(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 287 099 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.02.2011 Bulletin 2011/08

(51) Int Cl.:
B65H 9/16 *(2006.01)*

(21) Application number: **10172091.0**

(22) Date of filing: **05.08.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
BA ME RS

(30) Priority: **18.08.2009 US 543095**

(71) Applicant: **NCR Corporation**
Duluth, GA 30096 (US)

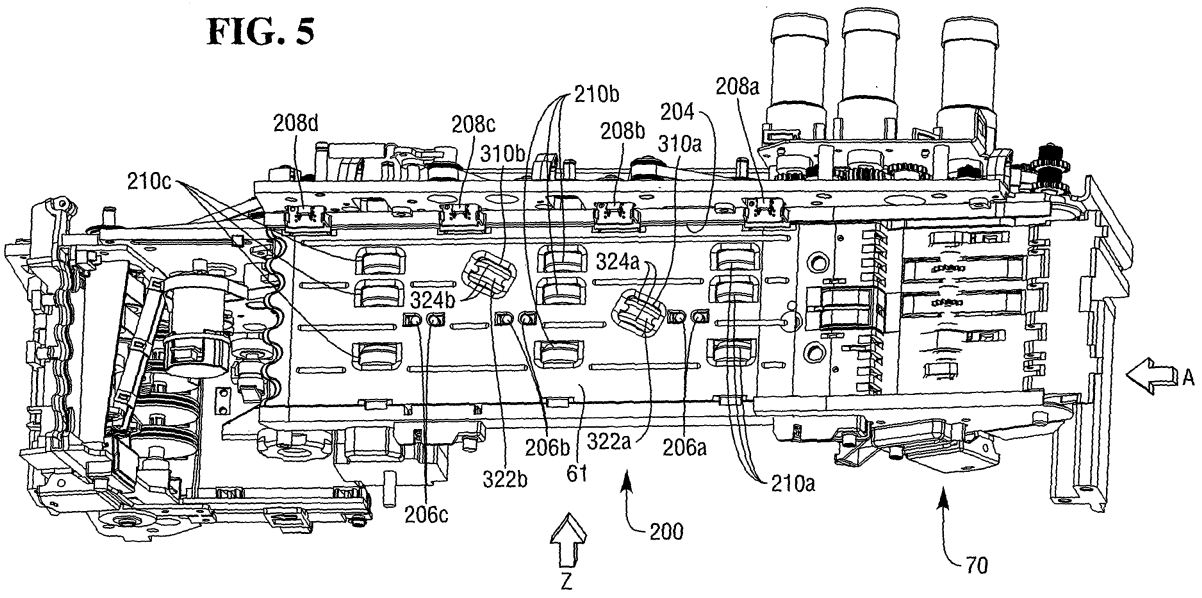
(72) Inventors:
- **Kallin, Frederik**
  Waterloo Ontario N2L 5T3 (CA)
- **Ross, Robert**
  Waterloo Ontario N2L 4V7 (CA)

(74) Representative: **MacLeod, Roderick William**
NCR Limited
Intellectual Property Section
Discovery Centre
3 Fulton Road
Dundee Tayside, DD2 4SW (GB)

(54) Document Deskewing

(57) A document deskewing module (200) is provided for a self service bunch document depositing terminal (10). The document deskewing module (200) comprises a set of sensors (208) arranged to detect when a document transported along a document transport path (61) from a mixed bunch of documents including documents of a first type and documents of a second type which is different from the first type is deskewed. The module (200) includes: hard drive rollers (210) disposed along the document transport path (61), a first set of idler rollers (212) moveable towards and away from the hard drive rollers (210), soft drive rollers (310) disposed along the document transport path (61), a second set of idler rollers (312) moveable towards and away from the soft drive rollers (310), and a controller (95) arranged to control operation of the first and second sets of idler rollers (212,312) in response to a number of signals from the set of sensors (208) such that either only the first set of idlers (212) are interacting with the hard drive rollers (210) or only the second set of idlers (312) is interacting with the soft drive rollers (310) at any one time to deskew either a document of the first type or a document of the second type which is different from the first type.

FIG. 5



EP 2 287 099 A2

Description

[0001] The present invention relates document deskewing. In particular, though not exclusively, the invention relates to a self-service document depositing terminal, and a document deskewing module therefor.

[0002] One type of self-service document depositing terminal is a bunch document depositing automated teller machine (ATM).

[0003] In a typical bunch document depositing ATM, an ATM customer is allowed to deposit a bunch of documents such as currency notes or checks (without having to place any of the documents in a deposit envelope) in a publicly accessible, unattended environment. To deposit a bunch of documents, the ATM customer typically inserts a user identification card through a user card slot at the ATM, and inserts the bunch of documents to be deposited through a slot of a bunch document acceptor. A document transport mechanism receives the inserted bunch of documents and transports the documents one-by-one in a forward direction along a document transport path to a number of locations within the ATM to process the documents.

[0004] If a particular document is not accepted for deposit, the document transport mechanism may transport the entire bunch of documents in a manner to return the bunch of documents to the ATM customer. If the entire bunch of documents is accepted for deposit, the amount of the bunch of documents is deposited into the ATM customer's account and the documents are transported one by one to a number of storage bins within the ATM. If a bunch of documents is a bunch of checks, an endorser printer prints an endorsement onto each check as the check is being transported to and stored in a check storage bin. If a bunch of documents is a bunch of currency notes, then each currency note is transported to and stored in a currency storage bin. Documents in the different storage bins within the ATM are periodically picked up and physically transported to a back office facility of a financial institution for further processing.

[0005] From time to time, a document may become skewed as the document is being transported along the document transport path to the different locations with the ATM. When a document becomes skewed along the document transport path, it is desirable to deskew the skewed document before it is processed at the different locations within the ATM. Otherwise, the skewed document may cause a document jam condition resulting in ATM downtime.

[0006] Document deskewing mechanisms are known. However, these known document deskewing mechanisms are designed to deskew only one type of document (e.g., either a currency note or a check, but not both). When a document deskewing mechanism is designed to deskew only one type of document, the mechanism is effective in deskewing a document of only that particular type. This is because different types of documents are of different sizes, different thicknesses, different paper grades, or the like. It would be desirable to provide a document deskewing mechanism which is effective to deskew a bunch of documents containing multiple types of documents such as a mixture of checks and currency notes.

[0007] According to a first aspect of the present invention there is provided a method of operating a document deskewing module for a self-service bunch document depositing terminal having a document transport path along which a document can be transported, the method comprising: at a first time, moving a first set of idler rollers towards a first set of drive rollers in the form of hard drive rollers to drive the document between first set of idler rollers and the hard drive rollers to move the document in a first direction of document travel from an upstream end of the document transport path to a downstream end of the document transport path; at a second time which is different from the first time, moving a second set of idler rollers towards a second set of drive rollers in the form of soft drive rollers to drive the document between the second set of idler rollers and the soft drive rollers to move the document towards a reference edge in a second direction of document travel which is transverse to the first direction of document travel so as to deskew the document relative to the first direction of document travel; and detecting when the document transported being along a document transport path is deskewed and providing a deskew signal indicative thereof.

