 or prevent the magnetic card from dropping out by using a slide plate or the like.

The above magnetic card does not interrupt the movement of a magnetic head when the head reads the magnetic stripe of the magnetic card because the magnetic stripe is exposed by setting the magnetic card so that the top of the magnetic card is exposed at a width of 11.0 to 20.0 mm. Moreover, it is possible to prevent the ink attached to a feed roller from being transferred to the signature entry portion of a credit card.

In the case of a preferred embodiment of the present invention, the holder forming member 205 is made of a polycarbonate sheet. Moreover, it is possible to use such synthetic resin such as vinyl chloride or polyethylene, cloth, or paper for the member 205. However, it is preferable to use a thin sheet made of a slightly-elastic material not influencing feeding of the magnetic card 100 because the card is inserted into the member. When the member 205 is made of an elastic material, the dropping-out preventive sheet serves as a cushion for absorbing the irregularity of embossment even for a magnetic card conforming to the JISII-type standard in which a magnetic stripe and the embossment are present on the same plane.

Then, a series of procedures in which the magnetic stripe 105 of the magnetic card 100 is read by the magnetic head 305 are described below by referring to Figure 16. The magnetic head 305 is able to read a magnetic stripe of a passbook and print the passbook or a document. First, the processing is started with block 501. Then, the magnetic card 100 is set to the card holder 200 by a user (block 503). To set the magnetic card 100 to the card holder 200, the back (plane where the magnetic stripe 105 is present) of the magnetic card 100 is turned upward and inserted into the card holder 200 as shown in Figure 8 when the magnetic card 100 is a card conforming to the ISO standard. In this case, the embossment 101 is covered with the opening 235. Figure 9 is a sectional view viewed from the direction A in Figure 8 when the magnetic card 100 is set to the card holder 200.

Then, in block 505, the user inserts the card holder by turning the magnetic stripe side of the card downward (hereafter, see Figures 12 and 13 according to necessity). In the case of the passbook printer 300 which is a preferred embodiment of the present invention, the magnetic head 305 is set under the feed path 309. Moreover, the passbook printer 300 which is a preferred embodiment of the present invention is able to print various types of documents in addition to the passbook 400. Because a magnetic stripe is not read for a document, it is preferable to distinguish the document from a passbook or magnetic card whose magnetic

stripe is read through previous keyboarding. This is because a document may be damaged by a magnetic head when magnetic stripe reading is applied to the document. However, as described above, it is also possible to detect a medium in accordance with the size of the medium.

When the card holder 200 is inserted into an insertion slot 307, an insertion-slot sensor 341 detects the card holder 200 in block 507. That is, the insertion-slot sensor 341 is turned on. Because the card holder 200 has a large enough width compared to the magnetic card 100, it is securely detected by the sensor. Moreover, because the card holder 200 has a color (white) with a high reflectance, it is rarely overlooked by the insertion-slot sensor 314. A signal detected by the insertion-slot sensor 341 is transferred to control means. The control means rotates feed rollers 311, 321, and 331 in the forward direction in block 509. The feed rollers are rotated by a motor. The rotation of the feed rollers feeds the card holder 200 in the forward direction in block 511. In this case, the roller setting member 310 and a roller setting member 320 are set at an interval larger than the length of the magnetic card 100. However, because the interval is smaller than the length of the card holder 200, the card holder 200 can be fed though the magnetic card 100 cannot be fed. Moreover, because the card holder 200 can be fed by using the feed rollers 311, 313, 315, 317, 319, 321, 323, 325, 327, and 328 which are more than the number of feed rollers for feeding the magnetic card 100 and moreover, the embossed area 101 is covered with the opening 235 of the card holder 200, the probability of medium's skewing is decreased.

Thereafter, when the card holder 200 is fed and the bottom end of the card holder 200 passes through the position of the insertion- slot sensor 341, the insertion-slot sensor 341 is turned off. Thus, the insertion-slot sensor 341 detects the bottom end of the card holder 200 in block 512. It is possible to detect the length of the medium according to a feeding distance until the insertion-slot sensor 341 is turned off after the sensor 341 is turned on. As described above, because the card holder 200 is made of a material with a high reflectance (white

material) and the opening 235 where the magnetic card 100 is exposed does not pass under the insertion-slot sensor 341, it is very rare that the length of a medium is erroneously detected.

Thereafter, the card holder 200 reaches the top sensor 343 or the alignment sensor 345 (because the card holder 200 has a sufficient width, it is securely detected by the top sensor 343 and the alignment sensor 345). The control means detects a skew of the top edge of the card holder 200 by detecting a difference for the card holder 200 to reach the top sensor 343 and the alignment sensor 345 (block 513). The control means decides whether the skew is a preset standard value or more (block 515). When the skew is the standard value or more, the control means inversely rotates feed rollers to eject the card holder 200 (block 521). When the skew is less than the standard value, the control means feeds the card holder 200 up to a predetermined position for reading the magnetic stripe 105 on the basis of the length of the card holder 200 detected in block 512 (block 517). When the magnetic stripe 105 already precedes the magnetic head 305 while the bottom end of the card holder 200 is detected, the control means inversely rotates the feed rollers to adjust the position of the magnetic stripe 105 to the position of the magnetic head 305 (a side optical sensor is turned on and control is performed according to the subsequent feeding distance).

Then, the magnetic head 305 is driven and the magnetic stripe is read (block 519). To realize the method of directly inserting the magnetic card 100 to read the magnetic stripe with a left- alignment-type passbook printer, the magnetic head 305 shown in Figure 12 must exceed a left guide of a feed path and move to the right side (in Figure 13, a left guide is shown at right and a right guide is shown at left). However, because a preferred embodiment of the present invention uses the card holder 200, there is no above restriction on design. In the case of a preferred embodiment of the present invention, the magnetic head 305 is driven by a magnetic-head moving motor (not illustrated) in a direction (shown by an arrow) vertical to the feeding direction and the magnetic stripe is read. As shown in Figure 12, when

reading by the magnetic head 305, because the card holder 200 holds five feed rollers of 321, 323, 325, 327, and 328, it will easily be understood that the stress and moment applied to each feed roller is smaller than the stress and moment for feeding the magnetic card 100 for reading. Therefore, it is not necessary to densely set the feed roller 311 and the like on the roller setting members 310, 320, and 330 or set the pressure to be applied to the feed roller to a large value.

When the magnetic stripe is present in a direction parallel with the feeding direction, it is also possible to drive the magnetic head to the position of the magnetic stripe (or move the magnetic head only upward or downward without vertically moving it) and move the card holder 200 by feed rollers to read the magnetic stripe. After the magnetic stripe is read, the control means inversely rotates the feed rollers and ejects the card holder (block 521) to complete the processing (block 523).

