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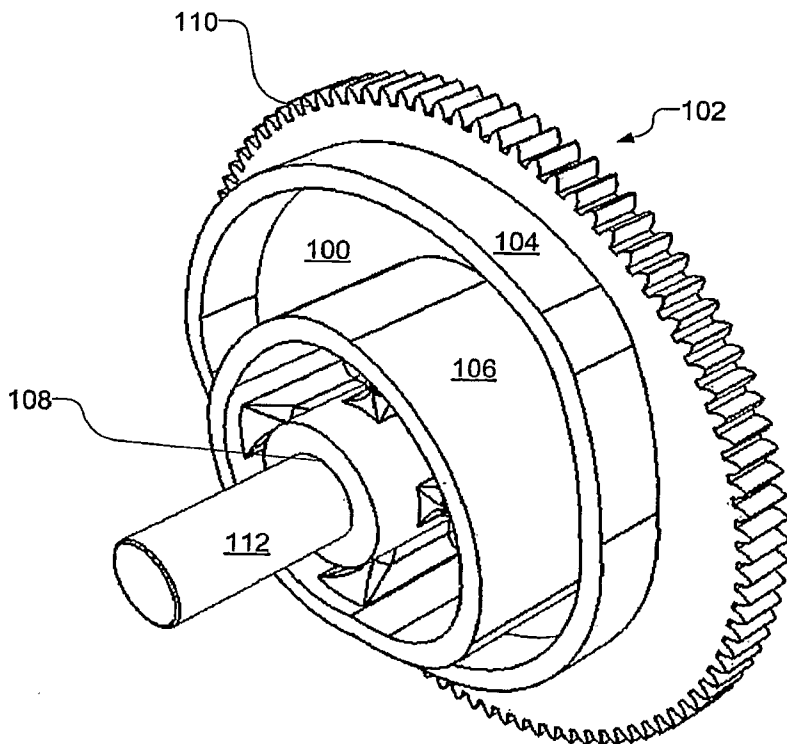
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(54) Title: ROTARY CAM FOR POSITIONING CONTROL IN A PRINTER



(57) Abstract: A rotary cam in a multi-media printer which is utilized for positioning control of a print head and/or eraser bar within the printer whereby the rotary cam raises and lowers the print head, eraser bar, or combination of such to accommodate varying thicknesses of a rewritable card within the printer, and to come into contact or prevent contact with a rewritable card to extend the life of a print head, eraser bar, or combination of such. The rotary cam may be coupled to a control motor which may be utilized to drive the rotary cam into one or a plurality of predefined card positions, each predefined card position being utilized to correctly adjust and position the print head, eraser bar, or combination of such.

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ROTARY CAM FOR POSITIONING CONTROL IN A PRINTER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/815,662 filed June 22, 2006, the contents of which are hereby incorporated by reference as if fully stated herein.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] This invention relates to printers that print financial transaction records such as gaming vouchers, promotional coupons, and gift cards, more specifically to a rotary cam in such a printer which is utilized for position control of a print head and/or eraser bar within the printer whereby the rotary cam raises and lowers the print head, eraser bar, or combination of such to accommodate varying thicknesses of a rewritable card within the printer, and to come into contact or prevent contact with a rewritable card.

Background

[0003] There currently exists a variety of printers which accept different types of rewritable media for reading, printing, encoding, and/or erasing. A problem with some of these printers is if an incorrect type of media is inserted into the printer, damage to the print head and/or eraser bar may occur. Another problem with some of these printers is that they are restricted to accept only a certain thickness of a rewritable card.

[0004] This invention offers a solution to these problems by providing a rotary cam which is used to adjust and position the print head and/or eraser bar to prevent such from contact with a rewritable card and to accommodate varying thicknesses of a rewritable card within the printer.

[0005] Two benefits of this invention relate to a magnetic head where the use of a rotary cam improves functional life of a magnetic head and reduces wear on the magnetic head by reducing the number of cycles that a rewritable card contacts the head.

DEFINITIONS

[0006] For the purposes of this document the following definitions apply:

[0007] “Rewritable Card” – media for reading and/or writing such as media with a magnetic stripe, media with a layer of writable and erasable thermally sensitive film, media containing Radio Frequency active, passive, or both elements, a smart card, thermal reversible media, RF fiber media, or write once media.

[0008] “Multi-media Printer” – a device used to print and/or encode a rewritable card and erase a rewritable card.

[0009] “Host System” – any collection of components that work together to perform a task. One example is a gaming system such as a slot machine in a casino. Other examples include a computer network, a server or multiple servers, a computer connected to a network, a stand alone computer, a handheld device, or a wireless device used for application and data storage, data processing, and file transfers.

[0010] “Printer Controller” – a device internal or external to a printer which controls print jobs and receives and/or transmits data, among other functions.

FEATURES OF THE INVENTION

[0011] A rotary cam in a multi-media printer which is utilized for positioning control of a print head and/or eraser bar within the printer whereby the rotary cam raises and lowers the print head, eraser bar, or combination of such to accommodate varying thicknesses of a rewritable card within the printer, and to come into contact or prevent contact with a rewritable card thereby extending the life of a print head, eraser bar, or combination of such is provided. The rotary cam may be coupled to a control motor which may be utilized to drive the rotary cam into one or a plurality of predefined card positions, each predefined card position being utilized to correctly adjust and position the print head, eraser bar, or combination of such.

[0012] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to a print head and eraser bar, the rotary cam may adjust and position the print head and/or eraser bar.