[0008] According to a second aspect of the invention there is provided a document deskewing module for a self-service bunch document depositing terminal, the document deskewing module comprising: a set of sensors arranged to detect when a document transported along a document transport path from a mixed bunch of documents including documents of a first type and documents of a second type which is different from the first type is deskewed; a first set of drive rollers in the form of hard drive rollers disposed along the document transport path; a first set of idler rollers moveable towards and away from the hard drive rollers; a second set of drive rollers in the form of soft drive rollers disposed along the document transport path; a second set of idler rollers moveable towards and away from the soft drive rollers; and a controller arranged to control operation of the first and second sets of idler rollers in response to a number of signals from the set of sensors such that either only the first set of idlers are interacting with the hard drive rollers or only the second set of idlers is interacting with the soft drive rollers at any one time to deskew either a document of the first type or a document of the second type which is different from the first type.

[0009] According to a third aspect of the present invention there is provided a bunch document depositing automated teller machine (ATM) for processing a mixed bunch documents including checks and currency notes, the bunch document depositing ATM comprising: a set of sensors arranged to detect when a document transported along a document transport path from the mixed

bunch of documents is deskewed relative to a first direction of travel from an upstream end of the document transport path to a downstream end of the document transport path; a first set of drive rollers in the form of hard drive rollers disposed along the document transport path; a first set of idler rollers moveable towards and away from the hard drive rollers; a second set of drive rollers in the form of soft drive rollers disposed along the document transport path; a second set of idler rollers moveable towards and away from the soft drive rollers; a pair of actuatable solenoids each having an armature link, one solenoid being operatively coupled through its armature link to a first set of arms to the first set of idler rollers and the other solenoid being operatively coupled through its armature link to a second set of arms to the second set of idlers; and a controller arranged to control actuation of the solenoids and thereby to control the first and second sets of idler rollers such that the first set of idlers move away from the hard drive rollers to disengage the hard drive rollers and the second set of idlers move towards the soft drive rollers to engage the soft drive rollers to deskew either a check or a currency note which is being transported along the document transport path from the upstream end to the downstream end of the document transport path.

[0010] In accordance with one embodiment of the present invention, a document deskewing module is provided for a self-service bunch document depositing terminal. The document deskewing module may comprise a set of sensors arranged to detect when a document transported along a document transport path from a mixed bunch of documents including documents of a first type and documents of a second type which is different from the first type is deskewed, a first set of drive rollers in the form of hard drive rollers disposed along the document transport path, a first set of idler rollers moveable towards and away from the hard drive rollers, a second set of drive rollers in the form of soft drive rollers disposed along the document transport path, a second set of idler rollers moveable towards and away from the soft drive rollers, and a controller arranged to control operation of the first and second sets of idler rollers in response to a number of signals from the set of sensors such that either only the first set of idlers are interacting with the hard drive rollers or only the second set of idlers is interacting with the soft drive rollers at any one time to deskew either a document of the first type or a document of the second type which is different from the first type.

[0011] These and other aspects of the present invention will be apparent from the following specific description, given by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a left-front perspective view of a bunch document depositing automated teller machine (ATM) constructed in accordance with one embodiment of the present invention;

Fig. 2 is a simplified schematic diagram, looking approximately in the direction of arrow X in Fig. 1, and illustrating a scalable deposit module (SDM) configured to operate in the ATM of Fig. 1;

Fig. 3 is a left-front perspective view of the SDM of Fig. 2;

Fig. 4 is a top perspective view, looking approximately in the direction of arrow Y in Fig. 3;

Fig. 5 is a view similar to the top perspective view of Fig. 4, with some parts removed to better illustrate parts of a document deskewing module constructed in accordance with one embodiment of the present invention; and

Fig. 6 is a bottom view, looking approximately in the direction of arrow Z shown in Fig. 5.

[0012] Referring to Fig. 1, a self-service bunch document depositing terminal in the form of an image-based bunch document depositing automated teller machine (ATM) 10 is illustrated. The check depositing ATM 10 comprises a fascia 12 coupled to a chassis (not shown). The fascia 12 defines an aperture 16 through which a camera (not shown) images a customer of the ATM 10. The fascia 12 also defines a number of slots for receiving and dispensing media items, and a tray 40 into which coins can be dispensed. The slots include a statement output slot 42, a receipt slot 44, a card reader slot 46, a cash slot 48, another cash slot 50, and a bunch document input/output slot 52. The slots 42 to 52 and tray 40 are arranged such that the slots and tray align with corresponding ATM modules mounted within the chassis of the ATM 10.

[0013] The fascia 12 provides a user interface for allowing an ATM customer to execute a transaction. The fascia 12 includes an encrypting keyboard 34 for allowing an ATM customer to enter transaction details. A display 36 is provided for presenting screens to an ATM customer. A fingerprint reader 38 may also be provided for reading a fingerprint of an ATM customer to identify the ATM customer. The user interface features described above are all provided on an NCR PERSONAS (trademark) 6676 ATM, available from NCR Financial Solutions Group Limited, Discovery Centre, 3 Fulton Road, Dundee, DD2 4SW, Scotland.

[0014] Referring to Figs. 2 and 3, one embodiment of a scalable deposit module (SDM) 60 is illustrated. Fig. 2 is a simplified schematic diagram (looking approximately in the direction of arrow X in Fig. 1) of part of the fascia 12 and main parts of the SDM 60. Fig. 3 is a left-front perspective view of the SDM 60 shown in Fig. 2.

[0015] The SDM 60 of Figs. 2 and 3 comprises five main units which include an infeed module 70, a transport module 80, a pocket module 90, an escrow re-bunch module (ERBM) 99, and a document deskewing module 200. The infeed module 70 receives a bunch of documents deposited into the bunch document input/output slot 52, and transports the documents one-by-one to an inlet of the transport module 80. The dimensions of the infeed module 70, such as its run length, may vary de-

pending upon the particular model ATM in which the SDM 60 is installed. The structure and operation of the infeed module 70 are conventional and well known and, therefore, will not be described.

