



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.12.2005 Bulletin 2005/49

(51) Int Cl.7: **G07B 1/00**, G07B 5/00,
B65H 18/00

(21) Application number: **04024937.7**

(22) Date of filing: **20.10.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(30) Priority: **31.05.2004 JP 2004162287**

(71) Applicants:
• **FUJITSU LIMITED**
Kawasaki-shi, Kanagawa 211-8588 (JP)
• **Fujitsu Frontech Limited**
Inagi-shi, Tokyo 206-8555 (JP)

(72) Inventors:
• **Kitagawa, Takeshi**
Inagi-shi Tokyo 206-8555 (JP)
• **Hiyama, Chisato**
Inagi-shi Tokyo 206-8555 (JP)
• **Goto, Noka**
Inagi-shi Tokyo 206-8555 (JP)
• **Ezoe, Kou**
Inagi-shi Tokyo 206-8555 (JP)

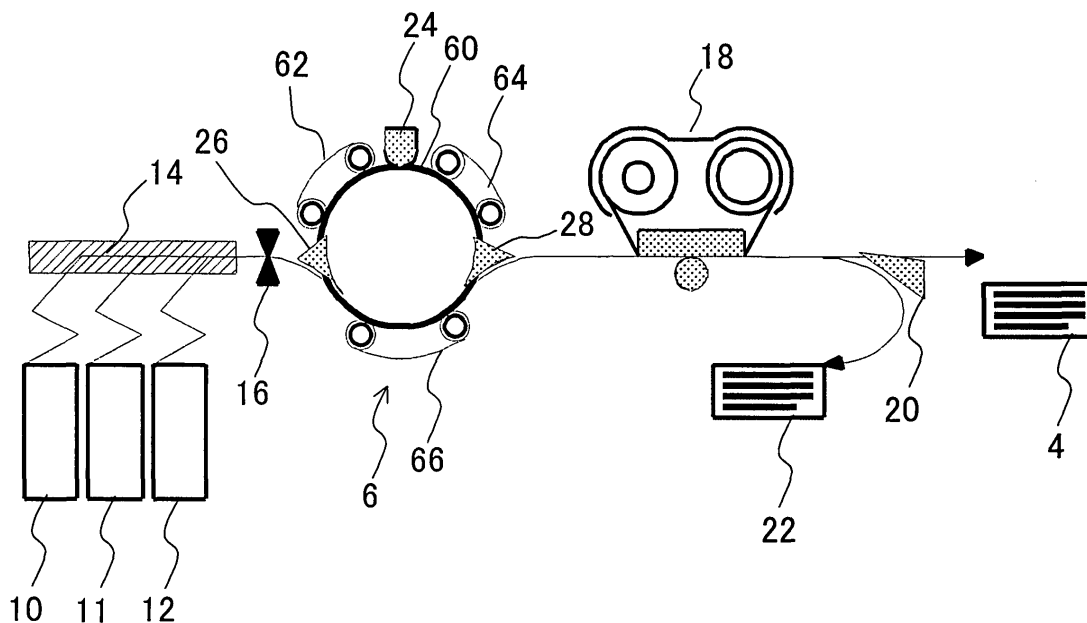
(74) Representative: **HOFFMANN EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(54) **Medium processing device, and medium issuing apparatus using the same**

(57) A medium processing device uses a loop-shaped transport mechanism of small size and with common components. A ring and a plurality of transport belt mechanisms are employed in the loop-shaped transport mechanism. By transporting the medium back

and forth using the transport mechanism, record processing is performed using a single recording element. Also, the loop-shaped transport mechanism is modularly structured, and transport required for the apparatus is attained in combination with a feed mechanism module.

FIG. 3



Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is based upon and claims the benefit of priority from the prior Japanese Patent Application No. 2004-162287, filed on May 31, 2004, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0002] The present invention relates to a medium processing device and a medium issue apparatus for transporting cut-sheet medium back and forth and processing the cut-sheet medium such as recording, and more particularly a medium processing device and a medium issue apparatus suitable for issuing a ticket having data recorded thereon, such as a boarding pass.

DESCRIPTION OF THE RELATED ART

[0003] As an automatic processing technique has been developed in recent years, an automatic issue apparatus is used for issuing tickets including boarding passes, train tickets, and the like. In recent years, in order to process the ticket automatically, it has been introduced to record machine-readable data in the form of magnetic data, not only to print out on the tickets.

[0004] Under such requirements, the automatic issue apparatus uses medium of the tickets having magnetic data areas, and issues the tickets after recording data (such as boarding date, flight number, departure time, seat position, passenger name, etc., in an exemplary case of the boarding pass), as well as printing these data for visualization. In recent years, it has been required for the automatic issue apparatus to handle a plurality of kinds of tickets (for example, tickets of different airline companies).

[0005] FIGS. 13 and 14 are explanation diagrams of the conventional medium issue apparatus.

[0006] As shown in FIG. 13, because the tickets for issue are equivalent to bank notes, continuous fanfold paper 100 is used as a contained form, instead of a cut sheet. In the figure, a case of using three types of continuous fanfold paper 100 is shown. The continuous fanfold paper for the tickets to be issued is fed, and separated into each cut-sheet ticket by a cutter 106. In some cases, because the ticket is a sort of bank note, each ticket connected in series with perforations may have a ticket management number to prevent forgery or the like.

[0007] In such cases, before cut with a cutter 106, each ticket is confirmed by reading the ticket management number using magnetic heads 102, 104. Data are then magnetic-recorded on the ticket having been cut

through a magnetic head 108, thereafter the data are read through magnetic head 108 and collated with the write data. If the collation result is satisfactory, the ticket is printed using a thermal transfer print head 112, and then ejected to an ejection stacker 118 through a gate 114. Meanwhile, as to the ticket of which collation resulted in inconsistency, the ticket is rejected through gate 114 without printout, and accommodated into a reject stacker 116 (for example, refer to Japanese Laid-open Patent Publication No. Hei-5-314333).

[0008] In such a conventional technique, in case of an apparatus for handling a plurality of medium (that is, an apparatus having a plurality of transport paths), the sets of transport mechanisms and magnetic heads 102, 104 proper to the each medium, each set performing an identical operation, are provided. Also, independent magnetic heads 108, 110 for read and write are provided. Therefore, it has been necessary to use a larger number of components and a larger area (for transport paths), as well as to control independent mechanisms and magnetic head operations initiated by a switchover order from an upper-level unit.

[0009] In order to solve such problems, such an apparatus as shown in FIG. 14 has been proposed, A loop-shaped transport path is formed and each function section having an identical function is constructed by a common component (for example, refer to Japanese Laid-open Patent Publication No. Hei-10-162174). More specifically, the loop-shaped transport path is formed of a drum 122 having a rotating shaft 124, drive rollers 128, 130, and guides 132, 134, 136 and 138. Inside drum 122, a single magnetic head 126 is provided, and gates 140, 142 are provided also.

[0010] According to this loop transport method, medium is transported by sandwiching each medium between a rotor having a rotating shaft and drive rollers. With this, back-and-forth medium transport, write/read operations using a single common magnetic head, and shorter length of the transport path can be achieved.

[0011] However, when transporting medium using the rotation of drum 122 having rotating shaft 124, and with the guides and the rollers, jamming of the medium is apt to arise. In particular, when transporting relatively thick medium along the loop, the guides are apt to induce jamming. Also, use of the rotation of drum 122 having rotating shaft 124 necessitates rotation bearings. Further, in order to transport the medium in cooperation with the rollers, a complicated structure such as a roller retract mechanism is necessary.

[0012] As a result, though the components are made common by means of back-and-forth medium transport, the structure becomes more complicated, and may possibly degrade the reliability of transport capability.

[0013] Further, in the conventional technique, because alteration of inlet and outlet of the medium to/from the loop-shaped transport path is needed to meet the installation environment and the usage of the apparatus, it is necessary to develop and manufacture the medium

transport mechanism to fit each environment or usage. This requires a lot of labor and time, and also it is not suitable for reducing the cost through mass production.

SUMMARY OF THE INVENTION

[0014] Accordingly, it is an object of the present invention to provide a medium processing device and a medium issue apparatus for preventing a complicated structure even employing a loop-shaped transport path.

[0015] It is another object of the present invention to provide a medium processing device and a medium issue apparatus for improving medium transport reliability with a simple structure.

[0016] Further, it is still another object of the present invention to provide a medium processing device and a medium issue apparatus, enabling easy alteration of medium inlet and outlet, corresponding to the installation environment or usage of the apparatus.

[0017] In order to achieve the aforementioned objects, a medium processing device of this invention is a device for transporting medium back and forth and performing record processing onto the medium. The medium processing device includes a ring having no rotation fulcrum, a plurality of belt transport mechanisms disposed on the circumference of the ring and a recording element disposed on the circumference of the ring. The plurality of belt transport mechanisms hold the ring with driving the rotation of the ring, and the medium is transported back and forth by being sandwiched between the belt transport mechanisms and the ring.

[0018] A medium issue apparatus in accordance with the present invention for recording data onto medium and issuing the medium includes a loop-shaped transport mechanism transporting the medium back and forth by rotating a rotor, and performing record processing onto the medium by means of a recording element, a feed mechanism feeding continuous medium from a hopper to the rotor and cutting the medium. The loop-shaped transport mechanism includes a ring having no rotation fulcrum a plurality of belt transport mechanisms disposed on the circumference of the ring and a recording element disposed on the circumference of the ring. The plurality of belt transport mechanisms hold the ring with driving the rotation of the ring, and the medium is transported back and forth by being sandwiched between the belt transport mechanisms and the ring.

[0019] According to the present invention, since the plurality of belt transport mechanisms and the ring are used in the loop-shaped transport mechanism, it becomes possible to hold the medium securely, as well as transport the medium using the belt, while preventing the occurrence of the medium jamming. In other words, deformed medium can be transported stably. Further, because guides are eliminated and a rotation fulcrum is made unnecessary, reduction of components in number or simplification of the mechanism can be achieved.

[0020] Further, according to the present invention, it

is preferable that the plurality of belt transport mechanisms are constituted of at least three belt transport mechanisms, so as to cover the circumference of the ring.

5 **[0021]** Still further, according to the present invention, it is preferable that a plurality of gates disposed between each of the plurality of belt transport mechanisms, for leading or ejecting the medium to/from the ring are also provided.

10 **[0022]** Further, according to the present invention, it is preferable that a drive motor is disposed inside the ring, for driving the plurality of belt transport mechanisms.

15 **[0023]** Also, according to the present invention, it is preferable that each belt transport mechanism is constituted of at least two rollers and a flat belt connecting the rollers.

[0024] Further, according to the present invention, it is preferable that the plurality of belt transport mechanisms are disposed at substantially equal intervals on the circumference of the ring.

20 **[0025]** Still further, according to the present invention, it is preferable that the ring, the plurality of belt transport mechanisms and the recording element are constituted as a single module.