[0013] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to a print head and eraser bar, the rotary cam may simultaneously adjust and position the print head and eraser bar.

[0014] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to a print head whereby the rotary cam may adjust and position the print head to

accommodate varying thicknesses of rewritable cards, depending on the thickness of the rewritable card.

[0015] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to a print head where the rotary cam may rotate against the print head assembly by direct contact, linkage, or spring-load device, among others.

[0016] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to a magnetic head to adjust and position the magnetic head to come into contact with a rewritable card when a magnetic read or write function is required.

[0017] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to a magnetic head to adjust and position the magnetic head out of contact with a rewritable card when a magnetic read or write function is not required thereby improving the functional life of the magnetic head since the number of cycles that a rewritable card contacts the head is reduced.

[0018] In another aspect of the invention, a rotary cam may be coupled to a thermal print head whereby the rotary cam may adjust and position the thermal print head to come into contact with a rewritable card.

[0019] In another aspect of the invention, a rotary cam may be coupled to a thermal print head whereby the rotary cam may adjust and position the thermal print head out of contact with a rewritable card.

[0020] In another aspect of the invention, a rotary cam may be coupled to a thermal print head whereby the rotary cam may adjust and position the thermal print head to accommodate varying thicknesses of a rewritable card, depending on the thickness of the rewritable card.

[0021] In another aspect of the invention, a rotary cam may be coupled to a RFID print head whereby the rotary cam may adjust and position the RFID print head to come into contact with a rewritable card.

[0022] In another aspect of the invention, a rotary cam may be coupled to a RFID print head whereby the rotary cam may adjust and position the RFID print head out of contact with a rewritable card.

[0023] In another aspect of the invention, a rotary cam may be coupled to a RFID print head whereby the rotary cam may adjust and position the RFID print head to accommodate varying thicknesses of a rewritable card, depending on the thickness of the rewritable card.

[0024] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to an eraser bar to adjust and position the eraser bar to come into contact with a rewritable card when an erase function is required.

[0025] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to an eraser bar to adjust and position the eraser bar out of contact with a rewritable card when an erase function is not required.

[0026] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to an eraser bar whereby the rotary cam may adjust and position an eraser bar to accommodate varying thicknesses of rewritable cards, depending on the thickness of the rewritable card.

[0027] In another aspect of the invention, a plurality of rotary cams for a multi-media printer whereby a rotary cam may be coupled to a print head and a rotary cam may be coupled to an eraser bar.

[0028] In another aspect of the invention, a plurality of rotary cams for a multi-media printer, each rotary cam may be coupled to an eraser bar and to each print head in the printer when the printer includes a plurality of print heads.

[0029] In another aspect of the invention, a rotary cam for a multi-media printer may be coupled to a control motor by way of one or a plurality of gears.

[0030] In another aspect of the invention, the control motor may include a motor or solenoid, among others.

[0031] In another aspect of the invention, a rotary cam for a multi-media printer may be removably and mechanically coupled to a supporting shaft, one or a plurality of print heads, and/or an eraser bar.

[0032] In another aspect of the invention, one or a plurality of rotary cams for a multi-media printer may be coupled to one or a plurality of predefined card positions.

[0033] In another aspect of the invention, a rotary cam for a multi-media printer wherein the rotary cam may be driven to one or a plurality of defined positions within the printer by a printer controller.

[0034] In another aspect of the invention, a rotary cam for a multi-media printer wherein the rotary cam may be driven to one or a plurality of defined positions within the printer by a host system.

[0035] In another aspect of the invention, a multi-media printer may include a print module, one or a plurality of rotary cams, one or a plurality of print heads, an eraser bar, one or a plurality of control motors, one or a plurality of gears, a printer controller, a scanning mechanism, memory, procedures, and program instructions, among others.

[0036] In another aspect of the invention, a rotary cam may be coupled to a magnetic head wherein the magnetic head is a magnetic read head or a magnetic read/write head and the magnetic head may encode, read and/or write a magnetic stripe of a rewritable card wherein the magnetic stripe allows information to be written and read electronically, the information used either alone or in combination with other information, such as that from an RFID chip or tag, or thermally sensitive film, among others.

[0037] In another aspect of the invention, a rotary cam may be coupled to a thermal print head, the thermal print head may print the thermally sensitive film of a rewritable card wherein the thermally sensitive film allows information to be written and read electronically and/or visually read, the information used either alone or in combination with other information, such as that from a magnetic stripe or RFID chip or tag, among others.

[0038] In another aspect of the invention, a rotary cam may be coupled to a RFID print head, the RFID print head may encode, read and/or write an RFID chip, tag, or other radio frequency technology of a rewritable card wherein the RFID allows information to be written and read electronically, the information used either alone or in combination with other information, such as that from a magnetic stripe of a rewritable card or thermally sensitive film, among others.

[0039] In another aspect of the invention, procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any may include the ways and means to determine card positions within the multi-media printer.