[0016] The transport module 80 includes a document transport mechanism which receives a document from the inlet adjacent to the infeed module 70, and transports the document along a first document track portion 61 which is the main track portion. The transport module 80 further includes a document diverter 82 which is operable to divert a document along a second document track portion 62 to the pocket module 90, and a third document track portion 63 which leads to the ERBM 99 and then back to the infeed module 70. The third document track 103 allows a bunch of documents which has accumulated in the ERBM 99 to be transported back to the infeed module 70. The structure and operation of diverter 82 shown in Fig. 2 may be any suitable diverter which is capable of diverting a document along one of two different document transport paths. The structure and operation of diverter 82 are conventional and well known and, therefore, will not be described.

[0017] The transport module 80 further includes a magnetic ink character recognition (MICR) head 83 for reading magnetic details on a code line of a check. The transport module 80 also includes an imager 84 including a front imaging camera 85 and a rear imaging camera 86 for capturing an image of each side of a check (front and rear). An endorser printer 88 is provided for printing endorsements onto checks. An image data memory 94 is provided for storing images of checks. A controller 95 is provided for controlling the operation of the elements within the SDM 60.

[0018] The pocket module 90 includes a check storage bin 91 (Fig. 3) for storing processed checks. The pocket module 90 further includes a currency storage bin 92 for storing processed currency notes. The pocket module 90 also includes a reject bin 93 for storing rejected documents. The structure and operation of the pocket module 90 are conventional and well known and, therefore, will not be described.

[0019] The SDM 60 processes a bunch of documents of different types (such as currency notes, checks, or a combination thereof). When a bunch of documents is being processed, each document of the bunch is separated at the infeed module 70 before it is individually processed. Each processed document is then re-assembled at the ERBM 99 to bunch the documents back together. Bunch processing of different types of documents is sometimes referred to as "multiple-document processing". Since individual documents are being bunched back together, an escrow module (such as the ERBM 99 shown in Figs. 2 and 3) is needed. The ERBM 99 is manufactured and available from Glory Products, located in Himeji, Japan. The ERBM 99 allows a bunch of documents to be processed in a single transaction. If a bunch of documents has accumulated in the ERBM 99 and is unable to be processed further within the SDM 60, then the bunch of documents is transported via the third document track portion 63 back to the infeed module 70 to return the unprocessed bunch of documents to the ATM customer.

[0020] Referring to Figs. 4, 5, and 6, the document deskewing module 200 includes a top guide assembly 202 (Fig. 4) which guides a document in the direction of arrow A along the first document track portion 61 (Fig. 5). Fig. 4 is a top perspective view, looking approximately in the direction of arrow Y in Fig. 3. Fig. 5 is a view similar to the top perspective view of Fig. 4, with some parts including the top guide assembly 202 removed to better illustrate certain parts of the document deskewing module 200. Fig. 6 is a bottom view, looking approximately in the direction of arrow Z shown in Fig. 5.

[0021] As shown in Fig. 5, the document deskewing module 200 has a relatively straight reference surface or edge 204 against which a document abuts as the document is being transported along the first document track portion 61 in the direction of arrow A. The reference surface 204 is referred to herein as the track bottom. A first set of track sensors 206a, 206b, 206c detects progress of the document as the document is being transported from an upstream end of the first document track portion 61 to a downstream end of the first document track portion. A second set of track sensors 208a, 208b, 208c, 208d detects when the document has been deskewed in a manner to be described hereinbelow.

[0022] A first set of drive rollers 210a, 210b, 210c (Fig. 5) cooperates with a first set of idler rollers 212a, 212b, 212c (Fig. 4) to advance the document downstream along the first document track portion 61. The first set of drive rollers 210a, 210b, 210c operate in direct contact with the opposing idlers 212a, 212b, 212c giving a large drive force and is referred to herein as the hard drive rollers. The first set of idler rollers 212a, 212b, 212c is referred to herein as the hard drive idlers. The hard drive rollers 210a, 210b, 210c lie "parallel" to the direction of document movement as indicated by arrow A shown in Fig. 5. A set of compression springs 214a, 214b, 214c (Fig. 4) maintains the set of hard drive idlers 212a, 212b, 212c in contact with the opposing set of hard drive rollers 210a, 210b, 210c. A first set of lifter arms 314a, 314b, 314c allows the set of hard drive idlers 212a, 212b, 212c to be disengaged from the set of hard drive rollers 210a, 210b, 210c, in a manner to be described later herein.

[0023] A second set of drive rollers 310a, 310b (Fig. 5) cooperates with a second set of idler rollers 312a, 312b (Fig. 4) to direct the document against the track bottom 204. The second set of drive rollers 310a, 310b do not contact the opposing idlers 312a, 312b directly while operating giving a much lighter drive force and is referred to herein as the soft drive rollers. The second set of idler rollers 312a, 312b is referred to herein as the soft drive idlers. The soft drive rollers 310a, 310b are "angled" relative to the hard drive rollers 210a, 210b, 210c as shown in Fig. 5. Accordingly, the soft drive rollers 310a, 310b, 310c lie "angled" to the direction of document movement as indicated by arrow A shown in Fig. 5. A second set of

lifter arms 316a, 316b allows the set of soft drive idlers 312a, 312b to move away from the set of soft drive rollers 310a, 310b, in a manner to be described later herein.

[0024] As shown in Fig. 5, each of the soft drive rollers 310a, 310b has a corresponding one of U-shaped depressions 322a, 322b. The U-shaped depression 322a is associated with the soft drive roller 310a and is disposed between a pair of tire surfaces 324a of the soft drive roller 310a. The corresponding soft drive idler 312a (Fig. 4) runs inside the U-shaped depression 322a of the soft drive roller 310a, and does not contact soft drive roller 310a. Similarly, the U-shaped depression 322b is associated with the soft drive roller 310b and is disposed between a pair of tire surfaces 324b of the soft drive roller 310b. The corresponding soft drive idler 312b (Fig. 4) runs inside the U-shaped depression 322b of the soft drive roller 310b, and does not contact soft drive roller 310b. A corresponding set of adjustment screws 318a, 318b allows the positions of the set of soft drive idlers 312a, 312b to be adjusted relative to the positions of the set of soft drive rollers 310a, 310b.

[0025] Cooperation between the soft drive roller 310a and the soft drive idler 312a and cooperation between the soft drive roller 310b and the soft drive idler 312b are the same. For simplicity, only cooperation between the soft drive roller 310a and the soft drive idler 312a will be described hereinbelow.

[0026] When a document is transported along the first document track portion 61 and moves between the soft drive roller 310a and the soft drive idler 312a, the soft drive idler deflects the document into the U-shaped depression 322a. The amount of drive force from the tire surfaces 324a acting on the document depends upon the amount of deflection force from the document. The amount of deflection force from the document depends upon the extent to which the soft drive idler 312a is running inside of the U-shaped depression 322a (as determined by position of the adjustment screw 318a).