Figure 17 shows a block diagram of the passbook printer 300 which is a preferred embodiment of the present invention. In Figure 17, symbol 601 represents a power supply for supplying electric power to the passbook printer 300. Symbol 603 represents a main card for electrically connecting various sensors, motors, and control means 629. In the case of this embodiment, the control means 629 is a microprocessor unit on the main card 603, comprising an MPU, ROM, and RAM. The control means 629 can also be a computer connected to a passbook printer. The control means 629 receives signals from various sensors 607, 609, 611, and 613 to control various motors 615, 617, and 627 and various cards 605, 619, and 623 in accordance with a control program stored in the unit. The control means 629 can decide whether the data read by the same magnetic head 625 is the data in a magnetic card or the data in a passbook in accordance with the format of the data read by the magnetic head 625.

Symbol 605 represents an operator panel card for a user to input data or for displaying data on a display panel. Symbols 607 to 613 represent various sensors, 607 represents an insertion-slot sensor, 609 represents a top sensor, 611 represents an alignment sensor, and 613 represents a jam detection sensor. Symbols 615, 617, and 627 represent motors, 615 represents a carrier motor for moving a print head, 617 represents a feed motor for rotating feed rollers (feeding motor), and 627 represents a magnetic head motor for driving a magnetic head. The print head 621 connects with the main card 603 through a connector card 619. The magnetic head (REMS) 625 connects with the main card 603 through the REMS card 623.

As described above, in the case of the preferred embodiments of the present invention, a case is described in which a magnetic stripe on a magnetic card is read by a passbook printer for processing a transverse-directional magnetic stripe of a passbook. However, when the present invention is applied to a passbook printer for processing a longitudinal-directional magnetic stripe, the magnetic stripe can be read by changing the card setting direction on the card holder by 90ø. In the case of a longitudinal-directional stripe of a passbook, the position of a magnetic recording track is set on the basis of the left end of a medium (also on the basis of the right end for some stripes) and the medium is fed along a left guide of an apparatus feeding system. Therefore, it is possible to read a stripe by equalizing the dimension from the left end of the card holder to a magnetic recording track on a card with the dimension from the left end of a passbook to a magnetic recording track on the passbook. When the distance from the left end of a passbook to the center of a magnetic recording track is 10.4 mm (that is, track-2), a card must be stored so as to fit the left end surface of the card holder with the magnetic-stripe side of the card because the distance coincides with track-2 of the card. In this case, the card has a degree of freedom for dropping out from the holder leftward. However, there is no problem because the two points of (1) the feeding direction is vertical and (2) the

left end of the card is held by the left guide of the apparatus feeding system while the card is fed.

[Advantages of the invention]

As described above, the present invention makes it possible to design a compact lightweight magnetic-card compatible passbook printer by using an exclusive magnetic card holder because there is no restriction on design. Moreover, the present invention moderates the influence of the shape of a storage medium to be read. Furthermore, a magnetic-card compatible passbook printer of the present invention does not deteriorate the printing capacity or the feeding capacity of its own or does not increase the probability of malfunction or erroneous operations of its own. Furthermore, the passbook printer is not influenced by the type of a magnetic card and it has an advantage that there are only a few restrictions on the design of the movable range of a magnetic head.

CLAIMS:

(1) A substantially-rectangular flat card holder to be inserted into a feed path of a magnetic recording-medium reading unit having a magnetic head for reading a magnetic recording medium and a feed roller for feeding said magnetic recording medium, said card holder being fed by said feed roller, said holder comprising:

a first opening for holding a magnetic card having a magnetic stripe and embossment;

a second opening, provided at the bottom of said first opening, for housing said embossment; and

a dropping-out preventive sheet for preventing said magnetic card from dropping out from said first opening; wherein said substantially-rectangular flat card holder has a leading edge larger than the long-side length of said magnetic card, and smaller than the feed path of said magnetic recording-medium reading unit, a side edge perpendicular to said leading edge being larger than the short-side length of said magnetic card, and a thickness adopted to be inserted into said feed path.

(2) The card holder according to Claim 1, wherein said card holder is rectangular, the length of the diagonal line of said card holder is larger than the width of said feed path, and the leading edge of said card holder is smaller than the width of said feed path.

(3) The card holder according to Claim 1, wherein said dropping- out preventive sheet is provided so that the upside of said magnetic card is exposed with a width of 11.0 mm - 20.0 mm when said magnetic card is set.

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(4) The card holder according to Claim 1, further comprising an optical notch whose light reflectance for adjusting a length to be recognized by an optical sensor for detecting the length of a fed medium is 15% or less.

(5) A flat card holder to be inserted into a feed path of a recording medium processing apparatus to be fed by the feed roller of said recording medium processing apparatus, the holder having an opening for holding a card-type recording medium, a leading edge larger than that of the short-side length of said card-type recording medium, and smaller than that of the feed path of said recording medium processing apparatus, a side edge perpendicular to said leading edge being larger than the long-side length of said card-type recording medium, and a thickness adopted to be inserted into said feed path.

(6) A flat card holder to be inserted into a feed path of a recording medium processing apparatus to be fed by the feed roller of said recording medium processing apparatus, the holder having an opening for holding a card-type recording medium, a leading edge larger than the long-side length of said card-type recording medium, and smaller than that of the feed path of said recording medium processing apparatus, a side edge perpendicular to said leading edge being larger than the short-side length of said card-type recording medium, and a thickness smaller than said feed path.

(7) A method for reading data from a magnetic stripe of a magnetic card having embossment by using a magnetic head in a passbook printer provided with a magnetic head and a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts by using a dropping-out preventive sheet for holding said magnetic card at its first opening, housing the embossment of said magnetic card with a second opening provided at the bottom of said first opening, and preventing said magnetic card from dropping out from said first opening; the method comprising the steps of:

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detecting that a flat card holder having a leading edge larger than the long-side length of said magnetic card and smaller than that of the feed path of said passbook printer, a side edge perpendicular to said leading edge being larger than the short-side length of said magnetic card, and a thickness smaller than said feed path is inserted into the feed path of said passbook printer;

starting the rotation of the feed rollers of said passbook printer when it is detected that said card holder is inserted into said feed path;

feeding said card holder by using the feed rollers of said reading unit;

adjusting a track in which the data in the magnetic stripe of said magnetic card held by said card holder is recorded to the position of said magnetic head; and

moving said magnetic head and reading data from said magnetic stripe.

(8) The method according to Claim 7, further comprising the step of deciding whether said read data is the data in a magnetic stripe of a magnetic card or the data in a magnetic stripe of a passbook.