[0040] In another aspect of the invention, procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any may include the ways and means to actuate a rotary cam into one or a plurality of predefined card positions to adjust and position one or a plurality of print heads to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[0041] In another aspect of the invention, procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any may include the ways and means to actuate a rotary cam into one or a plurality of predefined card positions to

adjust and position an eraser bar to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[0042] In another aspect of the invention, procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any may include the ways and means to actuate a rotary cam into one or a plurality of predefined card positions to simultaneously adjust and position one or a plurality of print heads and an eraser bar to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[0043] In another aspect of the invention, procedures, memory, and programming instructions may include the ways and means as a timing mechanism to actuate a rotary cam to adjust and position one or a plurality of print heads to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[0044] In another aspect of the invention, procedures, memory, and programming instructions may include the ways and means as a timing mechanism to actuate a rotary cam to adjust and position an eraser bar to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[0045] In another aspect of the invention, procedures, memory, and programming instructions may include the ways and means as a timing mechanism to actuate a rotary cam to simultaneously adjust and position one or a plurality of print heads and an eraser bar to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

BRIEF DESCRIPTION OF THE DRAWINGS

[0046] These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description and accompanying drawings where:

[0047] FIG. 1 is an isometric view of a rotary cam and a shaft in accordance with an exemplary embodiment of the present invention;

[0048] FIG. 2 is a top and side view of a rotary cam and other components in a multi-media printer in accordance with an exemplary embodiment of the present invention;

[0049] FIG. 3 is a block diagram of a multi-media printer in accordance with an exemplary embodiment of the present invention; and

[0050] FIG. 4 is a process diagram describing the adjustment to print head and eraser bar process in accordance with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION

[0051] FIG. 1 is an isometric view of a rotary cam and a shaft in accordance with an exemplary embodiment of the present invention. A side 100 of a rotary cam 102 includes a plurality of cam profiles, such as a cam profiles 104 and 106. One cam profile may be used for positioning control of a print head (not shown) while the other cam profile may be used for positioning control of an eraser bar (not shown) as later described in detail in FIG. 2.

[0052] The rotary cam further includes a center portion having aperture 108 extending through the rotary cam and an outer edge having teeth defining a rotary gear 110. The aperture provides the opening by which a shaft 112 may be rotably connected to the rotary cam while the teeth operably engage the rotary cam to one or a plurality of gears (not shown) for positioning control.

[0053] FIG. 2 is a top and side view of a rotary cam and other components in a multi-media printer module in accordance with an exemplary embodiment of the present invention. Any component may be optional. The multi-media printer module 200 includes a rotary cam 202, a shaft 204, a plurality of gears such as gears 206 and 208, a control motor 210, a plurality of rollers such as rollers 212, 214 and 216, an eraser bar bracket 218, an eraser bar 220, a print head 222, a print head bracket 224. The multi-printer module reads and/or writes a rewritable card 226.

[0054] The rotary cam adjusts and positions the print head and/or eraser bar, either to come into contact or prevent contact with a rewritable card. Additionally, the rotary cam may adjust and position the print head and/or eraser bar to accommodate varying thicknesses of a rewritable card.

[0055] The shaft allows the rotary cam to rotate.

[0056] Each gear forms a gear drive chain, which couples the rotary cam to the control motor.

[0057] The control motor actuates the rotary cam for positioning control of a print head and eraser bar.

[0058] The rollers guides the rewritable card as the rewritable card passes through the multi-media printer module of the multi-media printer.

[0059] The eraser bar bracket connects the eraser bar by a roller or bearing to the rotary cam for positioning control of the eraser bar.

[0060] The eraser bar is used to erase a rewritable card or contents therein.

[0061] The print head is used by the multi-media print module to print, read, write, and/or encode the rewritable card depending on the type of media of the rewritable card. For example, when a print head is a magnetic head and a rewritable card that enters the printer is determined to have thermally sensitive film and not a magnetic stripe, the rotary cam may adjust and position the print head to prevent contact with the rewritable card.

[0062] The print head bracket connects the rotary cam to the print head by a roller or bearing for positioning control of the print head.

[0063] The rewritable card includes data generated by the multi-media printer and printed, read, written, and/or encoded. Additionally, data on a rewritable card may be erased by the multi-media printer.

[0064] In operation, as a rewritable card enters the multi-media printer through the front of the print module, preferably through a slot (not shown), rollers guide the rewritable card through the print module. When the rewritable card is within proximity to the print head, the rotary cam actuates to adjust and position the print head and then the eraser bar. For example, to print, read, write, and/or encode a rewritable card, the rotary cam may adjust and position the print head to contact the rewritable card. To erase a rewritable card, the rotary cam may adjust and position the eraser bar to contact the rewritable card. To accommodate the thickness of the rewritable card, the rotary cam may adjust and position a print head and/or eraser bar. To prevent contact with a rewritable card, the rotary cam may retract the print head or eraser bar.

[0065] Similarly, as a rewritable card exits a magazine card drive (as later disclosed in FIG. 3) and enters the print module, the rollers guide the rewritable card through the print module. When the rewritable card is within proximity to the eraser bar, the rotary cam actuates to adjust and position the eraser bar and then the print head.

[0066] In one multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may simultaneously adjust and position the print head and eraser bar.

[0067] The movement of a rotary cam may be accomplished using procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any.

[0068] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a multi-media printer includes a plurality of print heads; each print head may be coupled to a rotary cam. For example, one print head is a thermal print head and another print head is a magnetic head. When a rewritable card enters the printer and the rewritable card is determined to have thermally sensitive film and not a magnetic stripe, the rotary cam for the thermal print head may adjust to allow the thermal print head to contact the rewritable card while the rotary cam for the magnetic head may raise the magnetic head up to prevent contact with the rewritable card to reduce wear on the magnetic head and reduce the number of cycles that the rewritable card may contact the magnetic head.

[0069] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a plurality of print heads.