[0027] The amount of deflection force from the document also depends upon the relative stiffness (or relative limpness) of the particular document. For example, a relative stiffer document provides a greater amount of deflection force and, therefore, provides a greater amount of drive force (from the tire surfaces 324a) which acts on the document. Similarly, a relative limper document provides a lesser amount of deflection force and, therefore, provides a lesser amount of drive force (from the tire surfaces 324a) which acts on the document. The angle of the tire surfaces 324a relative to the direction of travel (as indicated by arrow A) of document causes the document to abut against the track bottom 204.

[0028] It should be apparent that the cooperation between the soft drive roller 310a and the soft drive idler 312a provides a variable drive force which acts on the document being transported along the first document track portion 61. The variable drive force provided is such that relatively thicker or stiffer documents are driven harder, and relatively thinner or limper documents are driven more lightly. This variable drive force is advantageous because (i) a relatively thicker or stiffer document (such as one that has been folded, curled or crumpled) requires more drive force to overcome the friction of travelling down the first document track portion 61, and (ii) a relatively thinner or limper document is less likely to deform as the document is more lightly pushed against the track bottom 204.

[0029] A first actuatable solenoid 230 (Fig. 4) having an armature link 232 is operatively coupled through the first set of lifter arms 314a, 314b, 314c to the hard drive idlers 212a, 212b, 212c. A second actuatable solenoid 234 having an armature link 236 is operatively coupled through the second set of lifter arms 316a, 316b to the soft drive idlers 312a, 312b. When the first solenoid 230 is actuated, the hard drive idlers 212a, 212b, 212c are moved away from the hard drive rollers 210a, 210b, 210c. At the same time, the second solenoid 234 is actuated and the soft drive idlers 312a, 312b are moved towards and running inside the U-shaped depressions 322a, 322b of the soft drive rollers 310a, 310b.

[0030] When the first solenoid 230 is de-actuated, the armature link 232 releases the first set of lifter arms 314a, 314b, 314c. At the same time, the second solenoid 234 is de-actuated and the second set of lifter arms 316a, 316b are lifted. These two actions cause the hard drive idlers 212a, 212b, 212c to engage the hard drive rollers 210a, 210b, 210c, and at the same time, the soft drive idlers 312a, 312b to move away from or "disengage" the soft drive rollers 310a, 310b. Accordingly, only one function of either hard drive rollers 210a, 210b, 210c or the soft drive rollers 310a, 310b is normally provided at any one time.

[0031] When a document first comes out the infeed module 70, the document encounters the soft drive rollers 310a, 310b and the soft drive idlers 312a, 312b (i.e., the function of the soft drive rollers 310a, 310b is provided). The soft drive rollers 310a, 310b and the soft drive idlers 312a, 312b push the document against the track bottom 204 until at least two of the deskew sensors 208a, 208b, 208c, 208d are blocked. When at least two of the deskew sensors 208a, 208b, 208c, 208d are blocked, the second solenoid 234 is de-actuated to "disengage" the soft drive rollers 310a, 310b and the solenoid 230 is de-actuated to engage the hard drive rollers 210a, 210b 210c. It should be noted that the soft drive rollers 310a, 310b are preferably disengaged at this point. Otherwise, a relative thin or limp document may begin to curl and jam if it travels any significant distance with the angled soft drive rollers 310a, 310b engaged. The document is now deskewed and is transported to other parts of the SDM 60 under control of the hard drive rollers 210a, 210b, 210c.

[0032] By using a document deskewing module as described hereinabove, it is conceivable that the hard drive rollers 210a, 210b, 210c be momentarily engaged if the document is detected to hesitate (or stop) while under control of the soft drive rollers 310a, 310b. This momentary engagement of the hard drive rollers 210a, 210b,

210c would act as a small "nudge" or "kick" to the document in an attempt to correct what is causing the document to hesitate (or stop).

[0033] Although the above description describes the PERSONAS (trademark) 6676 NCR ATM embodying the present invention, it is conceivable that other models of ATMs, other types of ATMs, or other types of self-service bunch document depositing terminals may embody the present invention. Self-service bunch document depositing terminals are generally public-access devices that are designed to allow a user to conduct a bunch document deposit transaction in an unassisted manner and/or in an unattended environment. Self-service bunch document depositing terminals typically include some form of tamper resistance so that they are inherently resilient.

[0034] The particular arrangements disclosed are meant to be illustrative only and not limiting as to the scope of the invention.

[0035] Various modifications may be made to the above described embodiment within the scope of the present invention.

Claims

1. A method of operating a document deskewing module (200) for a self-service bunch document depositing terminal (10) having a document transport path along which a document can be transported, the method comprising:

   at a first time, moving a first set of idler rollers towards a first set of drive rollers in the form of hard drive rollers to drive the document between first set of idler rollers and the hard drive rollers to move the document in a first direction of document travel from an upstream end of the document transport path to a downstream end of the document transport path;
   at a second time which is different from the first time, moving a second set of idler rollers towards a second set of drive rollers in the form of soft drive rollers to drive the document between the second set of idler rollers and the soft drive rollers to move the document towards a reference edge in a second direction of document travel which is transverse to the first direction of document travel so as to deskew the document relative to the first direction of document travel; and
   detecting when the document transported being along a document transport path is deskewed and providing a deskew signal indicative thereof.

2. A method according to claim 1, wherein only either the first set of idler rollers is moving towards the hard drive rollers or the second set of idler rollers is moving towards the soft drive rollers at any one time.

3. A method according to claim 1 or 2, wherein the reference edge extends in a direction parallel to the first direction of document travel from the upstream end of the document transport path to the downstream end of the document transport path.

4. A method according to any preceding claim, wherein the second direction of document travel is perpendicular to the first direction of document travel.

5. A method according to any preceding claim, wherein detecting includes (i) detecting at least a first signal from one of a plurality of sensors, and (ii) detecting a second signal from another one of the plurality of sensors such that the deskew signal which is indicative of the document being deskewed varies as a function of both the first and second signals from the plurality of sensors.

6. A method according to any preceding claim, wherein the self-service bunch document depositing terminal comprises a bunch document depositing automated teller machine (ATM).

7. A document deskewing module (200) for a self-service bunch document depositing terminal (10), the document deskewing module (200) comprising:

   a set of sensors (208) arranged to detect when a document transported along a document transport path (61) from a mixed bunch of documents, including documents of a first type and documents of a second type which is different from the first type, is deskewed;
   a first set of drive rollers (210) in the form of hard drive rollers disposed along the document transport path (61);
   a first set of idler rollers (212) moveable towards and away from the hard drive rollers (210);
   a second set of drive rollers (310) in the form of soft drive rollers disposed along the document transport path (61);
   a second set of idler rollers (312) moveable towards and away from the soft drive rollers (310); and
   a controller (95) arranged to control operation of the first and second sets of idler rollers (212,312) in response to a number of signals from the set of sensors (208) such that either only the first set of idler rollers (212) are interacting with the hard drive rollers (210) or only the second set of idler rollers (312) is interacting with the soft drive rollers (310) at any one time to deskew either a document of the first type or a document of the second type which is different from the first type.