(9) A method for feeding a card-type recording medium in a recording medium processing apparatus provided with a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts; the method comprising the steps of:

feeding a flat card holder holding said card-type recording medium in its opening and having a leading edge larger than the long-side length of said card-type recording medium and smaller than that of the feed path of said recording medium processing apparatus, a side edge perpendicular to said leading edge being larger than the short-side length of said card-type recording medium, and a thickness smaller than said feed path by using the feed rollers of said recording medium processing apparatus when it is detected that said flat card holder is inserted into said feed path; and

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stopping said card-type recording medium held by said card holder at a recording-medium processing position.

(10) A method for reading or writing data from or in a card-type recording medium in a recording medium processing apparatus provided with a head for performing read or write and a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts, the method comprising the steps of:

feeding a flat card holder holding said card-type recording medium in its opening and having a leading edge larger than the long-side length of said card-type recording medium and smaller than that of the feed path of said recording medium processing apparatus, a side edge perpendicular to said leading edge being larger than the short-side length of said card-type recording medium, and a thickness smaller than said feed path by using the feed rollers of said recording medium processing apparatus when it is detected that said flat card holder is inserted into said feed path;

adjusting the data storage position of said card-type recording medium held by said card holder to the position of said head; and

reading data from said card-type recording medium or writing data in said card-type recording medium by using said head.

(11) A method for reading data from a magnetic stripe of a magnetic card by using a magnetic head in a passbook printer provided with a magnetic head and a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts, the method comprising the steps of:

detecting that a flat card holder holding said magnetic card in its opening and having a leading edge larger than the long-side length of said magnetic card and smaller than that of the feed path of said passbook printer, a side edge perpendicular to said leading edge being larger

than the short-side length of said magnetic card, and a thickness smaller than said feed path is inserted into the feed path of said passbook printer;

starting the rotation of the feed rollers of said passbook printer when it is detected that said holder is inserted into said path;

feeding said card holder by using the feed rollers of said reading unit;

adjusting a track saving the data in the magnetic stripe of said magnetic card held by said card holder to the position of said magnetic head; and

moving said magnetic head and reading data from said magnetic card.

(12) A passbook printer capable of reading data from said magnetic stripe of a passbook by a magnetic head, comprising:

(1) a flat card holder holding a magnetic card with a magnetic stripe located on its surface in its opening and having a leading edge larger than the long-side length of said magnetic card and smaller than that of the feed path of said passbook printer, a side edge perpendicular to said leading edge being larger than the short-side length of said magnetic card, and a thickness smaller than said feed path and (2) an optical sensor capable of detecting that a passbook with a magnetic stripe located on its surface is inserted into the feed path of said passbook printer;

feed roller control means for controlling a plurality of feed rollers capable of feeding said passbook and said card holder jointly with a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts and which are arranged at an interval longer than the short-side length of said magnetic card and adjusting a track saving the data stored in the magnetic stripe of said magnetic card held by said card holder to the position of said magnetic head;

a magnetic head for reading data from said magnetic card;

a magnetic head moving motor for moving said magnetic head; and

means for deciding whether the data read by said magnetic head is the data of said magnetic card or the data of said passbook.

(13) The passbook printer according to Claim 12, wherein said decision is made on the basis of the format of read data.

(14) A passbook printer capable of printing characters on a passbook by a print head and reading a magnetic stripe located on the cover of the passbook by a magnetic head, comprising:

(1) a flat card holder holding a magnetic card with a magnetic stripe located on its surface in its opening and having a leading edge larger than the long-side length of said magnetic card and smaller than that of the feed path of said passbook printer, a side edge perpendicular to said leading edge being larger than the short-side length of said magnetic card, and a thickness smaller than said feed path, (2) a passbook with a magnetic stripe located on it surface, and (3) a reflection-type optical sensor capable of detecting that three types of media of a document are respectively inserted into the feed path of said passbook printer;

means for detecting a user input for deciding whether a medium inserted into said feed path is any one of (1) a card holder and (2) a passbook or (3) a passbook;

feed roller control means for controlling said feed rollers capable of feeding said passbook and said card holder jointly with a plurality of roller setting members each of which has a plurality of feed rollers on their roller shafts and which are arranged at an interval longer than the short-side length of said magnetic card and adjusting a track saving the data of the magnetic stripe stored in said magnetic card held by said card holder to the position of said magnetic head when said user input is a signal showing any one of (1) the card holder and (2) the passbook;

a magnetic head moving motor for moving said magnetic head and reading data from said magnetic card; and

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means for deciding whether the data read by said magnetic head is the data stored in the magnetic stripe of said magnetic card or the data stored in the magnetic stripe of said passbook.

# RECORDING MEDIUM HOLDER, RECORDING MEDIUM PROCESSING APPARATUS AND CARD-TYPE RECORDING-MEDIUM FEEDING METHOD

## ABSTRACT

To decrease the number of restrictions on the design of a magnetic-card compatible passbook printer and decrease the magnetic-card compatible passbook printer in size and weight by using an exclusive magnetic card holder. A magnetic card (100) is set to an exclusive card holder (200) and inserted into a passbook printer (300). The passbook printer (300) can read a magnetic stripe of a passbook and print the passbook or a document. The card holder (200) is fed by a feed roller (311) or the like. Control means can detect the length of the card holder (200) by an insertion-slot sensor (341). The control means adjust the position of a magnetic stripe (105) to the position of a magnetic head (305) by the feed roller and the magnetic stripe (105) is read by the magnetic head (305). The control means decides whether the read data is the data in the magnetic card (100) or the data in the passbook in accordance with the format of the read data.