25 **[0026]** Further, according to the present invention, it is preferable that a feed mechanism for feeding continuous medium from a hopper to the ring, and cutting the medium, is further provided.

30 **[0027]** Still further, a medium processing device in accordance with the present invention includes a loop-shaped transport mechanism module which rotates a rotor, transports medium back and forth, and performs record processing onto the medium using a recording element and a feed mechanism module which feeds continuous medium from a hopper to the rotor, and cuts the continuous medium. The feed mechanism module is coupled to the loop-shaped transport mechanism module, and a plurality of gates for leading or ejecting the medium to/from the rotor are provided on the loop-shaped transport mechanism.

35 **[0028]** According to the present invention, a medium issue apparatus recording onto medium and issuing the medium includes a loop-shaped transport mechanism module which rotates a rotor, transports a medium back and forth, and performs record processing onto the medium with a recording element and a feed mechanism module which feeds continuous medium from a hopper to the rotor, and cuts the continuous medium. The feed mechanism module is coupled to the loop-shaped transport mechanism module, and a plurality of gates for leading or ejecting the medium to/from the rotor are provided on the loop-shaped transport mechanism.

40 **[0029]** According to the present invention, the loop-shaped transport mechanism and the feed mechanism are modularly structured, and a plurality of gates are provided in the transport mechanism so as to switch transport paths for transferring the medium from/to a

module/unit located before and after the transport mechanism. With this, it becomes possible to cope with a variety of installation conditions flexibly, even using an identical unit, by changing the direction of disposition of the unit, etc., for example, by changing the intake direction of the medium depending on the installation condition.

[0030] Further scopes and features of the present invention will become more apparent by the following description of the embodiments with the accompanied drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031]

FIG. 1 shows an outer view of a medium issue apparatus according to one embodiment of the present invention.

FIG. 2 shows a side view of the medium issue apparatus shown in FIG. 1.

FIG. 3 shows an internal configuration diagram of the medium issue apparatus shown in FIG. 1.

FIG. 4 shows a detailed internal configuration diagram of the medium issue apparatus shown in FIG. 1.

FIG. 5 shows a sectional view of a ring transport mechanism and a feed mechanism shown in FIGS. 3, 4.

FIG. 6 shows a perspective view of the ring transport mechanism and the feed mechanism shown in FIGS. 3, 4.

FIG. 7 shows an explanation diagram of continuous paper feed operation in the configuration shown in FIGS. 3 to 5.

FIG. 8 shows an explanation diagram of transport operation to a write ready position in the configuration shown in FIGS. 3 to 5.

FIG. 9 shows an explanation diagram of magnetic recording operation to a ticket in the configuration shown in FIGS. 3 to 5.

FIG. 10 shows an explanation diagram of write verification operation of a ticket in the configuration shown in FIGS. 3 to 5.

FIG. 11 shows an explanation diagram of an exemplary variation in a medium processing device of modular structure.

FIG. 12 shows an explanation diagram of another exemplary variation in a medium processing device of modular structure.

FIG. 13 shows an explanation diagram of the conventional art.

FIG. 14 shows an explanation diagram of the conventional loop-shaped transport mechanism.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] The preferred embodiments of the present invention are described hereinafter in order of a medium issue apparatus, a medium transport mechanism, a modular structure, and other embodiments, referring to the charts and drawings. However, it is noted that the scope of the present invention is not limited to the embodiments described below, but instead embraces all equivalents to the claims described.

[Medium issue apparatus]

[0033] FIG. 1 is an outer view of a medium issue apparatus according to one embodiment of the present invention. FIG. 2 is a side view of the medium issue apparatus shown in FIG. 1. FIG. 3 is an internal configuration diagram of the medium issue apparatus shown in FIG. 1. Further, FIG. 4 is a detailed configuration diagram of a transport path of the medium issue apparatus shown in FIG. 1.

[0034] FIG. 1 through FIG. 4 shows an automatic ticket issue machine for issuing airline tickets, as an example of the medium issue apparatus. As shown in FIGS. 1 and 2, the automatic ticket issue machine 1 is placed on a counter table, and hoppers 10, 11 accommodating continuous fanfold paper 7a and 7b are placed underneath the counter table. Continuous fanfold paper 7a, 7b is led via guide mechanisms 8a, 8b such as tension rollers, or directly, to the rear side of the automatic ticket issue machine 1.

[0035] As shown in FIG. 1, on the front face of the automatic ticket issue machine 1, an indicator group 2 for displaying operation conditions, an input key group 3 for operation, an ejection stacker 4, and a ticket inlet 5 are provided.

[0036] In FIG. 3, a feed mechanism 14 feeds the continuous fanfold paper for the ticket to be issued, separates the paper with a cutter 16, and produces cut-form tickets. Here, since the ticket for issue is equivalent to a bank note, to prevent forgery, etc., a management number may be recorded on respective tickets connected in series with perforation.

[0037] While the ticket having been cut is transported back and forth with a ring transport mechanism 6, a single magnetic head 24 magnetically records data on the ticket, and then reads the recorded data on the ticket to collate with the write data. When the collation result is satisfactory, the ticket concerned is printed by a thermal transfer print head 18, and then the ticket is ejected to the ejection stacker 4 via a gate 20. Meanwhile, when the magnetic data collation does not match, the ticket concerned is rejected by the gate 20 without being printed out, and the ticket is led and stored into a reject stacker 22.

[0038] Ring transport mechanism 6 is constituted of a cylinder-shaped ring 60 having no rotation fulcrum;

and transport belts 62, 64 and 66 disposed in such a way as surrounding the circumference of the ring 60. The cylinder-shaped ring 60 is held by the transport belts 62, 64, 66, and rotated by driving the transport belts 62, 64, 66. With this, a medium sandwiched between this ring 60 and belts 62, 64, 66 is transported along the circumference (locus) of the ring 60, together with the ring 60.

[0039] At this time, in order to hold and rotate the ring 60 by the transport belts, it is necessary to balance the ring 60. For this purpose, a plurality of transport belts 62, 64, 66 are disposed uniformly along the circumference of the ring 60. By uniformly disposing three transport belts 62, 64, 66 as shown in FIG. 3, it becomes possible to balance the ring 60 in both horizontal and vertical directions, enabling stable hold and rotation of the ring 60.

[0040] These transport belts 62, 64, 66 are commonly used for driving the ring 60 (for medium transport) and for guiding the medium. Thus, the medium is held and transported securely, similarly to the transport by belt, and jamming of the medium can be prevented. As such, holding the medium by belts 62, 64, 66 and ring 60 enables transport of even a deformed medium in a stable manner. Further, because the guides are eliminated and a rotation fulcrum becomes unnecessary, a reduced number of components and a simplified mechanism can be achieved.

[0041] In FIG. 3, the medium having been taken in by the feed mechanism 14 and cut by the cutter 16 is transported to the ring transport mechanism 6. The ring transport mechanism 6 sandwiches the medium between the ring 60 and the flat belts 62, 64, 66, and transports the medium by rotation, along with a circle orbit around the circumference of the ring 60. According to the rotation direction and the positions (settings) of gates 26, 28 at this time, the medium is transported from the ejection mechanism to a succeeding unit.

[0042] FIG. 4 is a detailed configuration diagram, in which the configuration shown in FIG. 3 is applied to the apparatus shown in FIGS. 1 and 2. In FIG. 4, the same parts shown in FIG. 3 are referred to by the same symbols. The feed mechanism 14 is constituted of a pair of insertion guides 30, 31; a pair of feed rollers 32, 33; a drive motor 34 for driving feed rollers 32, 33; a cutter 16; and a drive motor (not shown) for cutter 16.

[0043] The ring transport mechanism 6, of which detail will be described later referring to FIG. 5, is constituted of the cylinder-shaped ring 60 having no rotation fulcrum, and the transport belts 62, 64, 66 disposed in such a way as surrounding the circumference of the ring 60. A first transport belt 62 is constituted of a drive pulley 75, a pair of driven pulleys 76a, 76b, and a flat belt provided thereon. Similarly, a second belt 64 is constituted of a drive pulley 70, a pair of driven pulleys 71, 72, and a flat belt provided thereon. A third transport belt is constituted of a drive pulley 73, a driven pulley 74, and a flat belt provided thereon.

[0044] The transport belts 62, 64, 66 are driven by the drive motor 90 disposed inside the cylinder-shaped ring 60. These transport belts 62, 64, 66 hold the cylinder-shaped ring 60. Further, the drive of the transport belts 62, 64, 66 by means of the drive motor 90 rotates the cylinder-shaped ring 60. With this, the medium sandwiched between this ring 60 and the belts 62, 64, 66 is transported along the circumference (locus) of the ring 60, together with the ring 60.

[0045] At this time, to hold and rotate the ring 60 by the transport belts, a plurality of transport belts 62, 64, 66 are disposed uniformly along the circumference of ring 60, so that the ring 60 is balanced. Since each belt 62, 64, 66 has resiliency, by uniformly disposing three transport belts 62, 64, 66, it is possible to balance the ring 60 in both horizontal and vertical directions, thereby enabling stable hold and rotation of the ring 60.

[0046] These transport belts 62, 64, 66 are commonly used for driving the ring 60 (for medium transport) and for guiding the medium. This enables secure hold and transport of the medium, similarly to the transport by belt, and jamming of the medium can be prevented. As such, holding the medium by the belts 62, 64, 66 and the ring 60 enables transport a deformed medium in a stable manner. Further, because the guides are eliminated and a rotation fulcrum becomes unnecessary, a reduced number of components and a simplified mechanism can be achieved.

[0047] The print mechanism 18 is constituted of a thermal head 18b; a drive motor 18d for vertical action of thermal head 18b; a thermal transfer ribbon cassette 18a; and a drive motor 18c for thermal transfer ribbon cassette 18a. A transport roller 40 transports tickets from the ring mechanism 6 to the print mechanism 18. An ejection roller 44 ejects a ticket to be ejected to pocket-shaped ejection stacker 4. Transport roller 40 and ejection roller 44 are driven by a drive motor 46.

[0048] By means of the gate 20 shown in FIG. 3 (though not shown in FIG. 4), a switchback roller 42 transports the ticket having been rejected once to the right, and thereafter transports the ticket to the left, and accommodates the ticket into a reject box 22.

[Medium transport mechanism]

[0049] Next, the medium transport mechanism, namely the ring transport mechanism will be described in detail. FIG. 5 shows a sectional view of the medium transport mechanism in accordance with one embodiment of the present invention, and FIG. 6 is a perspective view of the medium transport mechanism. FIG. 5 is the sectional view in which the ring transport mechanism shown in FIG. 4 is viewed from the rear side, while FIG. 6 is the perspective view in which the ring transport mechanism shown in FIG. 4 is viewed from the left. In FIGS. 5 and 6, the same parts shown in FIGS. 3 and 4 are referred to by the same symbols.