[0070] Additionally, the mechanism for positioning control of a print head or eraser bar may take other forms. For example, the mechanism may incorporate a solenoid and spring or the like to extend and retract a print head or eraser bar or combination of such.

[0071] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to a print head and eraser bar, the rotary cam may adjust and position the print head and/or eraser bar.

[0072] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to a print head and eraser bar, the rotary cam may simultaneously adjust and position the print head and eraser bar.

[0073] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to a print head whereby the rotary cam may adjust and position the print head to accommodate varying thicknesses of rewritable cards, depending on the thickness of the rewritable card.

[0074] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to a print head where the rotary cam may rotate against the print head assembly by direct contact, linkage, or spring-load device, among others.

[0075] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to a magnetic head to adjust and position the magnetic head to come into contact with a rewritable card when a magnetic read or write function is required.

[0076] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to a magnetic head to adjust and position the magnetic head out of contact with a rewritable card when a magnetic read or write function is not required thereby improving the functional life of the magnetic head since the number of cycles that a rewritable card contacts the head is reduced.

[0077] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a thermal print head whereby the rotary cam may adjust and position the thermal print head to come into contact with a rewritable card.

[0078] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a thermal print head whereby the rotary cam may adjust and position the thermal print head out of contact with a rewritable card.

[0079] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a thermal print head whereby the rotary cam may adjust and position the thermal print head to accommodate varying thicknesses of a rewritable card, depending on the thickness of the rewritable card.

[0080] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a RFID print head whereby the rotary cam may adjust and position the RFID print head to come into contact with a rewritable card.

[0081] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a RFID print head whereby the rotary cam may adjust and position the RFID print head out of contact with a rewritable card.

[0082] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a RFID print head whereby the rotary cam may adjust and position the RFID print head to accommodate varying thicknesses of a rewritable card, depending on the thickness of the rewritable card.

[0083] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to an eraser bar to adjust

and position the eraser bar to come into contact with a rewritable card when an erase function is required.

[0084] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to an eraser bar to adjust and position the eraser bar out of contact with a rewritable card when an erase function is not required.

[0085] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to an eraser bar whereby the rotary cam may adjust and position an eraser bar to accommodate varying thicknesses of rewritable cards, depending on the thickness of the rewritable card.

[0086] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a plurality of rotary cams for a multi-media printer whereby a rotary cam may be coupled to a print head and a rotary cam may be coupled to an eraser bar.

[0087] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a plurality of rotary cams for a multi-media printer, each rotary cam may be coupled to an eraser bar and to each print head in the printer when the printer includes a plurality of print heads.

[0088] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be coupled to a control motor by way of one or a plurality of gears.

[0089] In a multi-media printer module in accordance with an exemplary embodiment of the invention, the control motor may include a motor or solenoid, among others.

[0090] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer may be removably and mechanically coupled to a shaft, one or a plurality of print heads, and/or an eraser bar.

[0091] In a multi-media printer module in accordance with an exemplary embodiment of the invention, one or a plurality of rotary cams for a multi-media printer may be coupled to one or a plurality of predefined card positions.

[0092] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer wherein the rotary cam may be driven to one or a plurality of defined positions within the printer by a printer controller.

[0093] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam for a multi-media printer wherein the rotary cam may be driven to one or a plurality of defined positions within the printer by a host system.

[0094] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a multi-media printer may include a print module, one or a plurality of rotary cams, one or a plurality of print heads, an eraser bar, one or a plurality of control motors, one or a plurality of gears, a printer controller, a scanning mechanism, memory, procedures, and program instructions, among others.

[0095] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a magnetic head wherein the magnetic head is a magnetic read head or a magnetic read/write head and the magnetic head may encode, read and/or write a magnetic stripe of a rewritable card wherein the magnetic stripe allows information to be written and read electronically, the information used either alone or in combination with other information, such as that from an RFID chip or tag, or thermally sensitive film, among others.

[0096] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a thermal print head, the thermal print head may print the thermally sensitive film of a rewritable card wherein the thermally sensitive film allows information to be written and read electronically and/or visually read, the information used either alone or in combination with other information, such as that from a magnetic stripe or RFID chip or tag, among others.

[0097] In a multi-media printer module in accordance with an exemplary embodiment of the invention, a rotary cam may be coupled to a RFID print head, the RFID print head may encode, read and/or write an RFID chip, tag, or other radio frequency technology of a rewritable card wherein the RFID allows information to be written and read electronically, the information used either alone or in combination with other information, such as that from a magnetic stripe of a rewritable card or thermally sensitive film, among others.

[0098] In a multi-media printer module in accordance with an exemplary embodiment of the invention, procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any may include the ways and means to determine card positions within the multi-media printer.

[0099] In a multi-media printer module in accordance with an exemplary embodiment of the invention, procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any may include the ways and means to actuate a rotary cam into one or a plurality of predefined card positions to adjust and position one or a plurality of print heads to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[00100] In a multi-media printer module in accordance with an exemplary embodiment of the invention, procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any may include the ways and means to actuate a rotary cam into one or a plurality of predefined card positions to adjust and position an eraser bar to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[00101] In a multi-media printer module in accordance with an exemplary embodiment of the invention, procedures, programming instructions, memory, a control motor, a combination of such, or a combination of any may include the ways and means to actuate a rotary cam into one or a plurality of predefined card positions to simultaneously adjust and position one or a plurality of print heads and an eraser bar to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[00102] In a multi-media printer module in accordance with an exemplary embodiment of the invention, procedures, memory, and programming instructions may include the ways and means as a timing mechanism to actuate a rotary cam to adjust and position one or a plurality of print heads to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[00103] In a multi-media printer module in accordance with an exemplary embodiment of the invention, procedures, memory, and programming instructions may include the ways and means as a timing mechanism to actuate a rotary cam to adjust and position an eraser bar to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[00104] In a multi-media printer module in accordance with an exemplary embodiment of the invention, procedures, memory, and programming instructions may include the ways and means as a timing mechanism to actuate a rotary cam to simultaneously adjust and position

one or a plurality of print heads and an eraser bar to come into contact or prevent contact with a rewritable card, and/or accommodate varying thicknesses of a rewritable card.