8. A document deskewing module according to claim

7, further comprising two actuatable solenoids (230,234) each having an armature link (232,236), one of which (232) is operatively coupled through a first set of arms (314) to the first set of idler rollers (212) and the other one (236) through a second set of arms (316) to the second set of idler rollers (312).

9. A document deskewing module according to claim 8, wherein the controller (95) is arranged to actuate the solenoids (230,234) to cause the armature links (232,236) to act on the first and second sets of arms (314,316) such that the first set of idler rollers (212) move towards the hard drive rollers (210) to engage the hard drive rollers (210) and the second set of idler rollers (312) move away from the soft drive rollers (310) to disengage the soft drive rollers (310).

10. A document deskewing module according to any of claims 7 to 9, wherein the set of sensors (208) comprises four sensors spaced along the document transport path (61).

11. A document deskewing module according to claim 10, wherein the controller (95) is arranged to actuate the solenoids (230,234) only when at least two of the sensors (208) provide an associated signal indicative of a deskewed document.

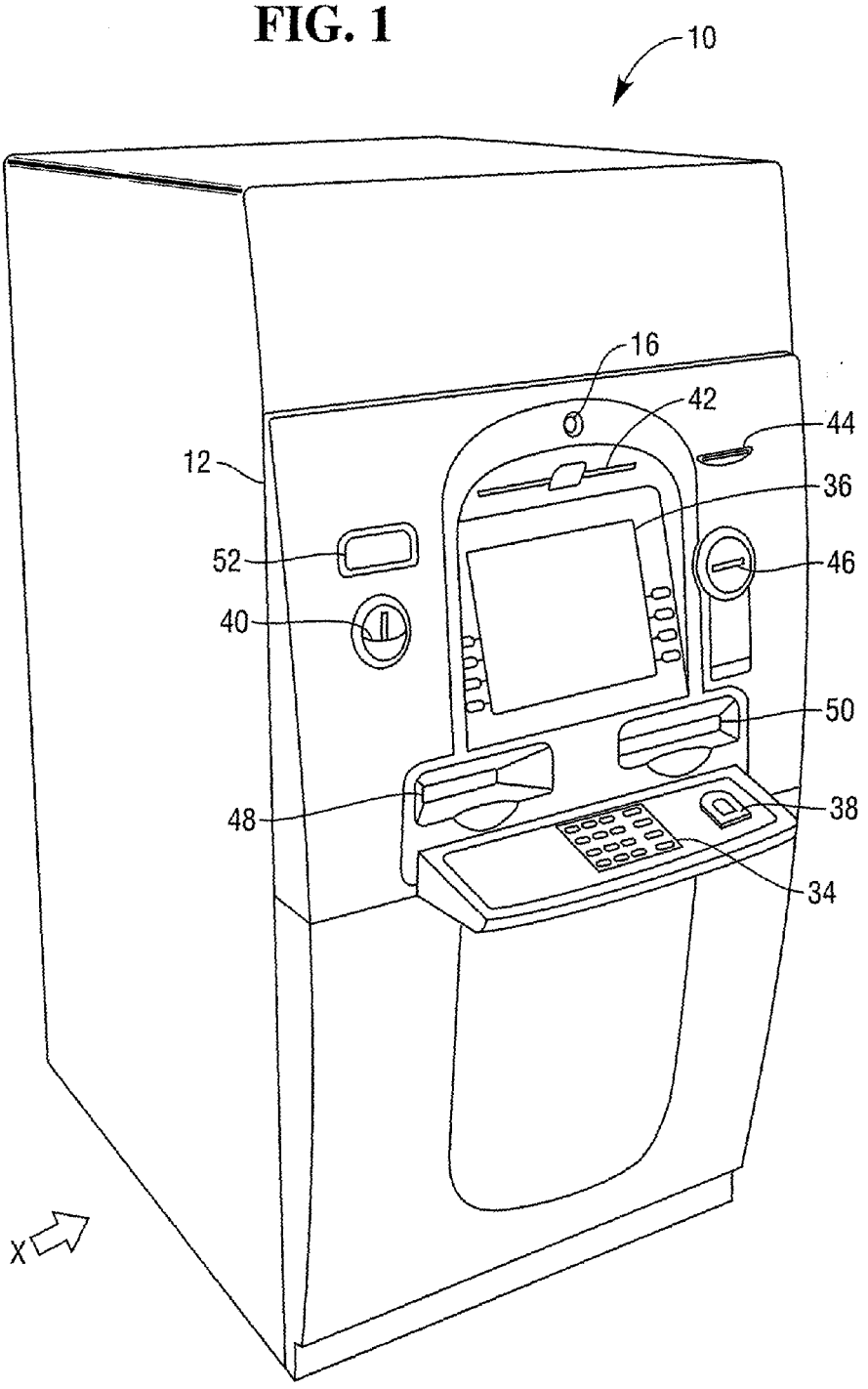
12. A bunch document depositing automated teller machine (10) for processing a mixed bunch documents including checks and currency notes, the machine (10) comprising:

a set of sensors (208) arranged to detect when a document transported along a document transport path (61) from the mixed bunch of documents is deskewed relative to a first direction of travel from an upstream end of the document transport path to a downstream end of the document transport path (61);
a first set of drive rollers (210) in the form of hard drive rollers disposed along the document transport path (61);
a first set of idler rollers (212) moveable towards and away from the hard drive rollers (210);
a second set of drive rollers (310) in the form of soft drive rollers disposed along the document transport path (61);
a second set of idler rollers (312) moveable towards and away from the soft drive rollers (310);
a pair of actuatable solenoids (230,234) each having an armature link (232,236), one solenoid (230) being operatively coupled through its armature link (232) to a first set of arms (314) to the first set of idler rollers (212) and the other solenoid (234) being operatively coupled through its armature link (236) to a second set of arms (316) to the second set of idlers (312); and
a controller (95) arranged to control actuation of the solenoids (230,234) and thereby to control the first and second sets of idler rollers (212,312) such that the first set of idler rollers (212) move away from the hard drive rollers (210) to disengage the hard drive rollers (210) and the second set of idler rollers (312) move towards the soft drive rollers (310) to engage the soft drive rollers (310) to deskew either a check or a currency note which is being transported along the document transport path from the upstream end to the downstream end of the document transport path.

13. A bunch document depositing ATM according to claim 12, wherein the set of sensors (208) comprise four sensors.

14. A bunch document depositing ATM according to claim 13, wherein the controller (95) is arrange to actuate the solenoids (230,234) only when at least two of the sensors (208) provide an associated signal indicative of a deskewed document.