[0050] As shown in FIGS. 5 and 6, a magnetic read/

write section 24 is further added to the ring transport mechanism, thus constituting the common (basic) module. Also, a variety of types of the feed mechanisms 14 are provided so as to meet various types of usage of the apparatus.

[0051] First, the ring transport mechanism 6 will be described. On a right frame 91 (FIG. 6), rotating shafts of: drive pulley 75 and the pair of driven pulleys 76a, 76b for the first transport belt 62; drive pulley 70 and the pair of driven pulleys 71, 72 for the second transport belt 64; and drive pulley 73 and driven pulley 74 for the third transport belt 66 are axially supported by the bearings, etc.

[0052] Also, on a left frame 93 (FIG. 6), rotating shafts of drive pulley 75 and the pair of driven pulleys 76a, 76b for the first transport belt 62, drive pulley 70 and the pair of driven pulleys 71, 72 for the second transport belt 64, and drive pulley 73 and driven pulley 74 for the third transport belt 66 are axially supported by the bearings, etc. Also, the drive motor 90 is fixed on the left frame 93.

[0053] Further, as shown in FIG. 5, on the left frame 93 side, there is provided a drive belt 96 for transmitting the drive force by coupling the rotating shaft of the drive motor 90 to the rotating shafts of drive pulley 75 of the first transport belt 62, drive pulley 70 of the second transport belt 64, and drive pulley 73 of the third transport belt 66, via a tension roller 94.

[0054] As shown in FIG. 5, gates 26, 28 and 36 are disposed between respective transport belts 62, 64, 66. Meanwhile, the magnetic head 24 is disposed in the middle of the transport belt 62. Each outlet 38a, 38b is provided for ejecting the tickets from the ring transport mechanism 6.

[0055] The feed mechanism 14 is also modularly structured. As mentioned earlier, a pair of insertion guides 30, 31, a pair of feed rollers 32, 33, a drive motor 34 for feed rollers 32, 33, a cutter 16, a drive motor (not shown) for cutter 16, and a connection frame 140 are disposed as shown in FIGS. 5 and 6.

[0056] Accordingly, as shown in FIG. 6, the feed mechanism 14 and the ring transport mechanism 6 are coupled by means of connection frame 140 of the feed mechanism 14 screwed into the right and left frames 91, 93 of the ring transport mechanism 6. With such a modular structure, reduction of development labor in regard to the basic unit can be attained.

[0057] Namely, in a drum-shaped rotor transport mechanism, a gate mechanism is adopted, in which the switchover of the transport paths for transferring the medium from/to other modules/units located before and after the transport mechanism is automatically selected depending on the rotation direction of the drum. Further, a plurality of gates is provided and settings (fixed/movable) of these gates are modified. Thus, it becomes possible to cope with a variety of installation conditions flexibly, even using an identical unit, by changing the direction of disposition of the unit, etc., for example, by changing the intake direction or the ejection direction of

the medium depending on the installation condition.

[0058] Next, referring to FIGS. 7 through 10, the operation of the medium processing device including the ring transport mechanism will be described. In FIGS. 7 through 10, the same parts shown in FIGS. 3 through 6 are referred to by the same symbols.

[0059] As shown in FIG. 7, specified continuous fanfold paper 7a is fed to the ring transport mechanism 6 via the cutter 16 by the feed mechanism 14. By a clockwise rotation of the ring transport mechanism 6, the continuous paper 7a is transported until the tail end of a ticket reaches a cutting position. During this, magnetic head 24 reads the magnetic stripe (a page management number, etc. recorded thereon) of continuous fanfoldpaper 7a. After transported, the continuous paper 7a is cut by cutter 16, and separated into a cut-form (ticket) T.

[0060] Next, as shown in FIG. 8, by the clockwise rotation of the ring transport mechanism 6, the separated ticket T is transported until the top end of the ticket T reaches the vicinity of the magnetic head 24. This position is called as a write wait position. At this time, a portion of continuous fanfold paper 7a having not been cut by the cutter 16 is retracted from a common transport path (transport path having the cutter 16), so as not to impede the feed of other continuous paper.

[0061] Further, as shown in FIG. 9, by the clockwise rotation of the ring transport mechanism 6, the magnetic head 24 records data magnetically onto the magnetic stripe of the separated ticket T. When the tail end of the ticket reaches magnetic head 24, the transport is suspended.

[0062] Finally, by the counterclockwise rotation of the ring transport mechanism 6, the ticket is transported while the data having been magnetic-recorded on the magnetic stripe of the ticket T are read, and the top end portion of the ticket T is led to the direction of the print head 18 by the gate 28 (refer to FIG. 3). When the tail end of the ticket T is left from the magnetic head 24, the transport is suspended, and so-called verification read, in which the read data are collated with the write data, is performed. The position concerned is referred to as verification read completion position.

[0063] Thereafter, as described earlier referring to FIG. 3, when the collation result is satisfactory, the ticket T is transported to the thermal transfer print head 18, printed by the head 18, and then ejected to the ejection stacker 4 via the gate 20 (refer to FIG. 3). On the other hand, when the collation of the magnetic data results in inconsistency, the ticket T is not printed. The ticket T is rejected by the gate 20 (refer to FIG. 3) and then accommodated into the reject stacker 22.

[0064] As such, in the loop-shaped transport path, even components are made in common, use of the ring transport mechanism enables prevention of a jamming trouble even when transporting a relatively rigid ticket or the like, with a simple mechanism. Further, because the ring 60 is structured without the rotation fulcrum, the transport motor 90 can be disposed inside the ring 60,

which enables more compact structure particularly suitable for modular structuring.

[Modular structure]

[0065] Next, modularization of the ring transport mechanism 6 and the feed mechanism 14 will be described in detail. FIGS. 11 and 12 are explanation diagrams of the modular structure according to the present invention. In FIGS. 11 and 12, the same parts shown in FIGS. 3 through 6 are referred to by the same symbols.

[0066] As shown in FIGS. 5 and 6, the ring transport mechanism 6 is provided with the magnetic read/write section 24, thus constituting a common (basic) module, and a variety of types of the feed mechanism 14 are provided so as to meet a variety of types of the apparatus usage.

[0067] As shown in FIG. 6, the feed mechanism 14 and the ring transport mechanism 6 are coupled by means of connection frame 140 of the feed mechanism 14 screwed into the right and left frames 91, 93 of the ring transport mechanism 6. With such modular a structure, reduction of development labor in regard to the basic portion can be attained.

[0068] In the example shown in FIGS. 3 through 6, the continuous fanfold paper is inlet from the rear face of the apparatus, namely from the side of the apparatus. In contrast, FIG. 11 shows an exemplary modular structure, in which the continuous fanfold paper is inlet from the bottom face of the apparatus.

[0069] Namely, as shown in FIG. 11, the structure and the disposition of the ring transport mechanism 6 are identical to those shown in FIG. 3. Meanwhile, a second feed mechanism 14a of modular structure includes a plurality of insertion guides 30a, 30b, 31a; a plurality of feed rollers 32a, 32b, 33a; a drive motor 34a for feed rollers 32a, 32b, 33a; a cutter 16; and a connection frame 140 (not shown).

[0070] Each component constituting the second feed mechanism 14a is basically identical to that employed in feed mechanism 14 shown in FIGS. 3 through 6. However, the disposition is different so as to meet the feed/retract directions of the continuous fanfold paper.

[0071] Similarly, FIG. 12 shows an exemplary module for inletting the continuous fanfold paper from the top face of the apparatus. Namely, as shown in FIG. 12, the structure of ring transport mechanism 6 is identical to that shown in FIG. 3, while ring transport mechanism 6 has a disposition of being rotated for 90 degrees in the clockwise direction, as compared with the disposition shown in FIG. 3.

[0072] Meanwhile, a third feed mechanism 14b of modular structure includes a plurality of insertion guides 30c, 31c; a plurality of feed rollers 32c, 33c; a drive motor 34b of feed rollers 32c, 33c; a cutter 16; and a connection frame 140 (not shown).

[0073] Each component constituting the third feed mechanism 14b is basically identical to that employed

in feed mechanism 14 shown in FIGS. 3 through 6. However, the disposition is different so as to meet the feed/retract directions of the continuous fanfold paper.

[0074] As such, in the drum-shaped rotor transport mechanism 6, a gate mechanism is adopted, in which the switchover of the transport paths for transferring the medium from/to other modules/units located before and after the transport mechanism is automatically selected depending on the rotation direction of the drum. Further, there are provided a plurality of gates, of which settings (fixed/movable) are modified. Thus, it becomes possible to cope with a variety of installation conditions flexibly, even using an identical unit, by changing the direction of disposition of the unit, etc., for example, by changing the intake direction of the medium depending on the installation condition.

[0075] Additionally, the above-mentioned modular structure is not limited to the ring transport mechanism having ring 60 and flat belts 62, 64, 66. It is also possible to apply such a loop-shaped transport mechanism to other drum transport mechanisms.

[Other embodiment]

[0076] In the aforementioned embodiments of the present invention, the medium processing device using magnetic recording has been described. It is also applicable to other apparatuses which use other record processing by use of optics, etc. Also, although the above description is exemplified by the airline ticket issue machine, the present invention is applicable for other cut-form tickets such as train ticket, boarding pass, luggage tag, etc. Further, the present invention is also applicable for other ticket output apparatuses other than the ticket issue apparatus.

[0077] Because a plurality of transport belts and a ring are employed as a loop-shaped transport mechanism, medium can be held securely and transported similarly to the belt transport, and medium jamming can be prevented. It is possible to transport deformed medium stably. Also, because guides are eliminated and a rotation fulcrum becomes not necessary, a reduced number of components and a simplified structure can be attained.

[0078] Moreover, the loop-shaped transport mechanism and the feed mechanism are modularly structured, and a plurality of gate mechanisms are provided in the loop-shaped transport mechanism, thereby switching the medium transport paths from/to modules/units located before and after the transport mechanism. Also, it becomes possible to cope with a variety of installation conditions flexibly, even using an identical unit, by changing the direction of disposition of the unit, etc., for example, by changing the intake direction of the medium depending on the installation condition.

Claims

1. A medium processing device for transporting medium back and forth and performing record processing on the medium, comprising:

a ring having no rotation fulcrum;
a plurality of belt transport mechanisms disposed on the circumference of the ring; and
a recording element disposed on the circumference of the ring,

wherein the plurality of belt transport mechanisms hold the ring and drive a rotation of the ring so as to transport the medium back and forth by being sandwiched between the belt transport mechanisms and the ring.

2. The medium processing device according to claim 1,

wherein the plurality of belt transport mechanisms are constituted of at least three belt transport mechanisms, so as to cover the circumference of the ring.

3. The medium processing device according to claim 1, further comprising:

a plurality of gates disposed between each of the plurality of belt transport mechanisms, for leading or ejecting the medium to/from the ring.

4. The medium processing device according to claim 1, further comprising:

a drive motor driving the plurality of belt transport mechanisms disposed inside the ring.