Figure 12

FIG. 1

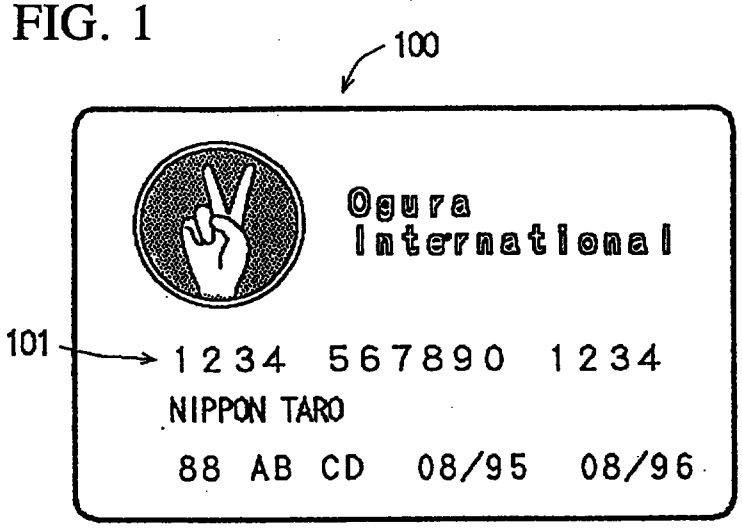
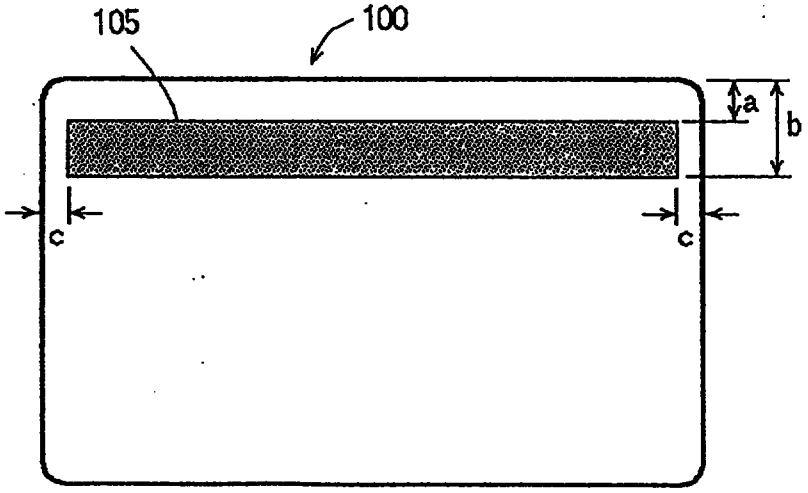



FIG. 2




| | Dimension (mm) |
|---|---|
| a | Up to 5.54 |
| b | At least 11.89 |
| c | Up to 2.92 |

FIG.3

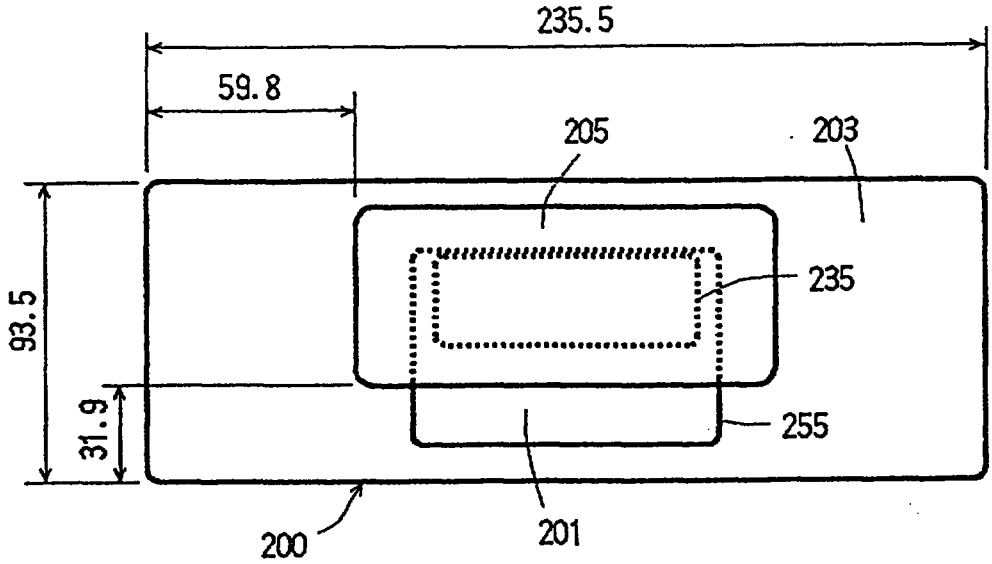
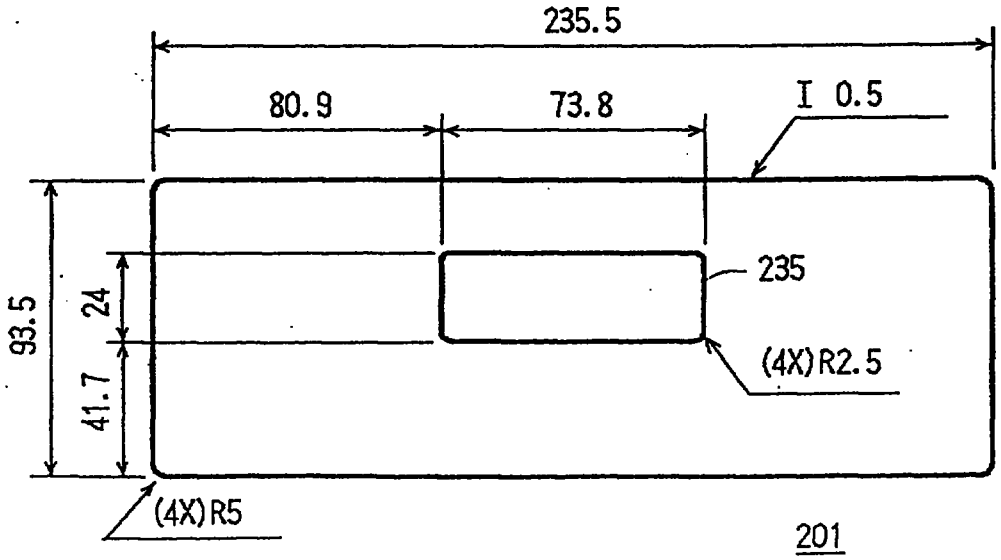