[00105] FIG. 3 is a block diagram of a multi-media printer in accordance with an exemplary embodiment of the present invention. A multi-media printer 400 may include a printer controller 401, a multi-media printer module 402, and one or more card magazines, such as card magazines 403 and 404. Any of these components may be optional.

[00106] The multi-media printer module 402 may include a print card drive 405 that moves cards through the multi-media printer module 402. The print card drive 405 is reversible such that a card may be fed through the multi-media printer module 402 in more than one direction by the print card drive 405. The print card drive may include a card motion sensor 406 for sensing card movement within the print card drive. A more detailed discussion of printer media motion detection within a printer is presented in U.S. Patent Application No. 10/640,495 filed August 12, 2003, the contents of which are hereby incorporated by reference as if stated herein in full. The print card drive may further include an embossing detector 408 that may be used to sense when an embossed item, such as a conventional credit card, is inserted into the multi-media printer module. The embossing detector may be a mechanical device, such as a limit switch, that contacts an inserted card and detects any embossing. If an embossed card is inserted into the multi-media printer, the multi-media printer may not attempt to write to the card, only read the card.

[00107] The multi-media printer module may further include a security feature reading device 410 for reading any security features included in a card. The multi-media printer module may further include a print head 412 for writing indicia to a rewritable card and an erase head 414 for erasing the indicia from the rewritable card. The multi-media printer module may further include an optical scanning device 416 for scanning the indicia printed onto a rewritable card. The multi-media printer module may further include a magnetic strip read/write head 418 used to read and write from and to a rewritable card's magnetic strip. The multi-media printer module may be removably and electronically coupled to the printer controller and removably and mechanically coupled to the card magazine.

[00108] In operation, the multi-media printer module receives printer control signals from the printer controller. In response to the printer control signals, the multi-media printer module scans rewritable cards for the presence and value of any security feature in the rewritable card. As the multi-media printer module scans the rewritable card, the security

feature reading device generates a security signature signal that is transmitted to the printer controller. In addition, the multi-media printer module thermally prints on the rewritable cards, and thermally erases the rewritable cards, under the control of the printer controller. The multi-media printer module may also receive a rewritable card from a player and transmit a rewritable card detection signal to the printer controller.

[00109] The multi-media printer module may also include a static memory read/write connector 420 for coupling to a "smart" card having a readable/writable static memory. The printer controller transmits static memory write signals and receives static memory read signals to and from the static memory read/write head.

[00110] The one or more independently controlled card magazines 403 and 404 store rewritable cards and provide the rewritable cards to the multi-media printer module on command from the printer controller. Each card magazine may include one or more magazine card drives 422 for moving cards into and out of the magazine. Each card magazine may also include a card storage area 424 for storage of rewritable cards. In operation, the card magazine receives card magazine control signals from the printer controller. In response to the control signals, the card magazine feeds cards to the multi-media printer module from the card storage area using the magazine card drive. In response to the card magazine control signals, the card magazine may also receive rewritable cards from the multi-media printer module and store the rewritable cards in the card storage area.

[00111] The card magazine may also include one or more card sensors 426 used to detect the number of cards stored in the card storage area. The card sensors sense the quantity of cards stored in the card storage area and transmit card count signals to the printer controller for further processing. The card magazine may also include a read/write static memory 428 for semi-permanent storage of card information about cards stored in the card magazine.

[00112] The printer controller may include a processor 430 coupled to a main memory by a system bus 432. The printer controller may also include a storage memory 434 coupled to the processor by the bus. The storage memory stores programming instructions 436, executable by the processor to implement the features of a multi-media printer. The storage memory may also include printer and card information 438 stored and used by the processor. The printer and card information may include information received by the printer controller about the status of the multi-media printer module and card magazine and also about the status and identity of any cards stored in the card magazines or being operated on by the

multi-media printer module. The types of status information may include an image of a last printed rewritable card as scanned by the optical scanning device and the current status, such as millimeters of advancement, of a card currently in the multi-media printer module.

[00113] The printer controller may also include an Input/Output (I/O) device 440 coupled to the processor by the system bus. The I/O device may be used by the printer controller to transmit control signals to the multi-media printer module and the card magazine. The I/O device may also be used by the printer controller to receive security feature and status signals from the multi-media printer module and card magazine.

[00114] The multi-media printer module further includes a linear cam control motor 441 for operation of a linear cam as previously described. The printer controller may also include procedures 442 which are used, for example, to determine card positions and to actuate one or a plurality of linear cams as to adjust and position one or a plurality of print heads and an eraser bar to the thickness of a rewritable card.

[00115] One or more communications devices 444 may be coupled to the system bus for use by the printer controller to communicate, for instance, with a cashless gaming system host or a game controller. The printer controller may use the communication devices to receive commands, program instructions, and card information from the external devices 446. In addition, the printer controller may use the communication devices to transmit printer status information to the external devices. Other communication devices may also be used by the printer controller to couple in a secure fashion over a local area network 448 for administrative or other purposes.