5. The medium processing device according to claim 1,

wherein each belt transport mechanism is constituted of at least two rollers and a flat belt connecting the rollers.

6. The medium processing device according to claim 1,

wherein the plurality of belt transport mechanisms are disposed on the circumference of the ring at substantially equal intervals.

7. The medium processing device according to claim 1,

wherein the ring, the plurality of belt transport mechanisms and the recording element are constituted as a single module.

8. The medium processing device according to claim 1, further comprising:

a feed mechanism for feeding continuous medium from a hopper to the ring and cutting the medium.

9. A medium processing device comprising:

a loop-shaped transport mechanism module having a rotating rotor for transports medium back and forth and a recording element for performs record processing onto the medium being transported by the rotor; and
a feed mechanism module which feeds continuous medium from a hopper to the rotor and cuts the continuous medium,

wherein the feed mechanism module is coupled to the loop-shaped transport mechanism module, and a plurality of gates for leading or ejecting the medium to/from the rotor are provided on the loop-shaped transport mechanism.

10. The medium processing device according to claim 9, wherein the loop-shaped transport mechanism module comprises:

a ring having no rotation fulcrum;
a plurality of transport belt mechanisms disposed on the circumference of the ring; and
a recording element disposed on the circumference of the ring.

11. A medium issue apparatus which records data onto a medium and issues the medium, comprising:

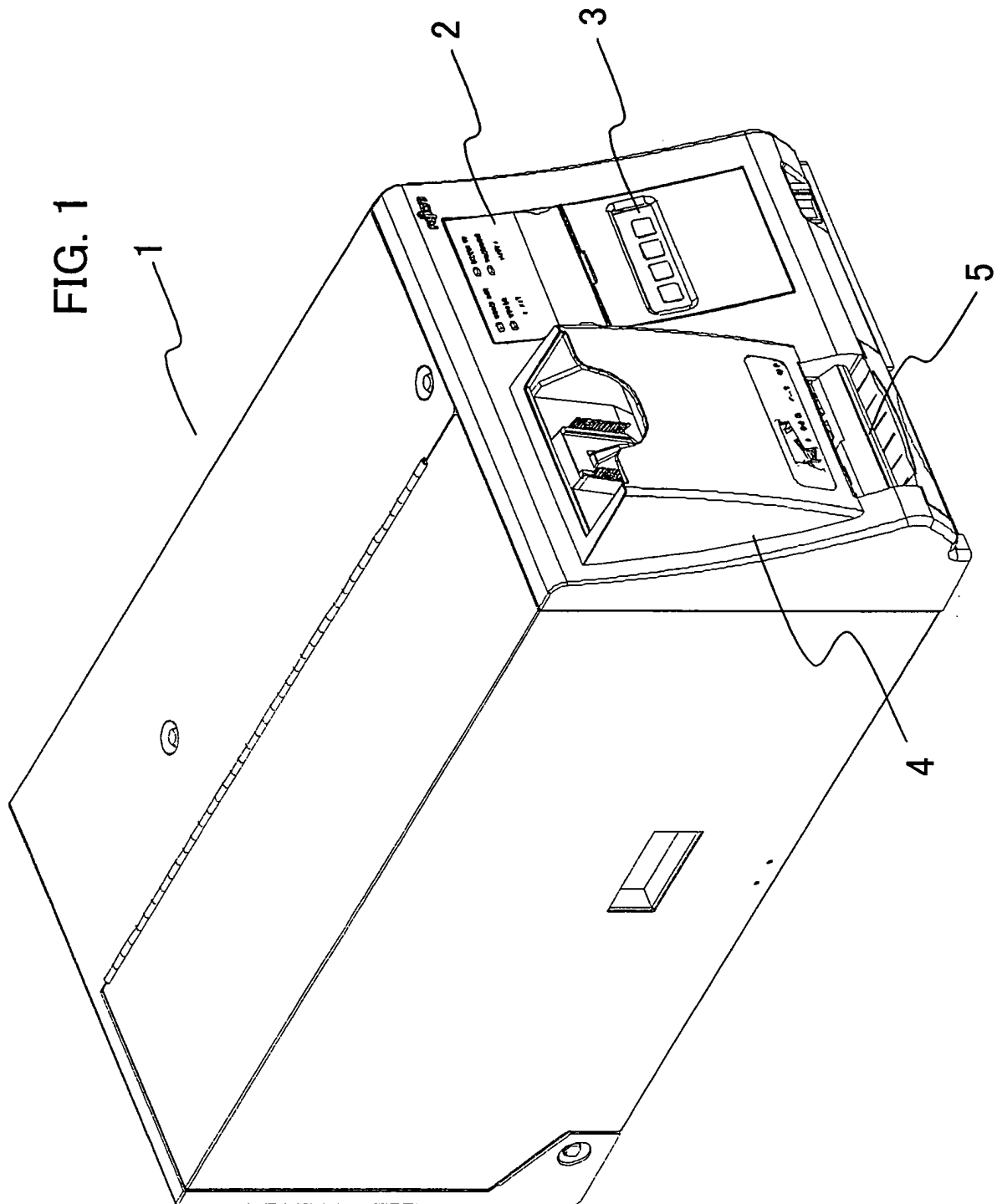
a loop-shaped transport mechanism having a rotating rotor for transporting the medium back and forth and a recording element for performs record processing onto the medium being transported by the rotor; and
a feed mechanism which feeds continuous medium from a hopper to the rotor, and cuts the continuous medium,

wherein said the loop-shaped transport mechanism comprising:

a ring having no rotation fulcrum;
a plurality of transport belt mechanisms disposed on the circumference of the ring; and
a recording element disposed on the circumference of the ring,

and wherein the plurality of belt transport mechanisms hold the ring and rotate the ring so as to transport the medium back and forth by being sandwiched between the belt transport mechanisms and the ring.

12. The medium issue apparatus according to claim 11,
wherein the plurality of belt transport mechanisms are constituted of at least three belt transport mechanisms, so as to cover the circumference of the ring. 5
13. The medium issue apparatus according to claim 11,
further comprising
a plurality of gates disposed between each of the plurality of belt transport mechanisms, for leading or ejecting the medium to/from the ring. 10
14. The medium issue apparatus according to claim 11,
further comprising: 15
a drive motor disposed inside the ring, for driving the plurality of belt transport mechanisms.
15. The medium issue apparatus according to claim 11,
wherein each belt transport mechanism is constituted of at least two rollers, and a flat belt connecting the rollers. 20
16. The medium issue apparatus according to claim 11,
wherein the plurality of belt transport mechanisms are disposed on the circumference of the ring at substantially equal intervals. 25
17. The medium issue apparatus according to claim 11,
wherein the ring, the plurality of belt transport mechanisms and the recording element are constituted as a single module. 30
18. A medium issue apparatus recording data onto a medium and issuing the medium, comprising: 35
a loop-shaped transport mechanism module having a rotor for transporting a medium back and forth and a recording element for performing record processing onto the medium being transported by the rotor; and 40
a feed mechanism module which feeds continuous medium from a hopper to the rotor, and cuts the continuous medium, 45
wherein the feed mechanism module is coupled to the loop-shaped transport mechanism module, and a plurality of gates for leading or ejecting the medium to/from the rotor are provided on the loop-shaped transport mechanism. 50
19. The medium issue apparatus according to claim 18,
wherein the loop-shaped transport mechanism module comprises: 55
a ring having no rotation fulcrum;
a plurality of transport belt mechanisms disposed on the circumference of the ring; and
- a recording element disposed on the circumference of the ring.
20. The medium issue apparatus according to claim 18,
further comprising:
a transport mechanism transporting the medium, on which record processing is completed in the loop-shaped transport mechanism module, to an outlet.