235.5
59.8
205
203
235
93.5
31.9
255
200
201

FIG. 5


235.5
80.9
73.8
I 0.5
235
93.5
24
41.7
(4X)R2.5
(4X)R5
201

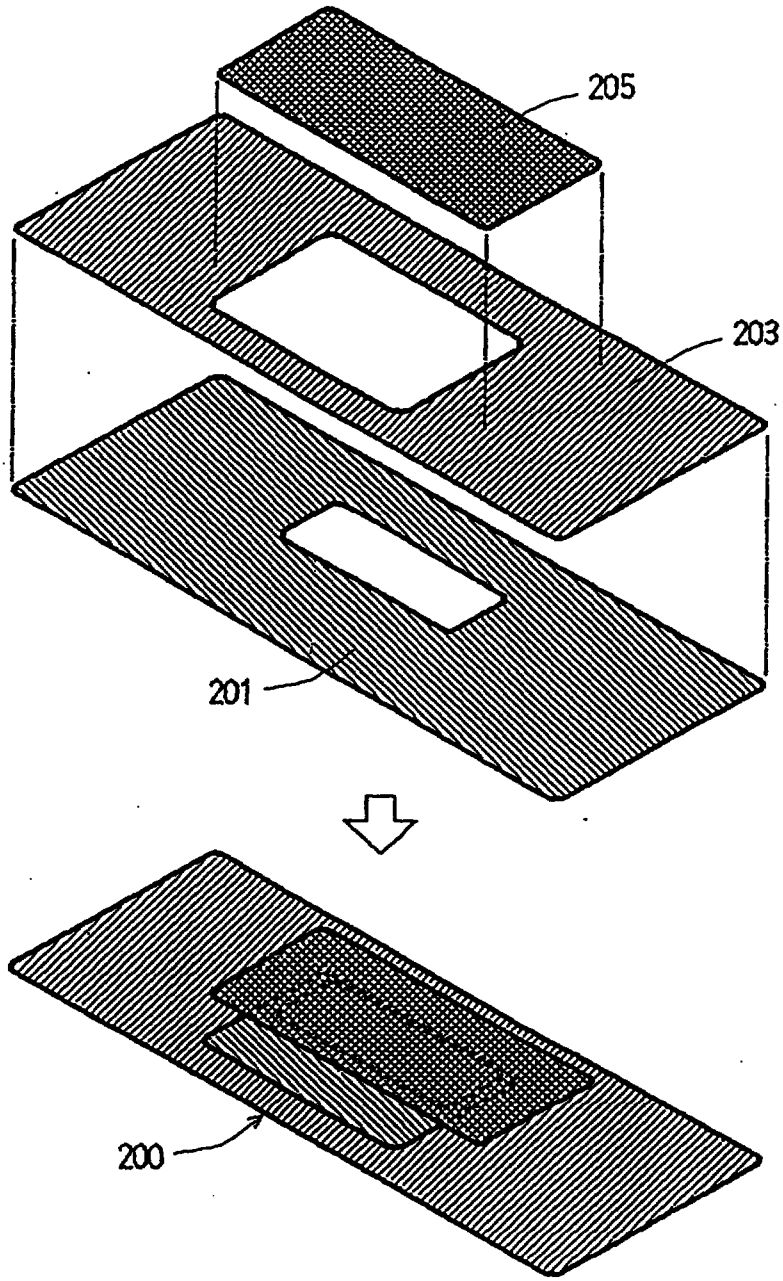



FIG.4

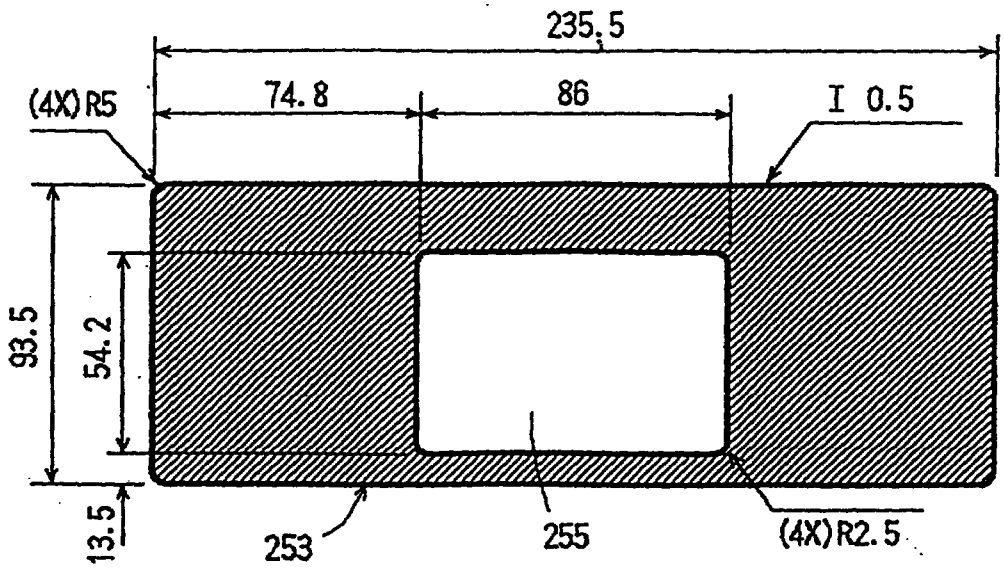

235.5
74.8
86
I 0.5
(4X) R5
93.5
54.2
13.5
253
255
(4X) R2.5

FIG. 6

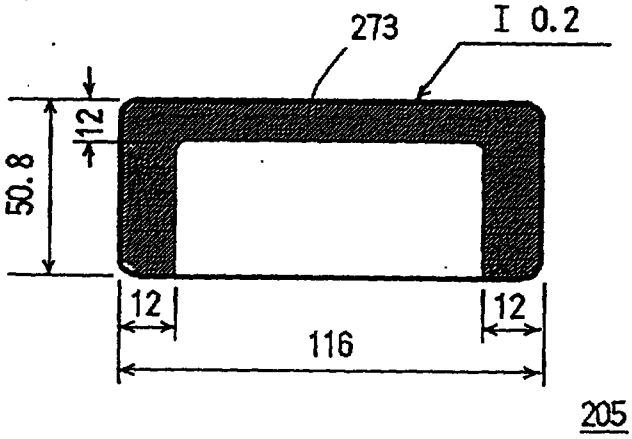

273
I 0.2
12
50.8
12
12
116
205

FIG. 7