[00116] Additional communication devices and channels may be provided for communication with other peripheral devices as needed. For example, one communication device may be provided with a local communications port, accessible from an exterior of a gaming machine hosting the multi-media printer that a technician may use to communicate with the printer controller during servicing using an external controller. The external controller may communicate with the printer controller using an infrared link, other short-range wireless communication link, or a hard link with an external connector in a secure manner.

[00117] The processor may be further coupled to an encryption/decryption module 450 that may be used to encrypt and decrypt messages encoded using an encryption standard. This enables the printer controller to engage in secure transactions with external devices. The

processor may access the display device either as a component through the bus as shown or as an external device through a communications device using a high level communications protocol. In addition, the printer controller may also include program instructions to perform encryption/decryption services as well.

[00118] The processor may be further coupled to a display device 452 that may be used to display printer status information or card information. For example, the display may used to display an "as-scanned" version of the most recently printed and scanned card. The processor may access the display device either as a component through the I/O device or as an external device through a communications device.

[00119] In operation, the processor loads the programming instructions into the main memory 453 and executes the programming instructions to implement the features of a multi-media printer as described herein.

[00120] As illustrated, the printer controller is shown as being coupled to the multi-media printer module and card magazine. The printer controller may be mounted in a variety of ways and may be incorporated into various components of either the multi-media printer or, for instance, a host system (such as a game) coupled to the multi-media printer. For example, the printer controller may be attached to and supported by the multi-media printer module, the card magazine, or the host game as may be required to mechanically integrate the multi-media printer into the host game.

[00121] The foregoing description of the controller in the multi-media printer is provided by way of example and not of limitation, it being understood that controller could be implemented in a variety of ways without deviating from the spirit of the invention. For example, logic modules could be constructed from hardware such as hardwired circuits within the controller. Alternatively, logic modules could be implemented in the form of software, such as computer-executable instructions stored on a computer-readable medium, and the controller could be a programmable controller with a processor and memory. Finally, the controller could also be constructed from a combination of hardware and software components.

[00122] FIG. 4 is a process diagram describing the adjustment to print head and eraser bar process in accordance with an exemplary embodiment of the present invention.

[00123] As illustrated, the process (500) begins (501) with a rewritable card being detected (502) in the print module by the multi-media printer and components thereof after which a determination (504) is made if an adjustment in the position of a print head is needed.

[00124] If an adjustment is needed, the process continues with adjust and position (506) of the print head after which a determination (508) is made if an erase of the rewritable card is needed.

[00125] If an erase is needed, the process continues with adjust and position (510) of the eraser bar. This process loops back to detect card for the real-time monitoring of cards detected in the print module.

[00126] The determination for an adjustment for a print head and/or eraser bar may be made using procedures, programming instructions, memory, a control motor, or a combination of any.

[00127] In one embodiment, the process may determine that an adjustment is needed to the print head and eraser bar wherein the rotary cam may simultaneously adjust and position the print head and eraser bar.

[00128] In another embodiment, the rotary cam may adjust and position a print head and/or eraser bar to a predefined position. The predefined positions may be determined using procedures, programming instructions, memory, a control motor, or a combination of any.

[00129] In one variation, if an adjustment is not needed or the print head and/or eraser bar is adjusted and positioned, the process may not loop back to detect card, but may end.

[00130] Although this invention has been described in certain specific embodiments, many additional modifications and variations would be apparent to those skilled in the art. It is therefore to be understood that this invention may be practiced otherwise than as specifically described. Thus, the present embodiments of the invention should be considered in all respects as illustrative and not restrictive.

WHAT IS CLAIMED IS:

1. A rotary cam for a multi-media printer module, comprising:
 - a first side having a first cam profile for movably coupling to a print head and a second cam profile for movably coupling to an erase head;
 - an outer edge having teeth defining a rotary gear for coupling with a control motor via a rotary gear; and
 - an aperture for rotably coupling the rotary cam to a supporting shaft.

2. The rotary cam of Claim 1, wherein the rotary cam is positioned at determined card positions by the control motor.

3. The rotary cam of Claim 1 wherein the rotary cam adjusts and positions the print head to accommodate varying thicknesses of rewritable cards, to come into contact with a rewritable card, and/or prevent the print head from making contact with the rewritable card.

4. The rotary cam of Claim 1 wherein the rotary cam adjusts and positions the erase head to accommodate varying thicknesses of rewritable cards, to come into contact with a rewritable card, and/or prevent the erase head from making contact with the rewritable card.