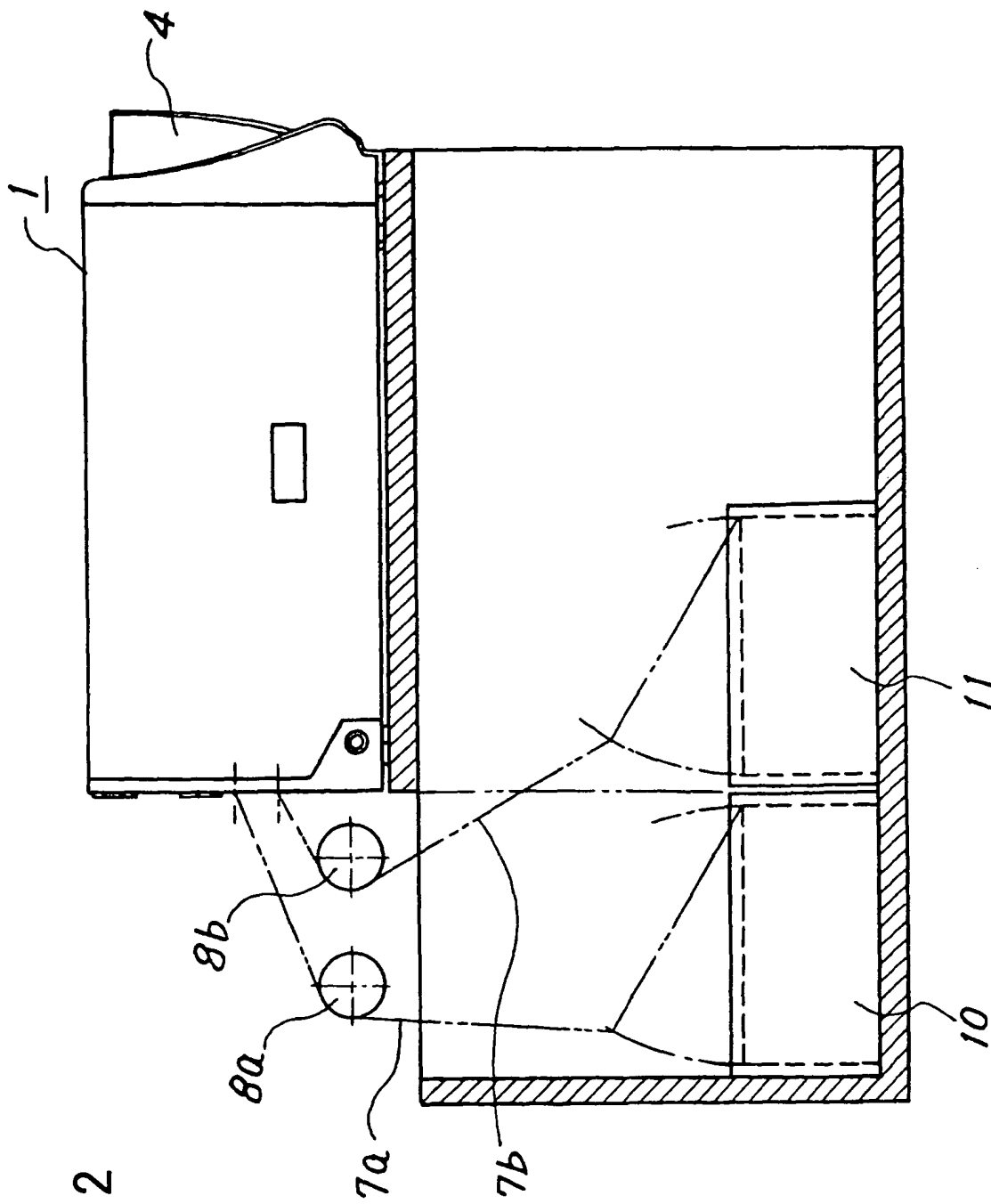


FIG. 2

FIG. 3

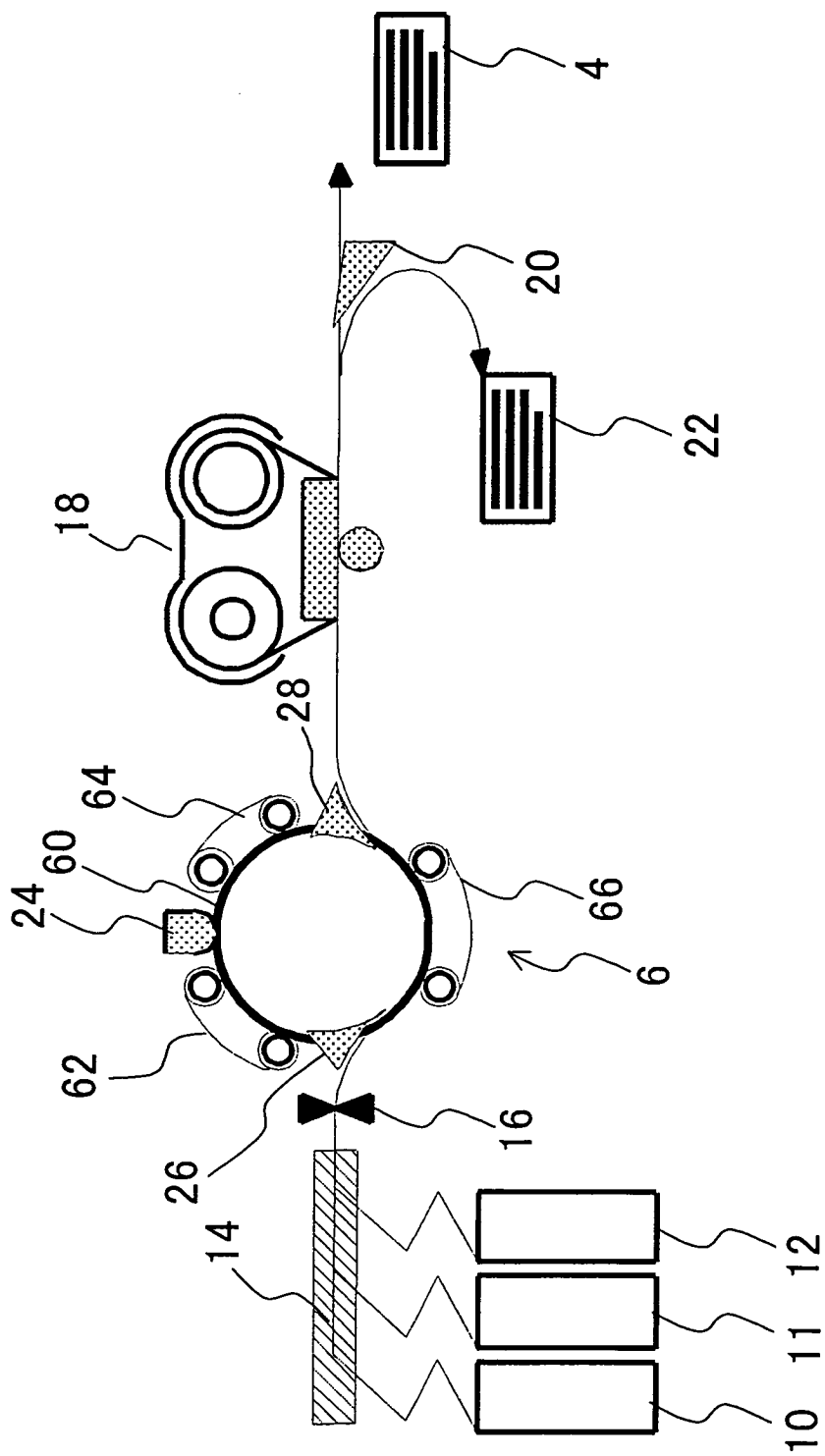


FIG. 4

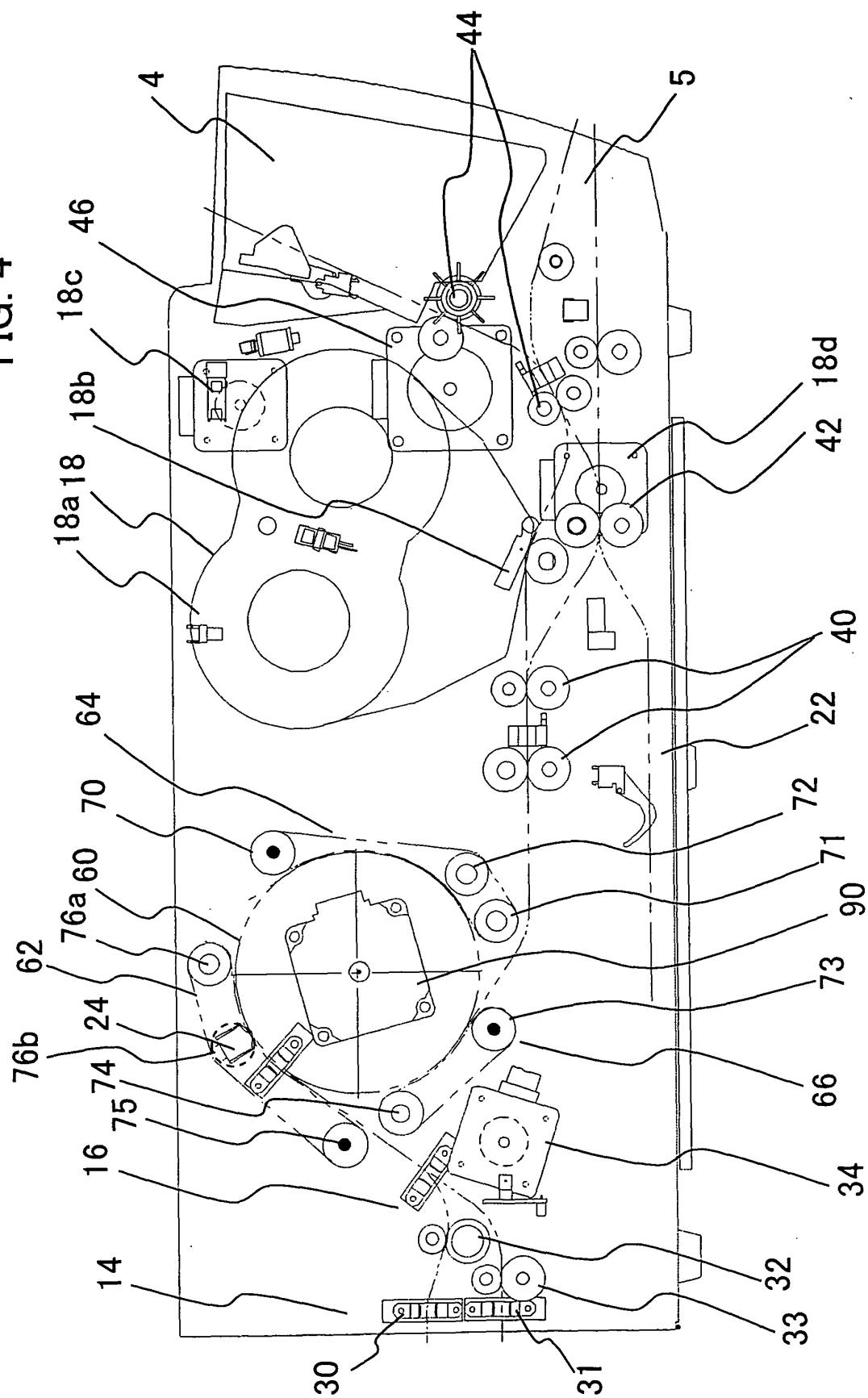


FIG. 5

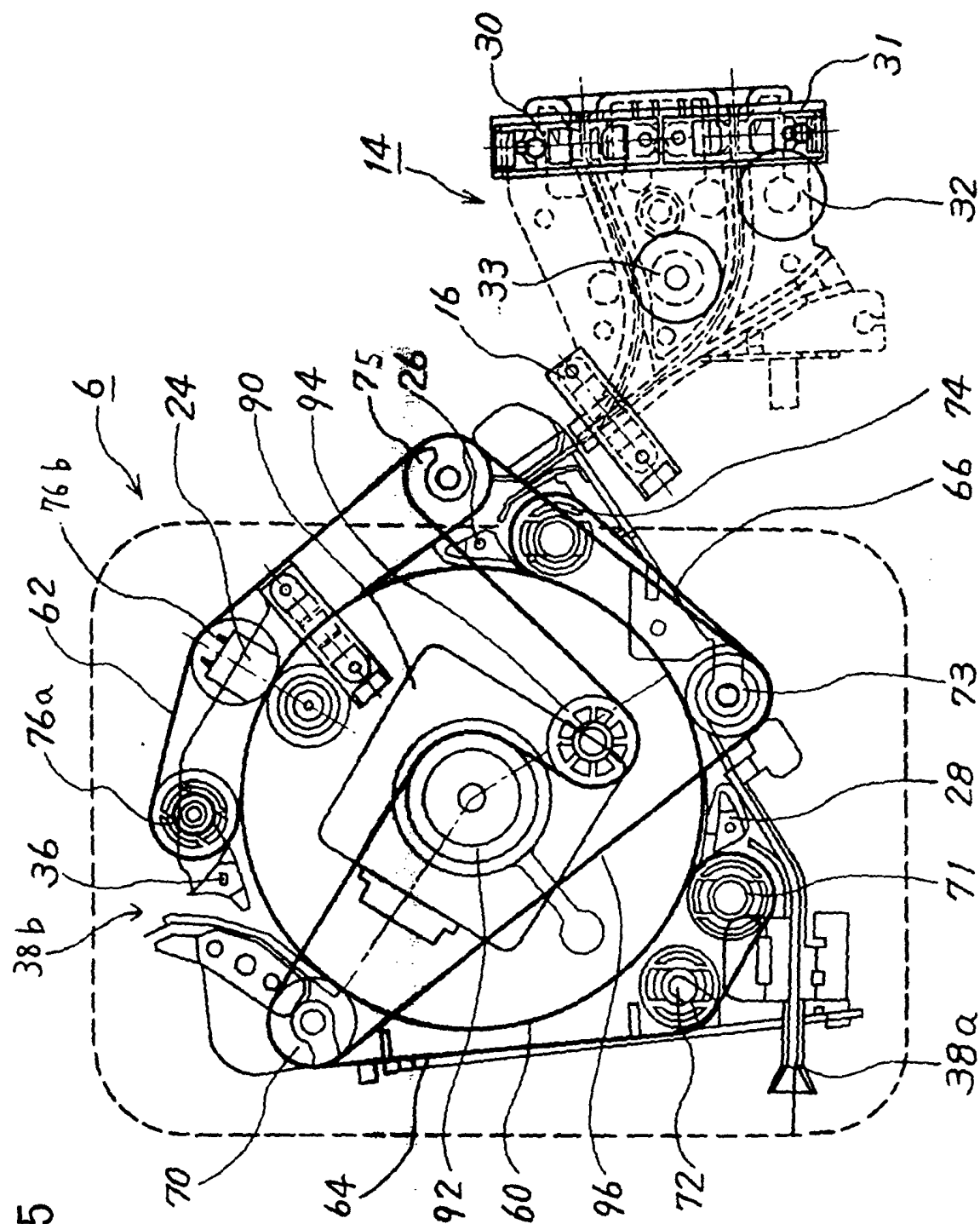


FIG. 6

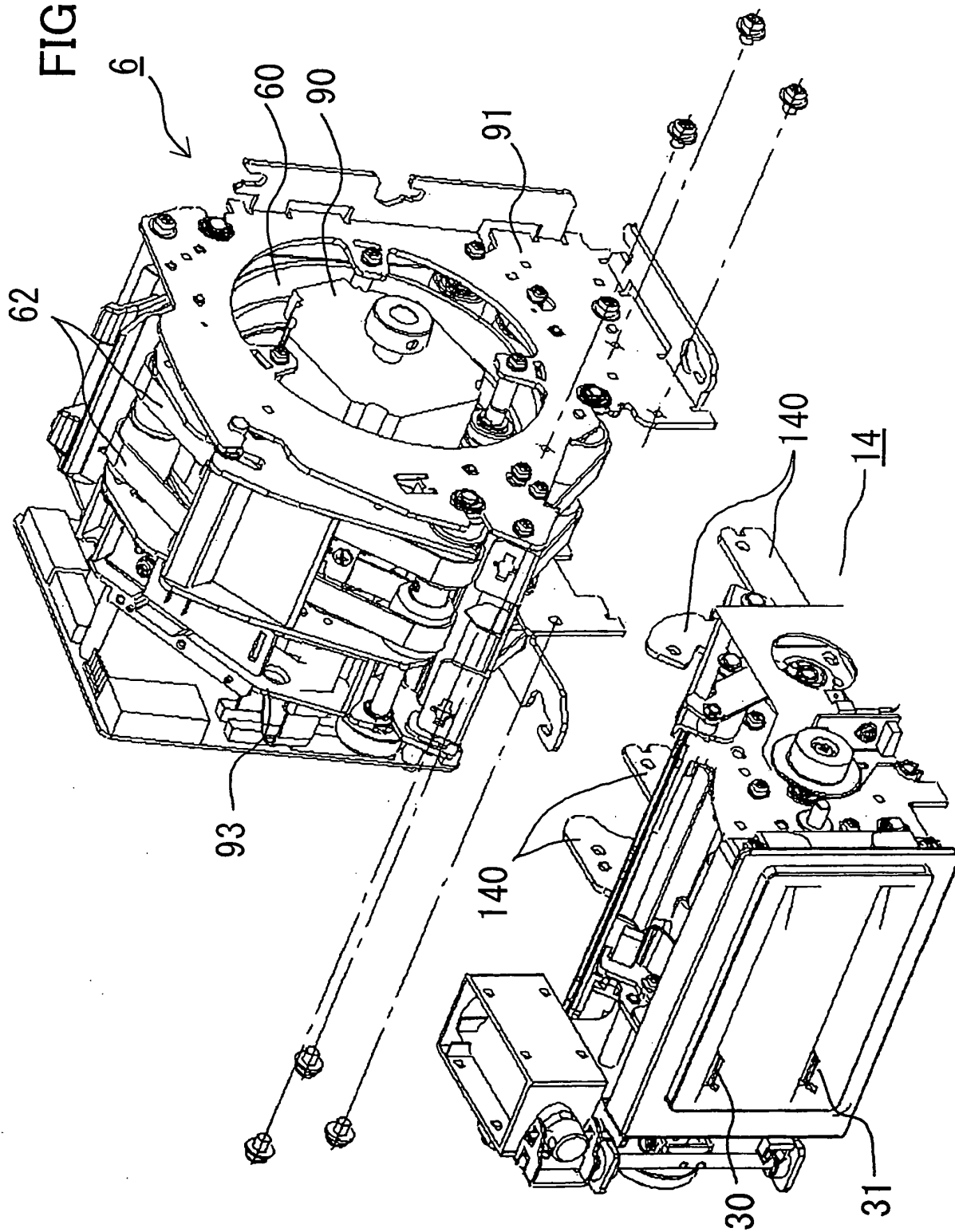


FIG. 7

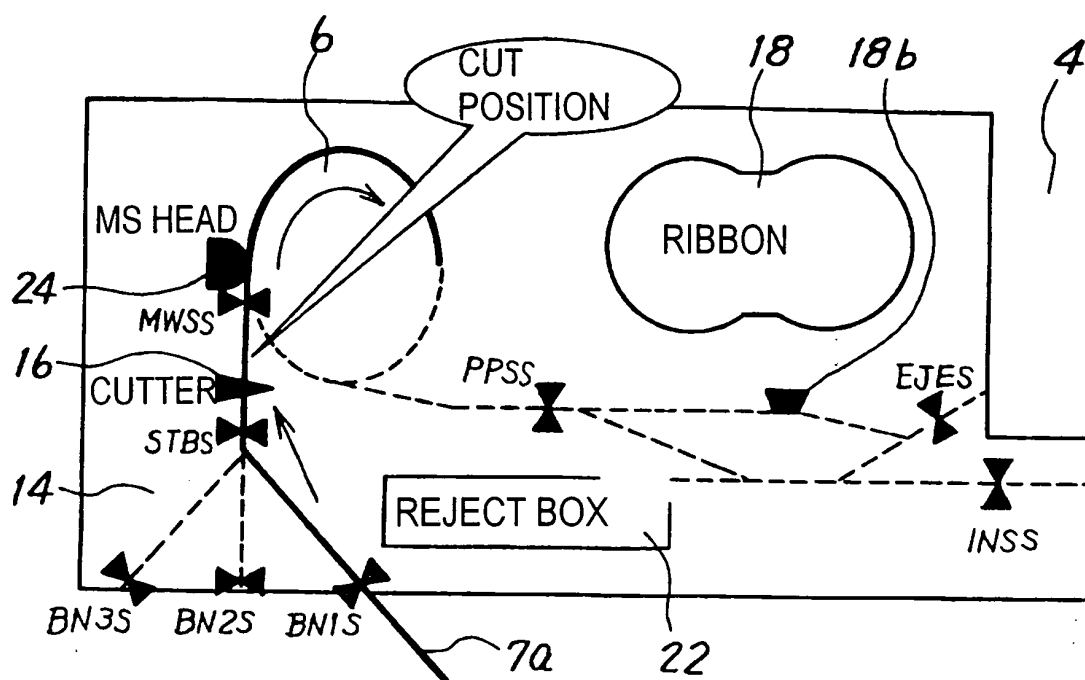


FIG. 8

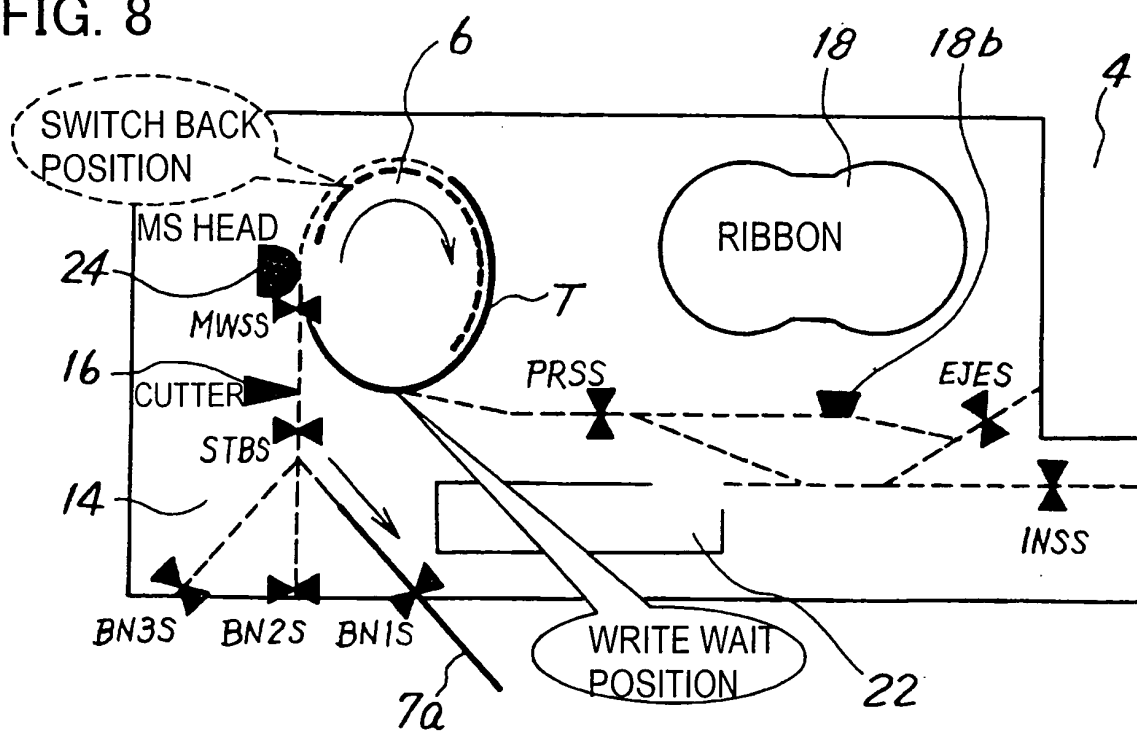


FIG. 9

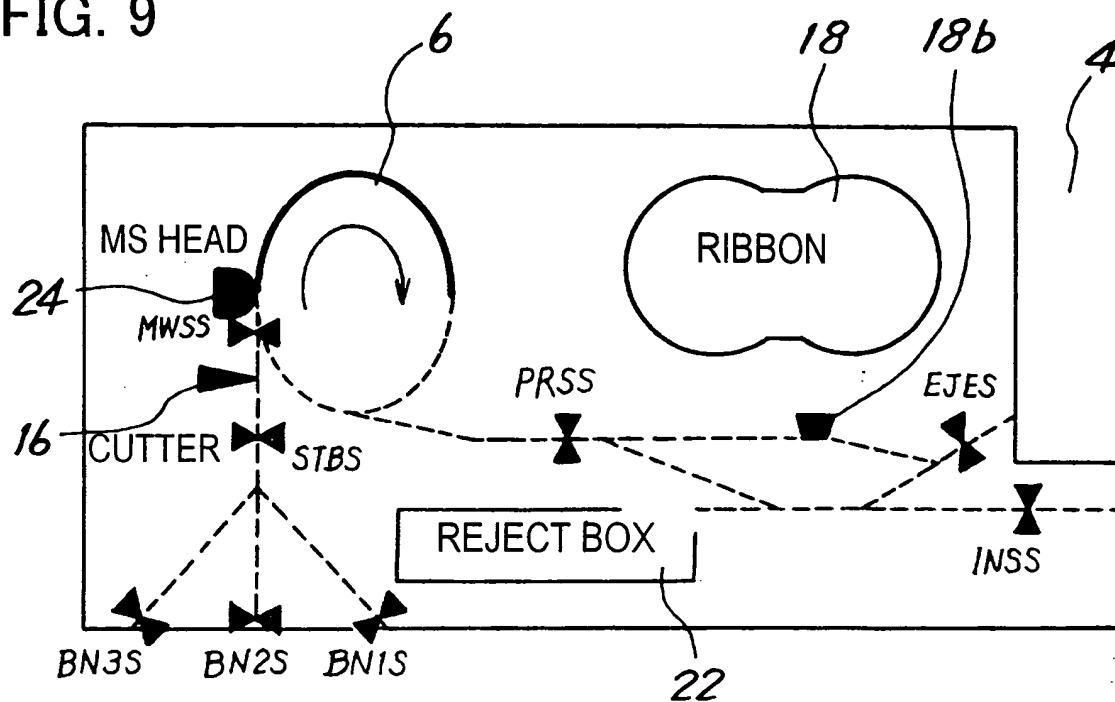


FIG. 10

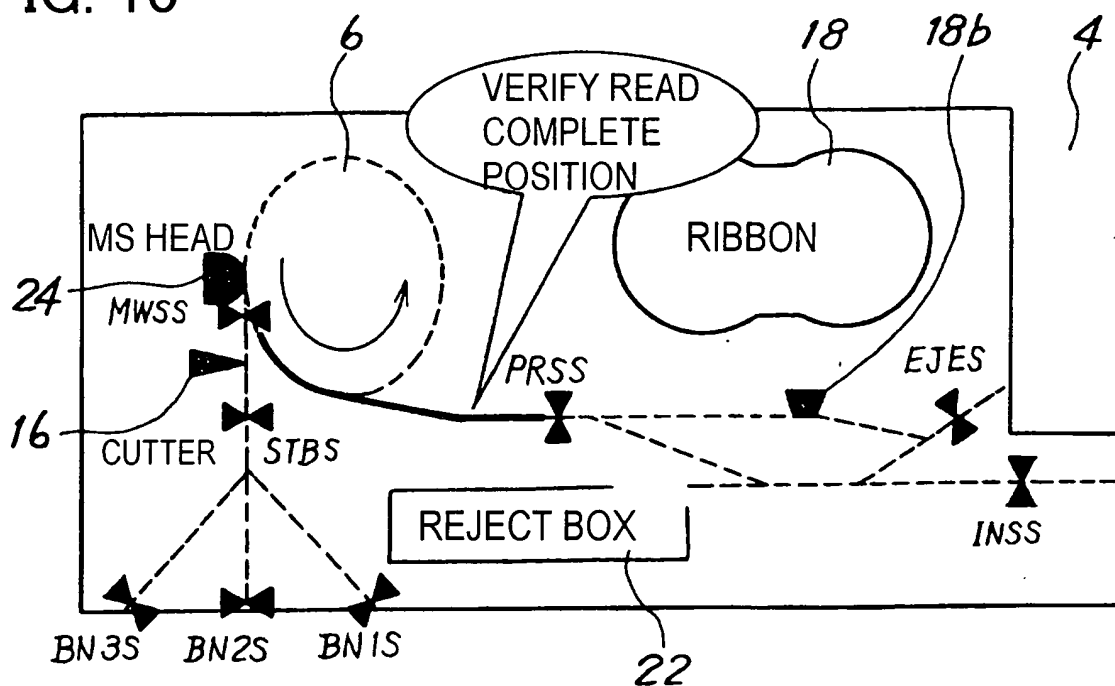


FIG. 11

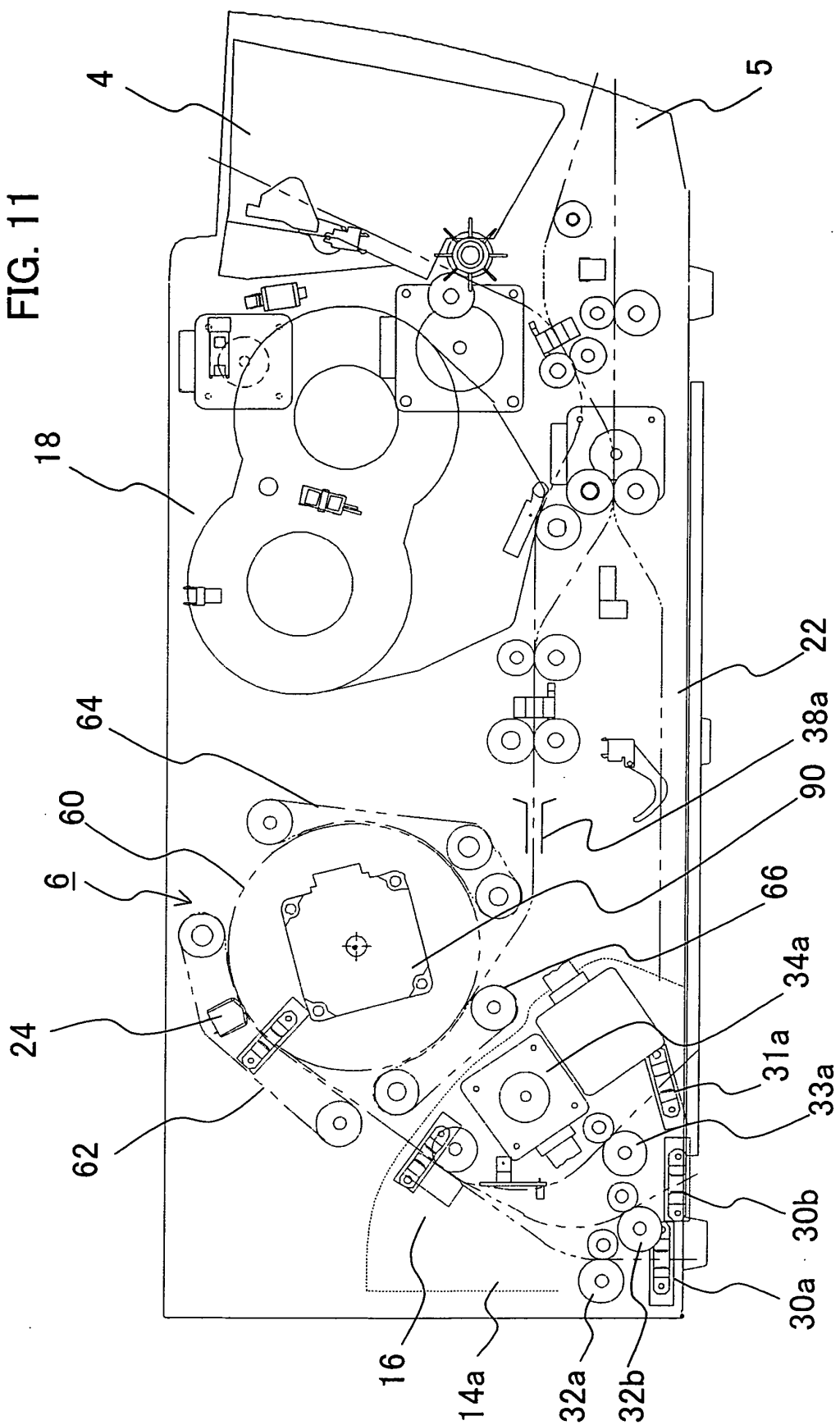


FIG. 12

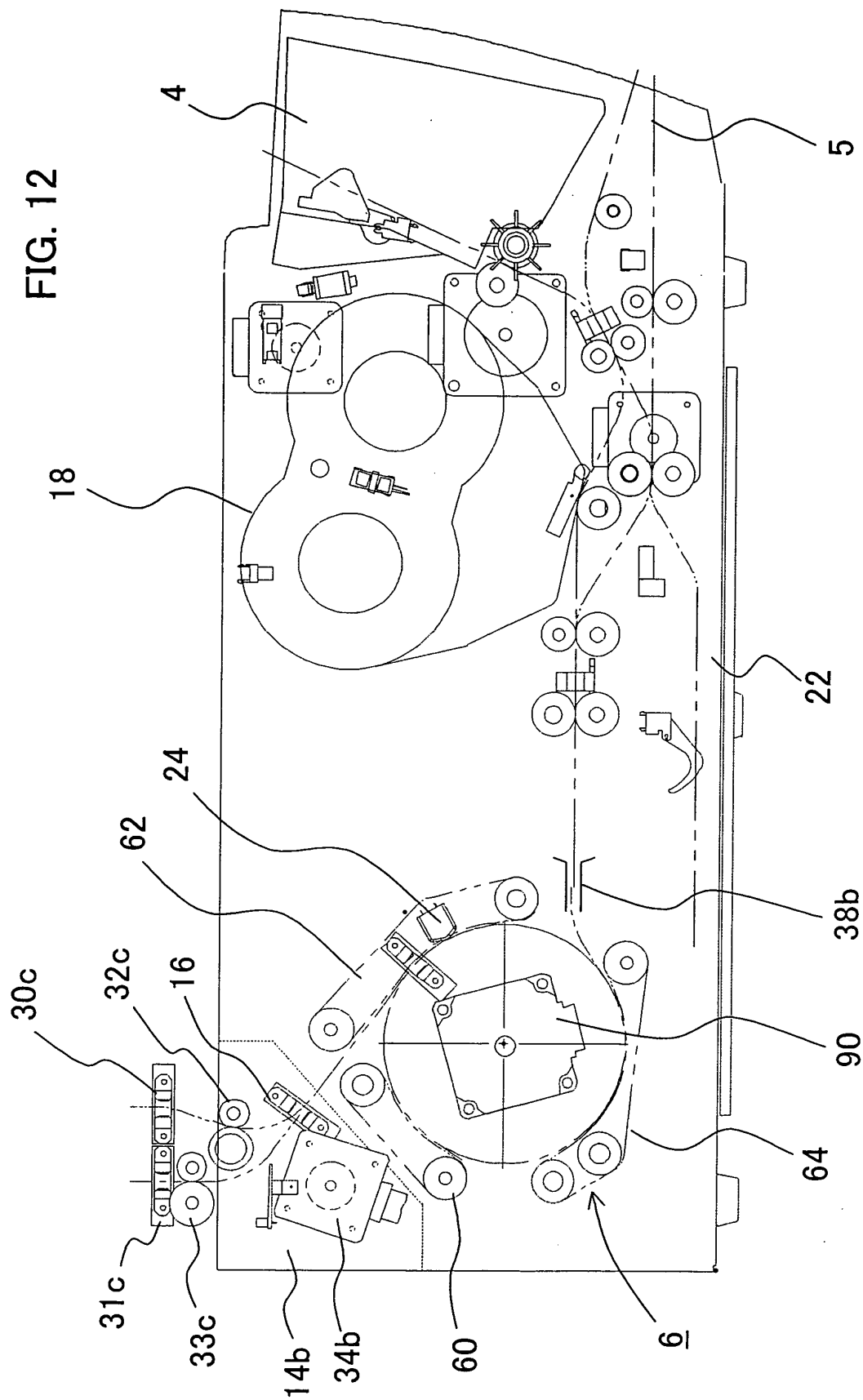


FIG. 13

PRIOR ART

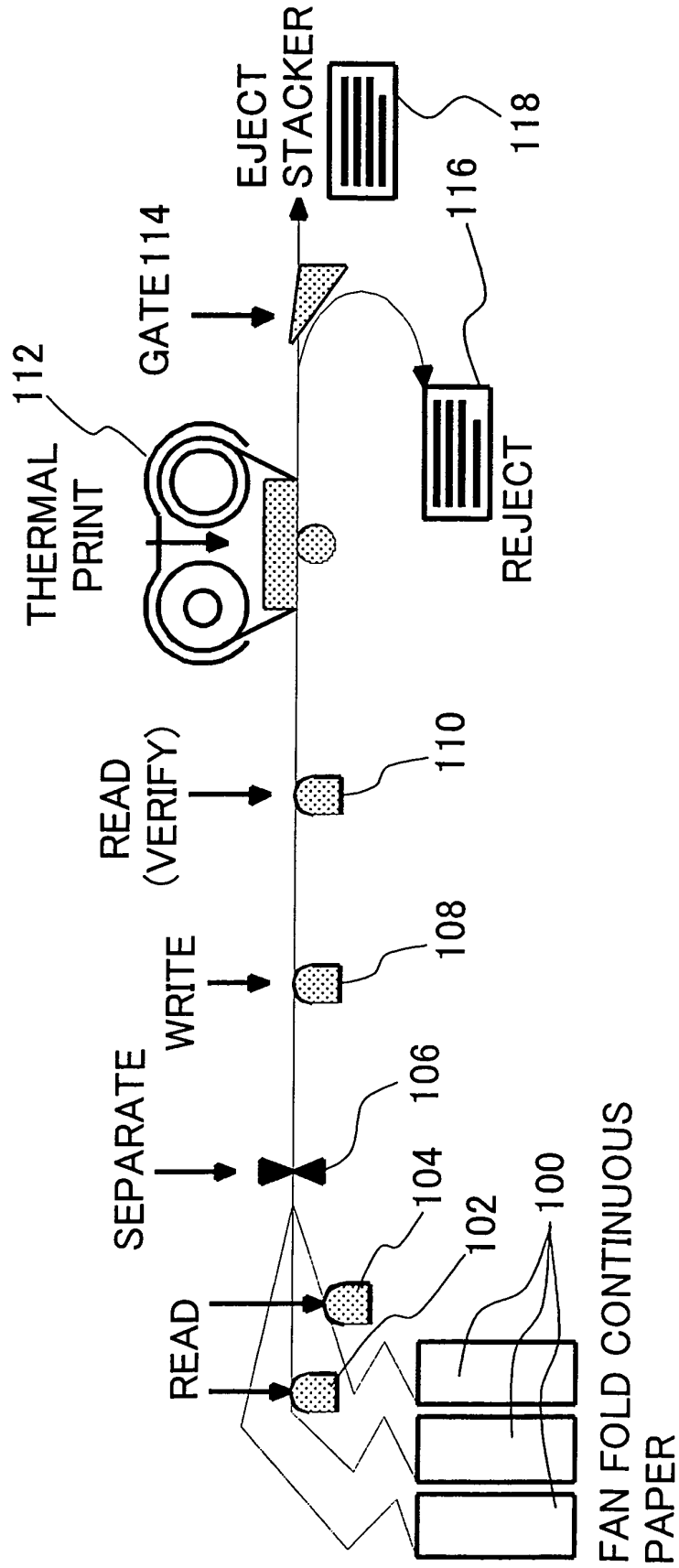
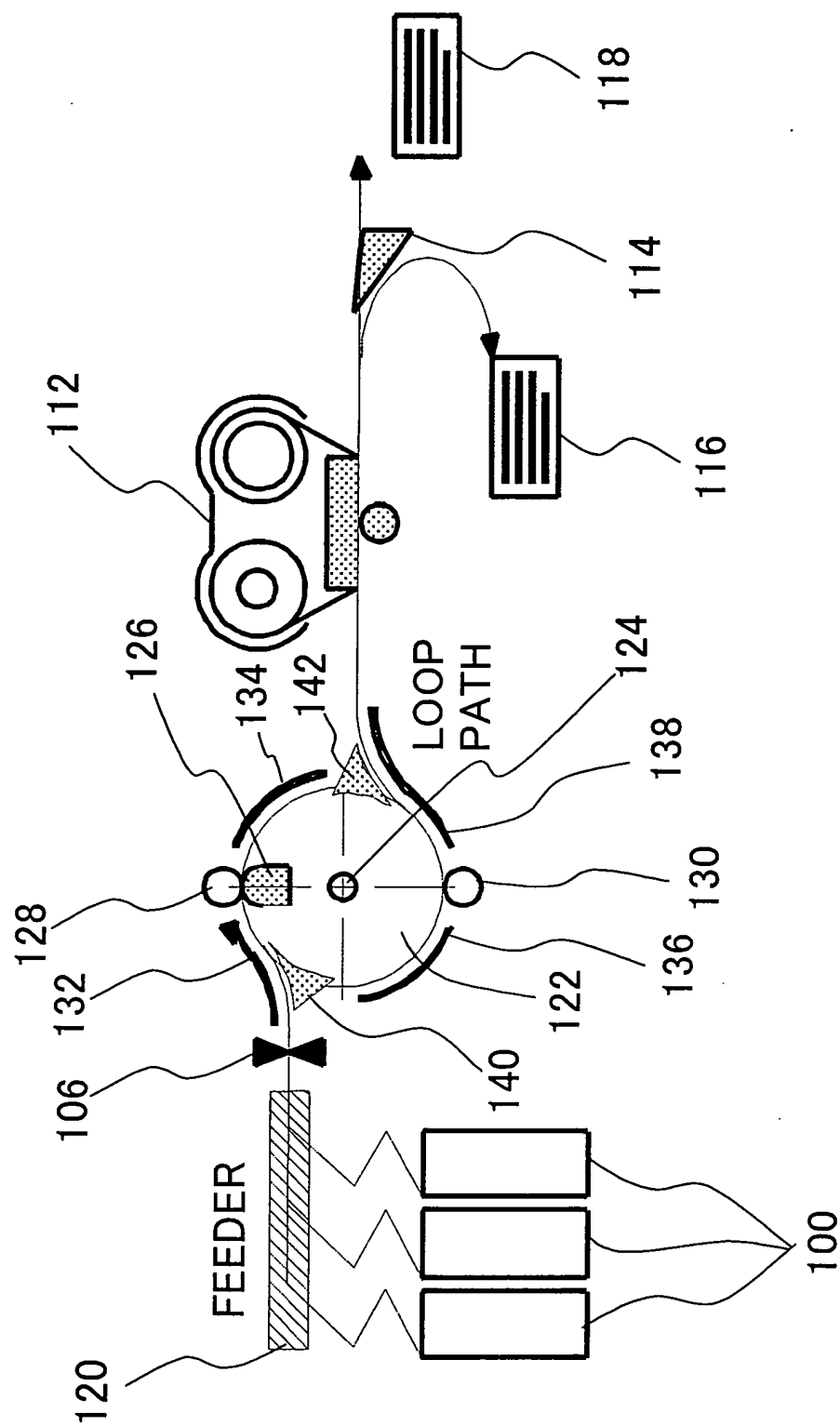