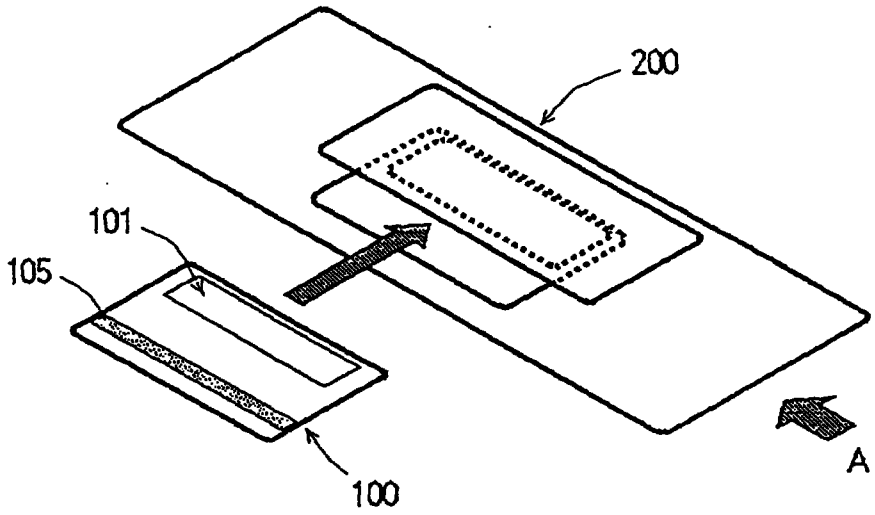



FIG. 8

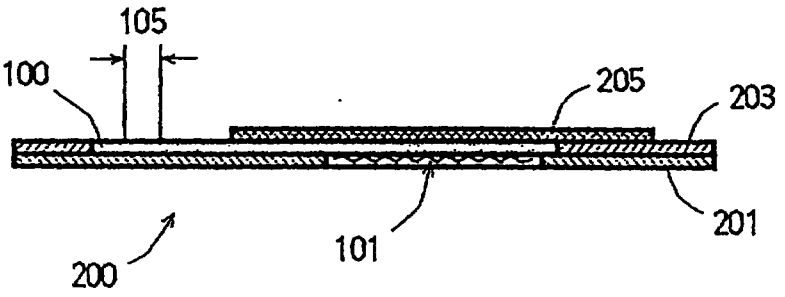



FIG. 9

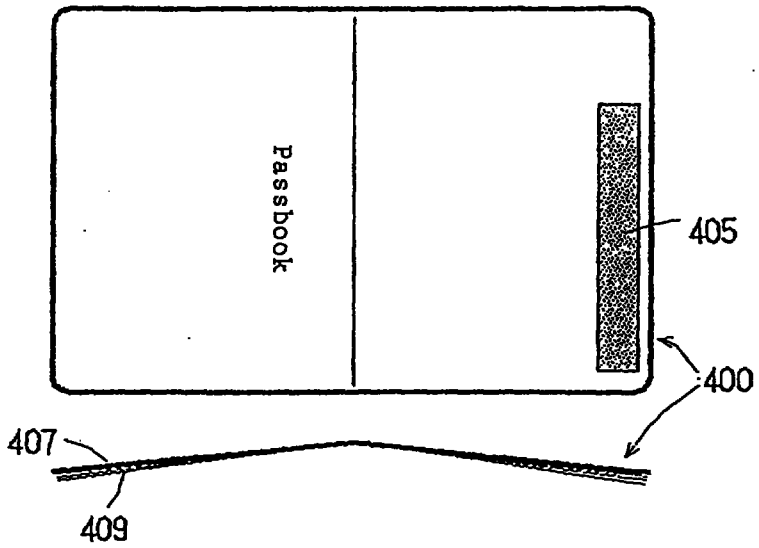

Passbook
405
400
407
409

FIG. 10

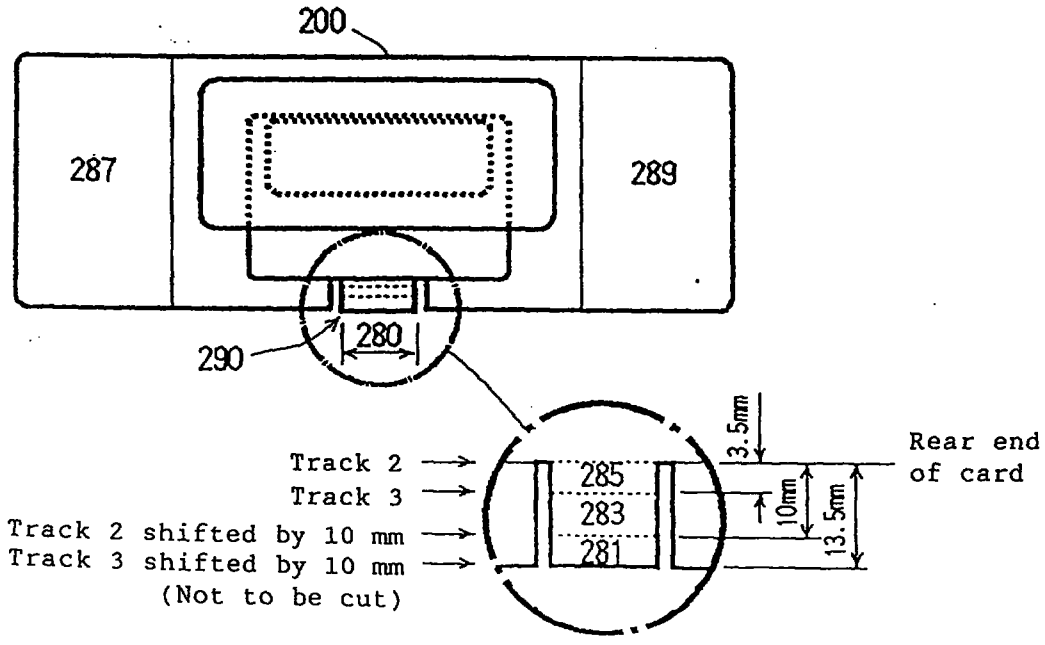

200
287
289
290
280
Track 2
Track 3
Track 2 shifted by 10 mm
Track 3 shifted by 10 mm
(Not to be cut)
285
283
281
3.5mm
10mm
13.5mm
Rear end
of card