FIG. 1



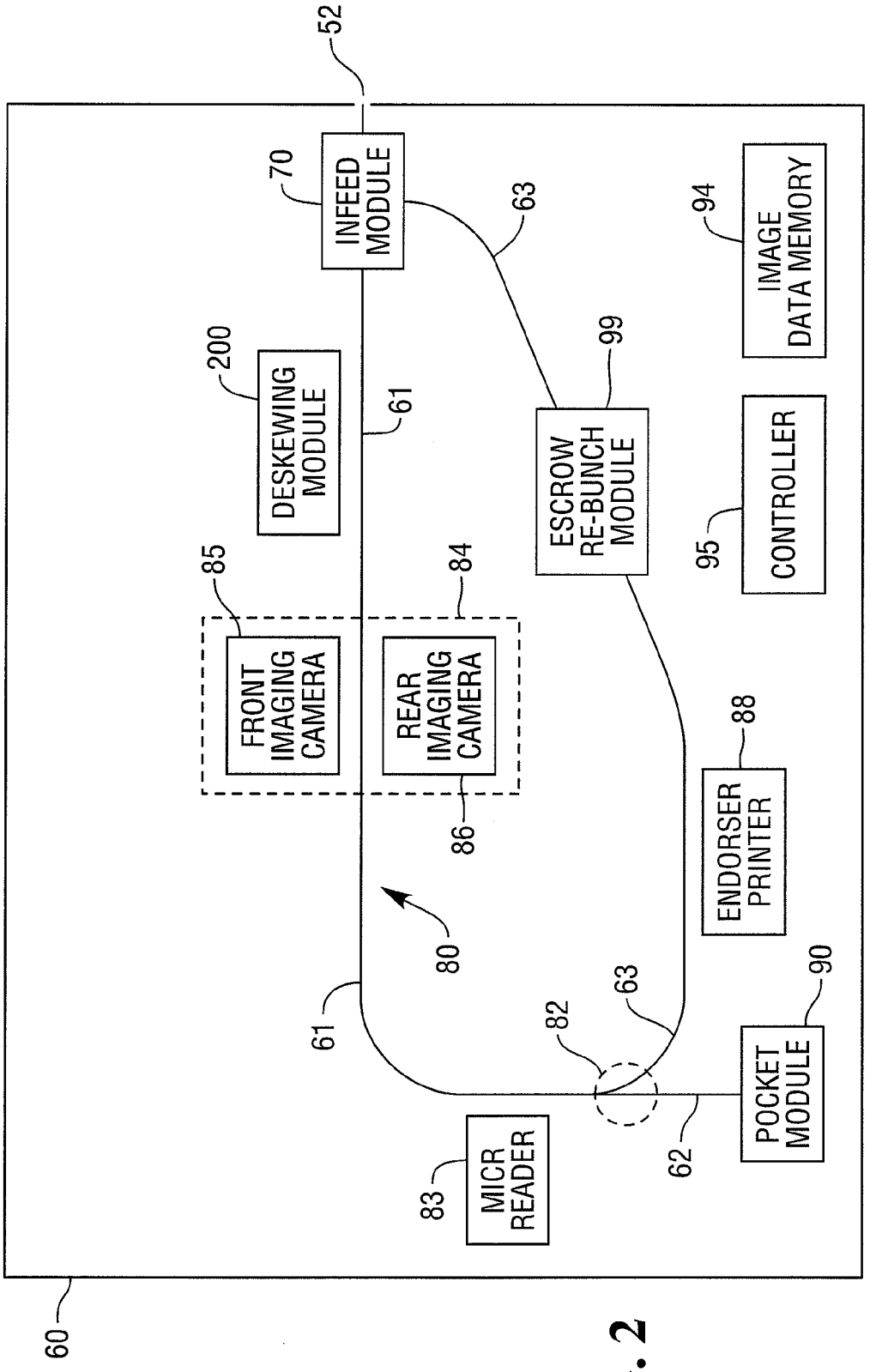

52
70
INFEED MODULE
63
94
IMAGE DATA MEMORY
200
DESKEWING MODULE
61
99
ESCROW RE-BUNCH MODULE
95
CONTROLLER
85
84
FRONT IMAGING CAMERA
REAR IMAGING CAMERA
86
88
ENDORSER PRINTER
80
61
63
82
90
POCKET MODULE
62
83
MICR READER
60