FIG. 14

PRIOR ART





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 02 4937

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 338 436 B1 (IGUCHI KOJI ET AL) 15 January 2002 (2002-01-15) * column 5, line 42 - column 10, line 32 * * figures 4,16B *	9,18,20	G07B1/00 G07B5/00 B65H18/00
A	FR 2 566 705 A (DASSAULT ELECTRONIQUE) 3 January 1986 (1986-01-03) * page 3, line 25 - page 5, line 14 * * figures *	1,11	
A	EP 0 473 137 A (OKI ELECTRIC INDUSTRY CO., LTD) 4 March 1992 (1992-03-04) * column 7, line 39 - column 9, line 30 * * figures 1-3,6A-6C *	1,11	
A	US 2003/052167 A1 (HILTON GRAHAM H ET AL) 20 March 2003 (2003-03-20) * paragraph [0033] - paragraph [0034] * * paragraph [0042] - paragraph [0043] * * figures 1,4,5 *	9,18	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			G07B B65H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 September 2005	Examiner Paraf, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 02 4937

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-09-2005

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6338436	B1	15-01-2002	JP 2570047 B2	08-01-1997
			JP 5221568 A	31-08-1993
			JP 2786371 B2	13-08-1998
			JP 5309851 A	22-11-1993
			JP 3012735 B2	28-02-2000
			JP 5309984 A	22-11-1993
			JP 5314333 A	26-11-1993
			JP 2906880 B2	21-06-1999
			JP 6162425 A	10-06-1994
			DE 69313889 D1	23-10-1997
			DE 69313889 T2	15-01-1998
			EP 0556071 A2	18-08-1993
FR 2566705	A	03-01-1986	FR 2566705 A1	03-01-1986
			EP 0173587 A1	05-03-1986
			US 4556334 A	03-12-1985
EP 0473137	A	04-03-1992	JP 2901772 B2	07-06-1999
			JP 4245391 A	01-09-1992
			JP 4106687 A	08-04-1992
			JP 2647248 B2	27-08-1997
			JP 4160585 A	03-06-1992
			DE 69118620 D1	15-05-1996
			DE 69118620 T2	28-11-1996
			EP 0473137 A2	04-03-1992
			US 5268561 A	07-12-1993
US 2003052167	A1	20-03-2003	US 2005061885 A1	24-03-2005
			CA 2458447 A1	06-03-2003
			EP 1430448 A2	23-06-2004
			NO 20040788 A	22-04-2004
			WO 03018513 A2	06-03-2003