FIG. 11

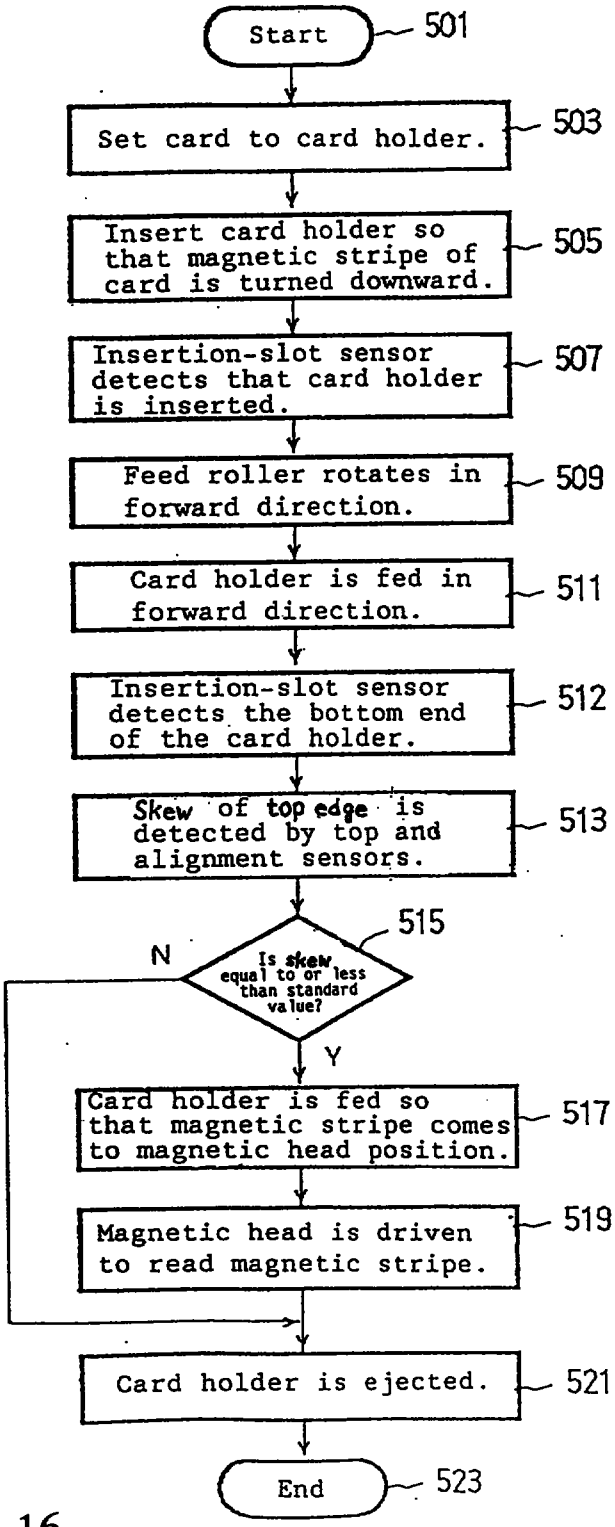

Start
501
Set card to card holder.
503
Insert card holder so that magnetic stripe of card is turned downward.
505
Insertion-slot sensor detects that card holder is inserted.
507
Feed roller rotates in forward direction.
509
Card holder is fed in forward direction.
511
Insertion-slot sensor detects the bottom end of the card holder.
512
Skew of top edge is detected by top and alignment sensors.
513
Is skew equal to or less than standard value?
515
N
Y
Card holder is fed so that magnetic stripe comes to magnetic head position.
517
Magnetic head is driven to read magnetic stripe.
519
Card holder is ejected.
521
End
523