FIG. 2

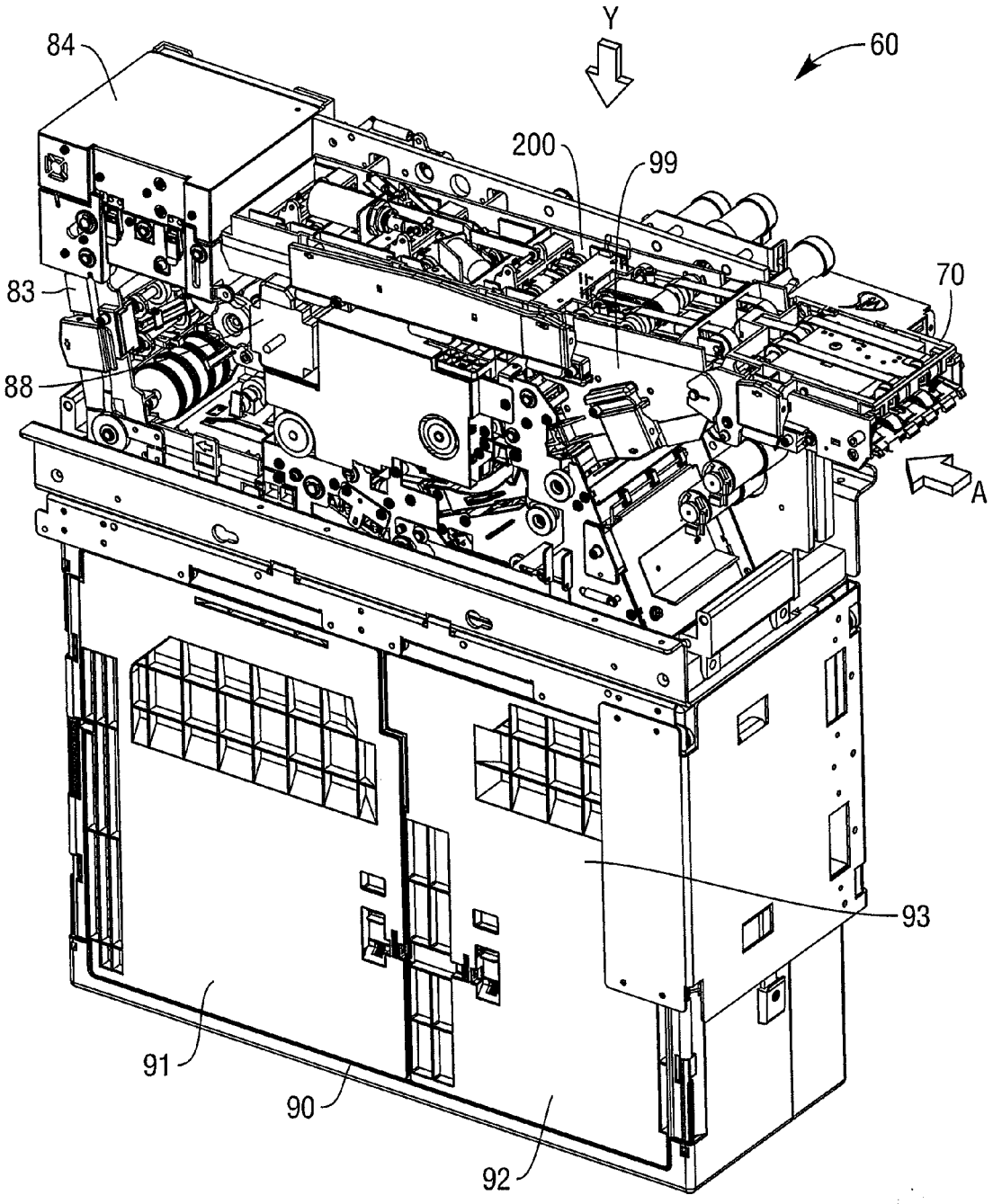
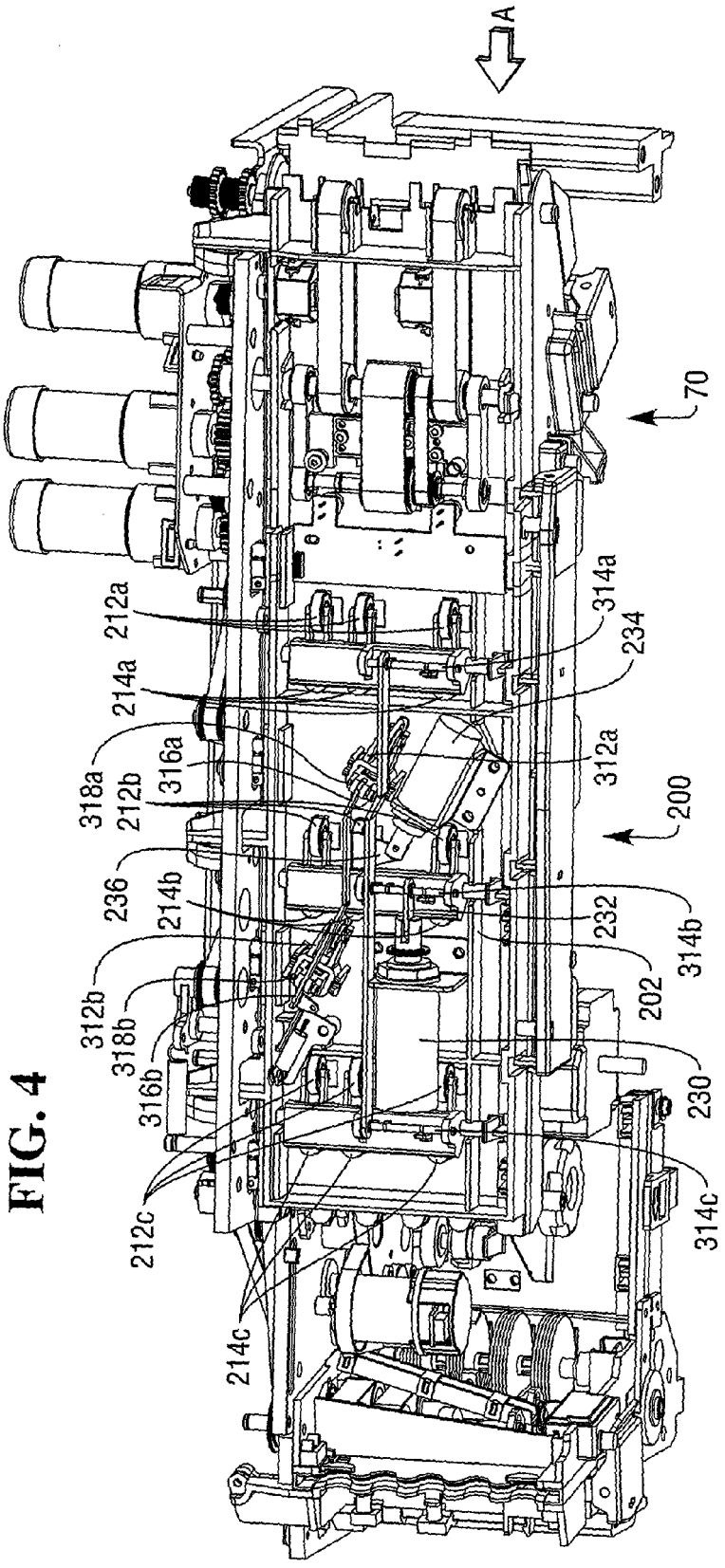


FIG. 3

FIG. 4


A
70
212a
214a
318a
316a
212b
236
214b
312b
318b
316b
212c
214c
314a
234
312a
200
232
314b
202
230
314c