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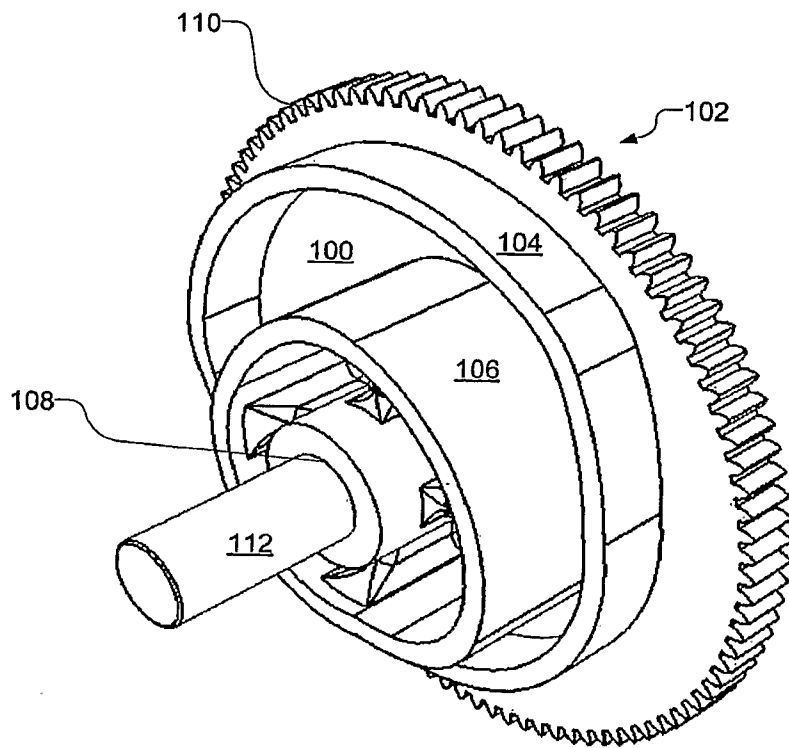