FIG. 16

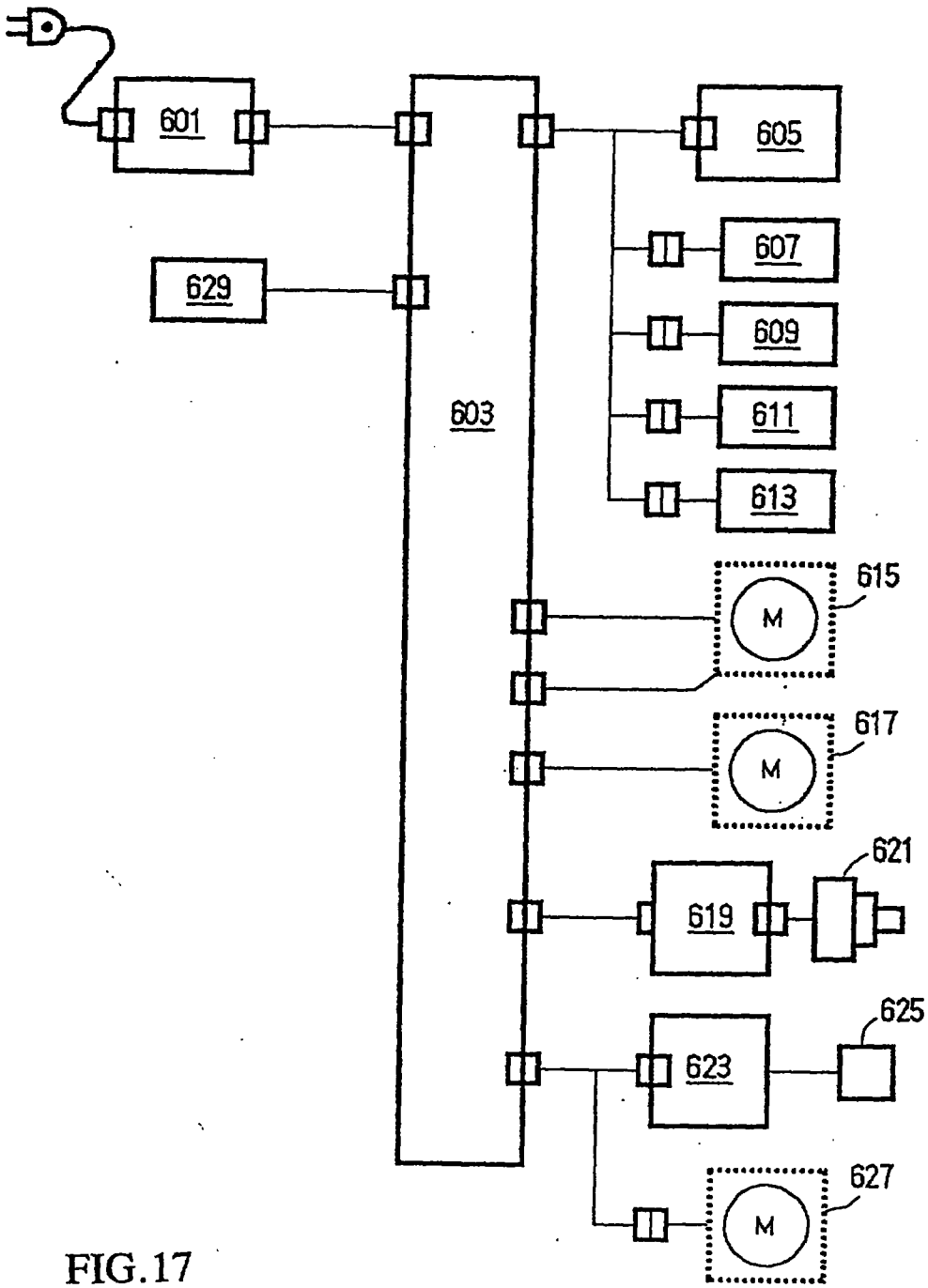



FIG.17

FIG. 12

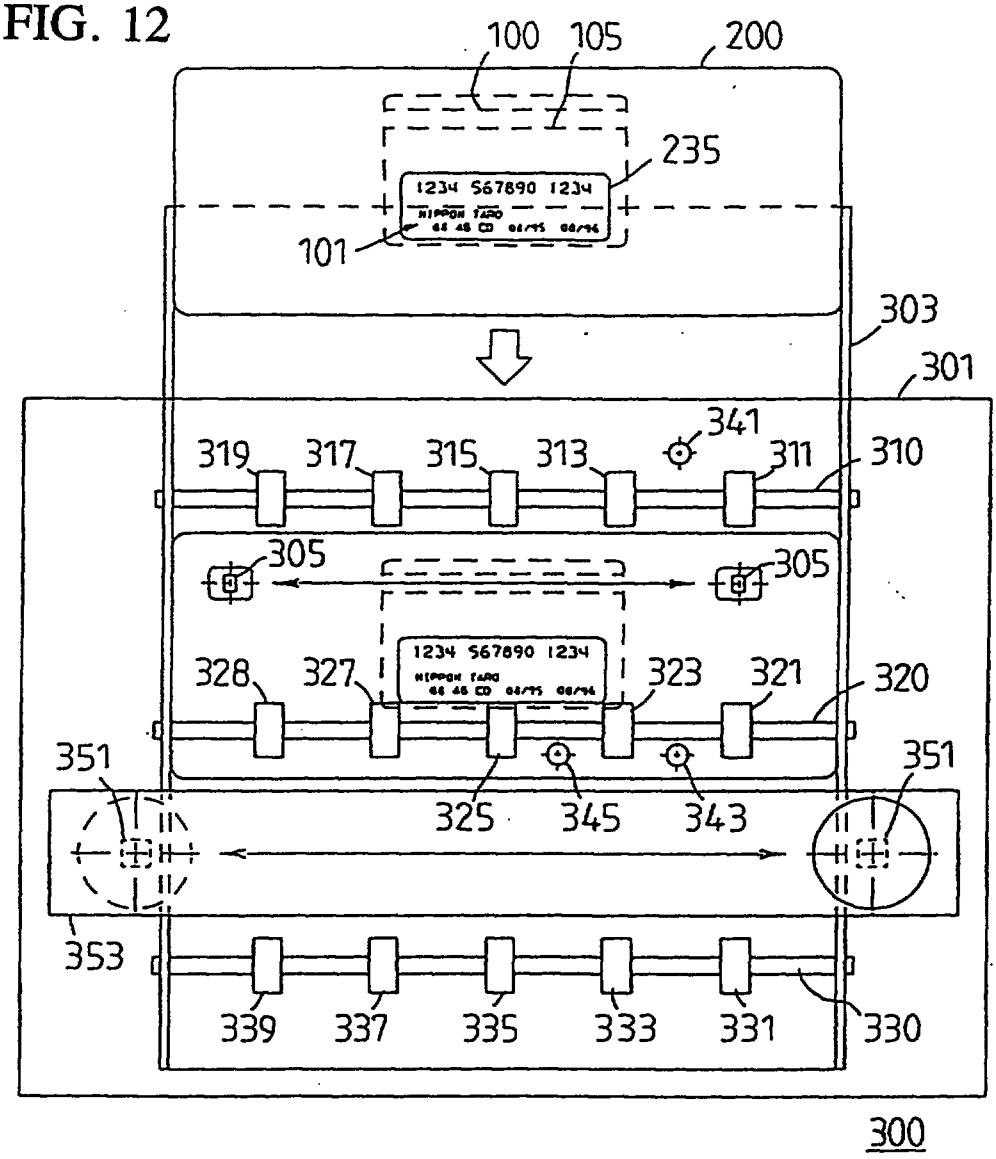
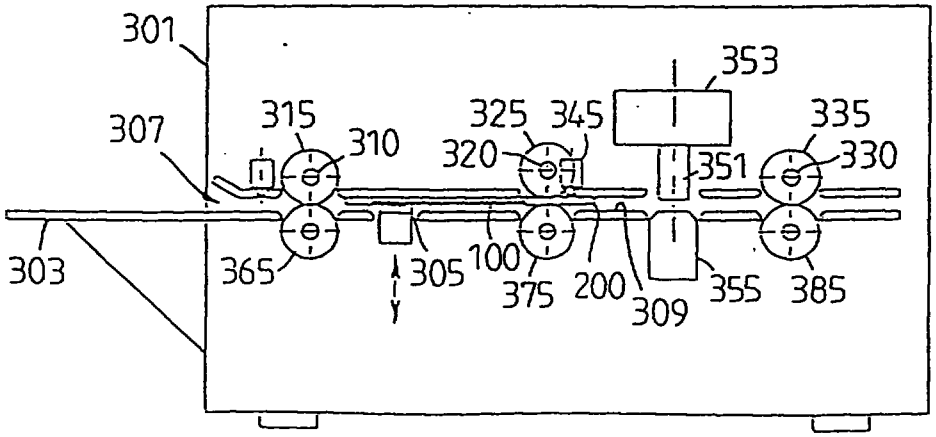

100
105
200
235
1234 567890 1234
101
303
301
341
319
317
315
313
311
310
305
305
1234 567890 1234
328
327
323
321
320
351
351
325
345
343
353
339
337
335
333
331
330
300

FIG. 13


301
353
307
315
310
325
345
320
335
330
351
303
365
305
100
375
200
309
355
385

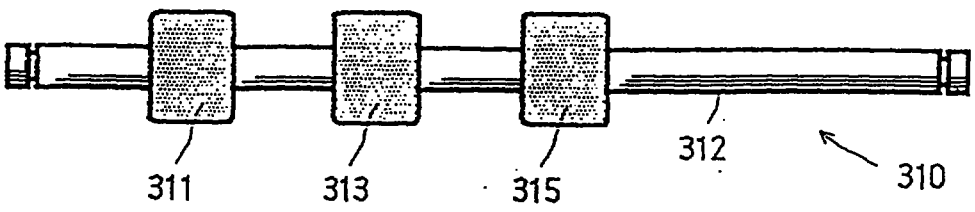



FIG. 14

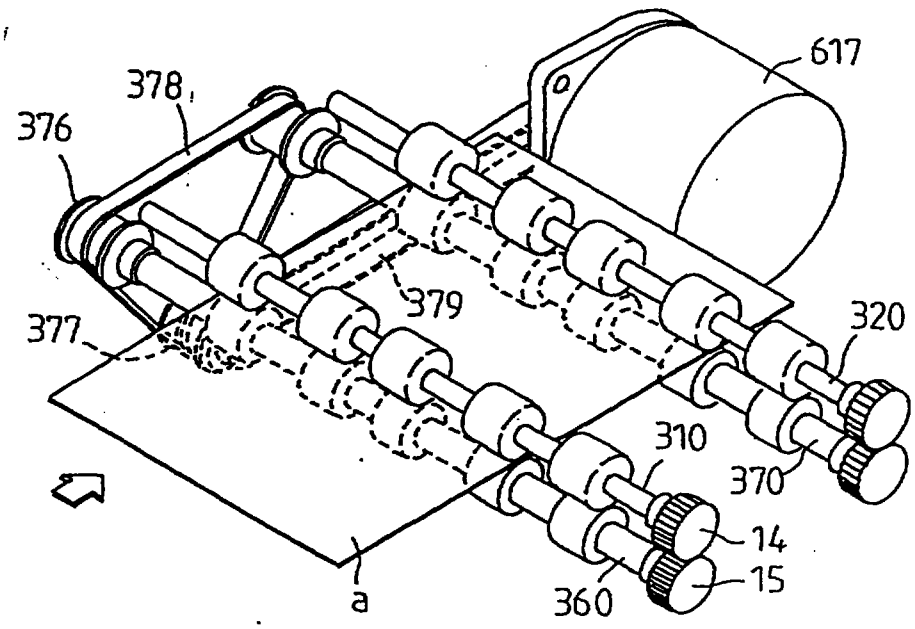



FIG. 15