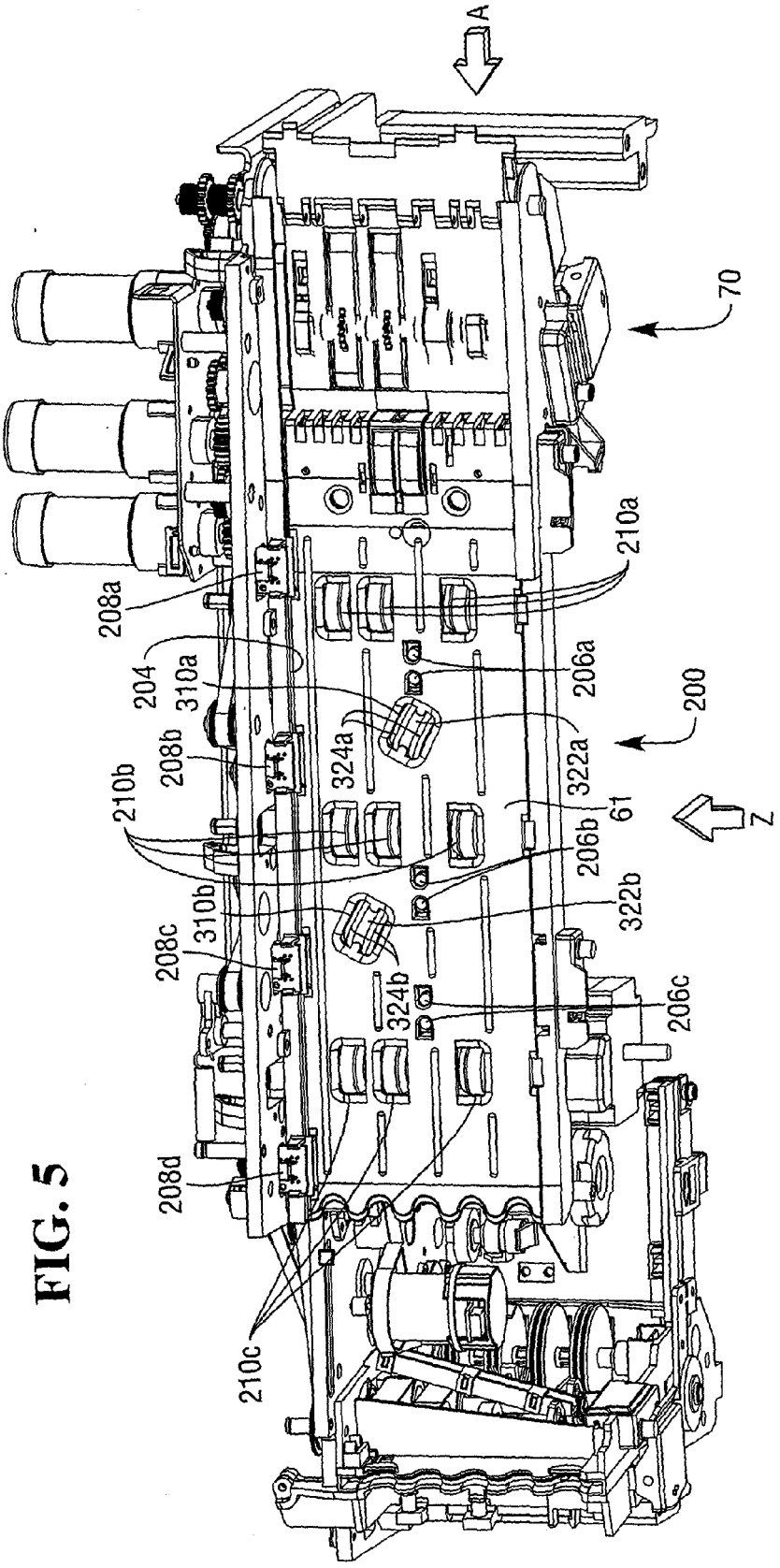

A
70
210a
208a
204
310a
206a
200
208b
324a
322a
210b
61
Z
206b
322b
310b
208c
324b
206c
208d
210c

FIG. 5

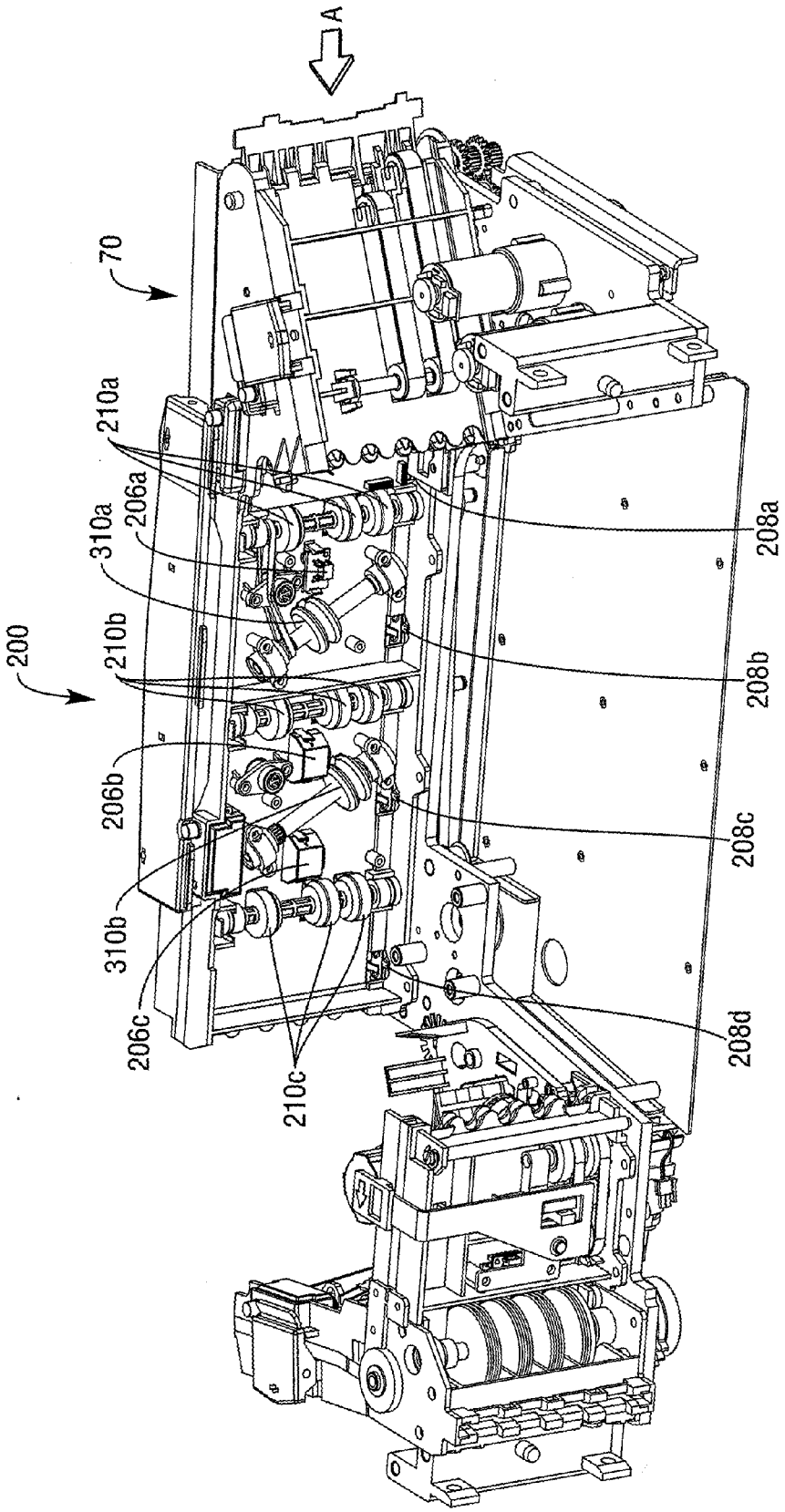

A
70
210a
206a
310a
208a
200
210b
208b
206b
208c
310b
206c
210c
208d

FIG. 6