FIG. 1

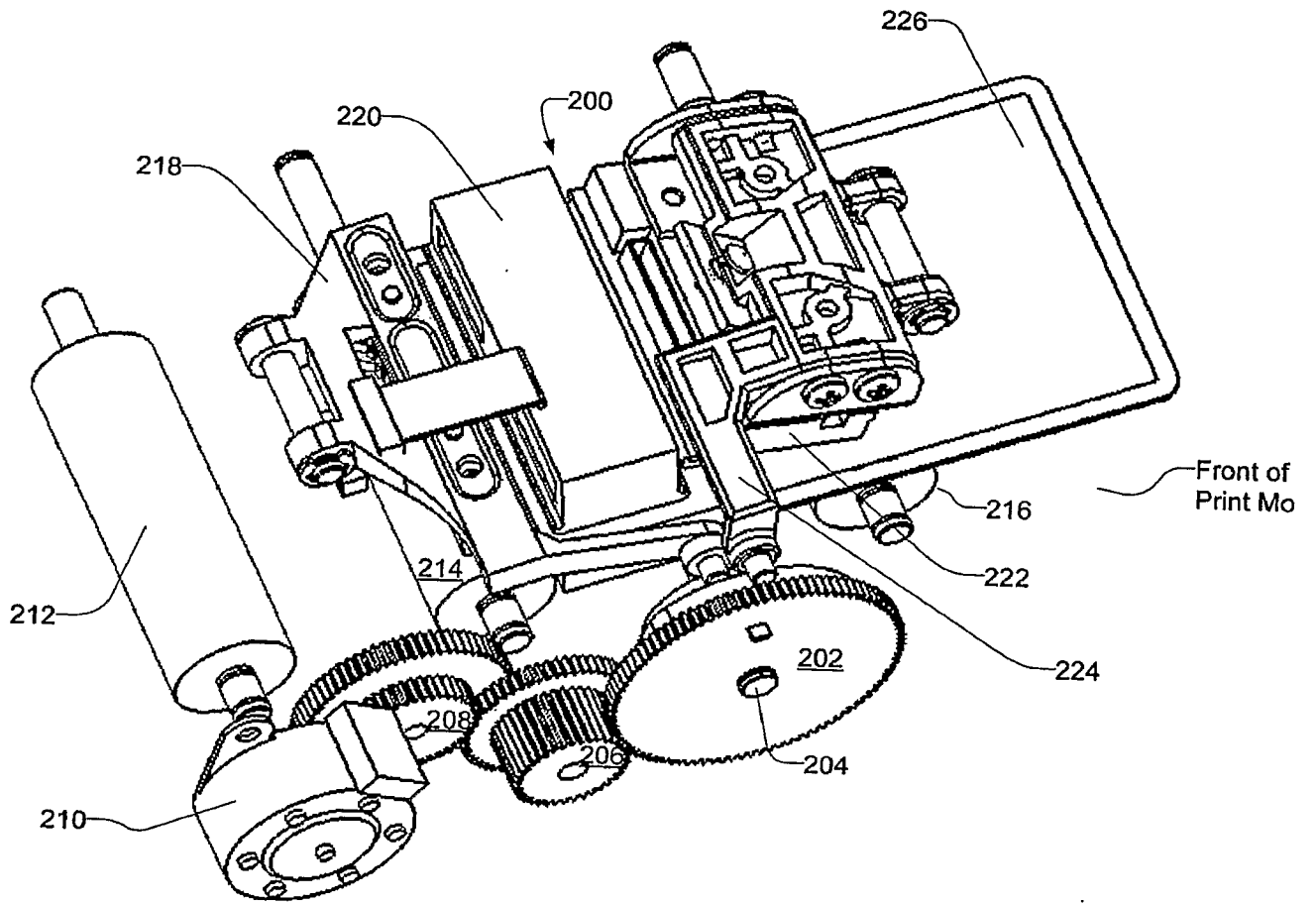


FIG. 2

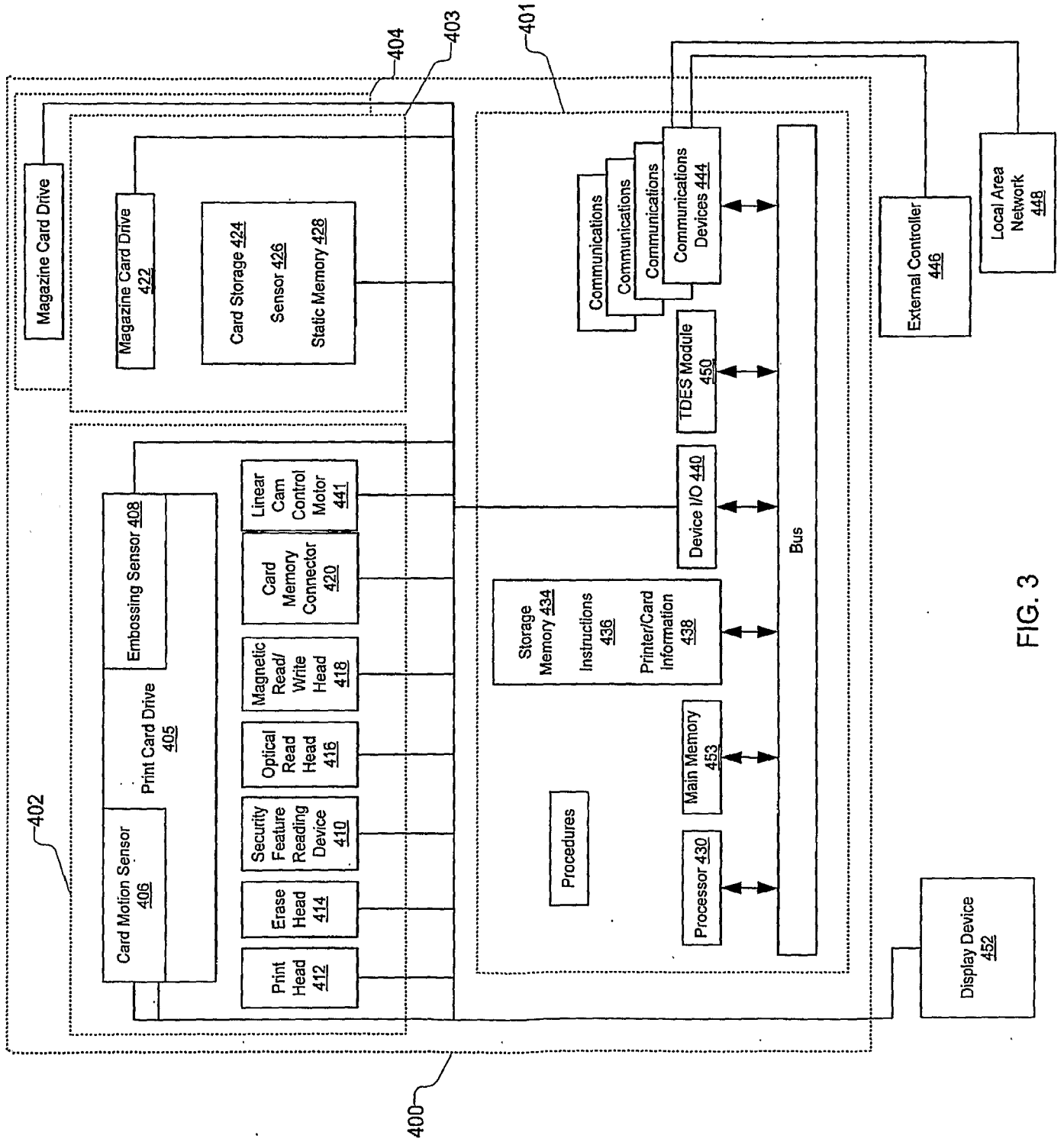


FIG. 3

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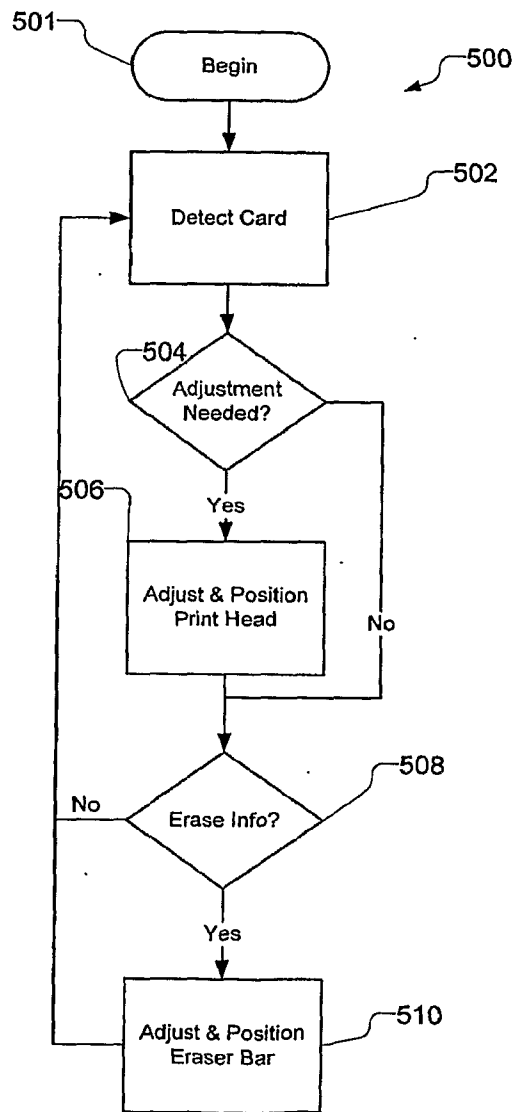


FIG. 4