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(54) **LONG MEDIUM FOR PRINTER**

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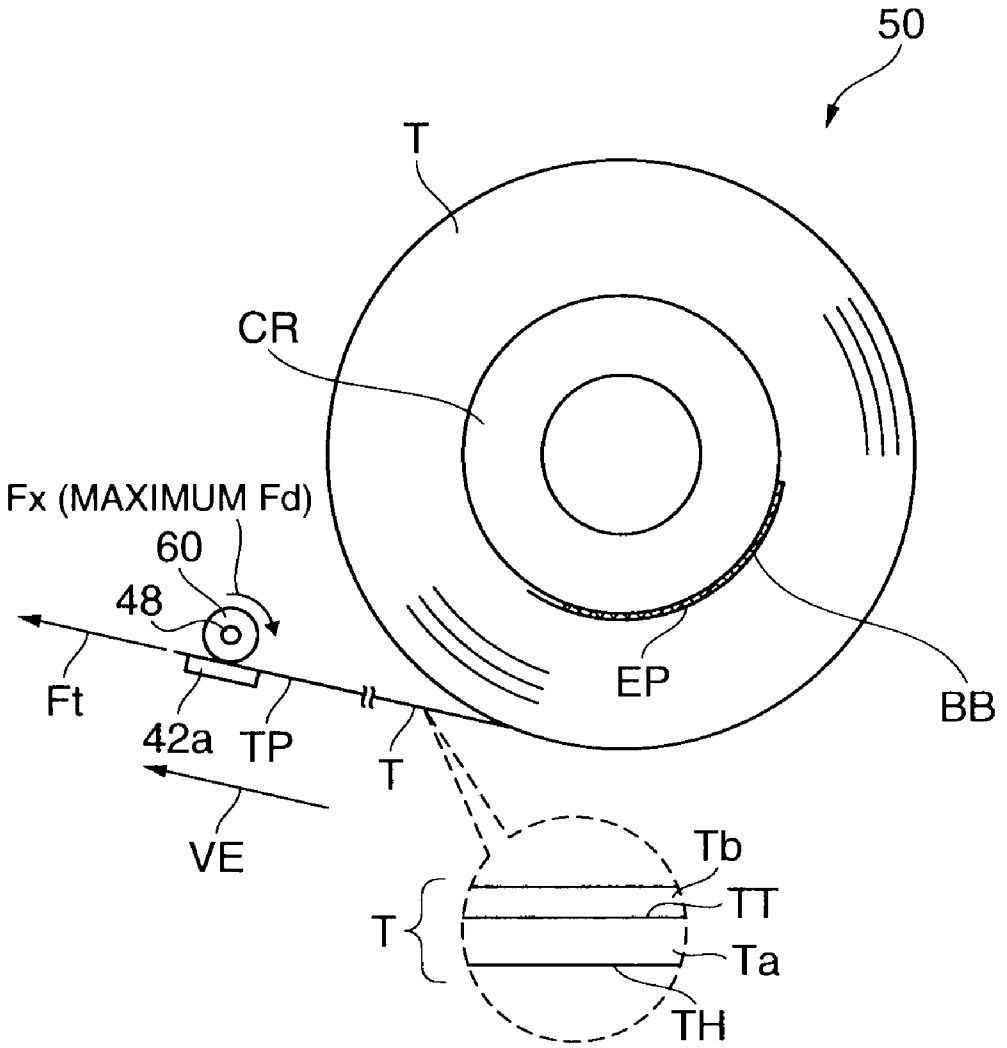
(57) **ABSTRACT**

A long medium for a printer includes: a main body wound around a core to which an end portion of the main body is affixed; and a core stop tape portion which joins the core and the end portion; wherein the bonding force of the core stop tape portion is larger than the drawing force for drawing the main body wound around the core from the core.



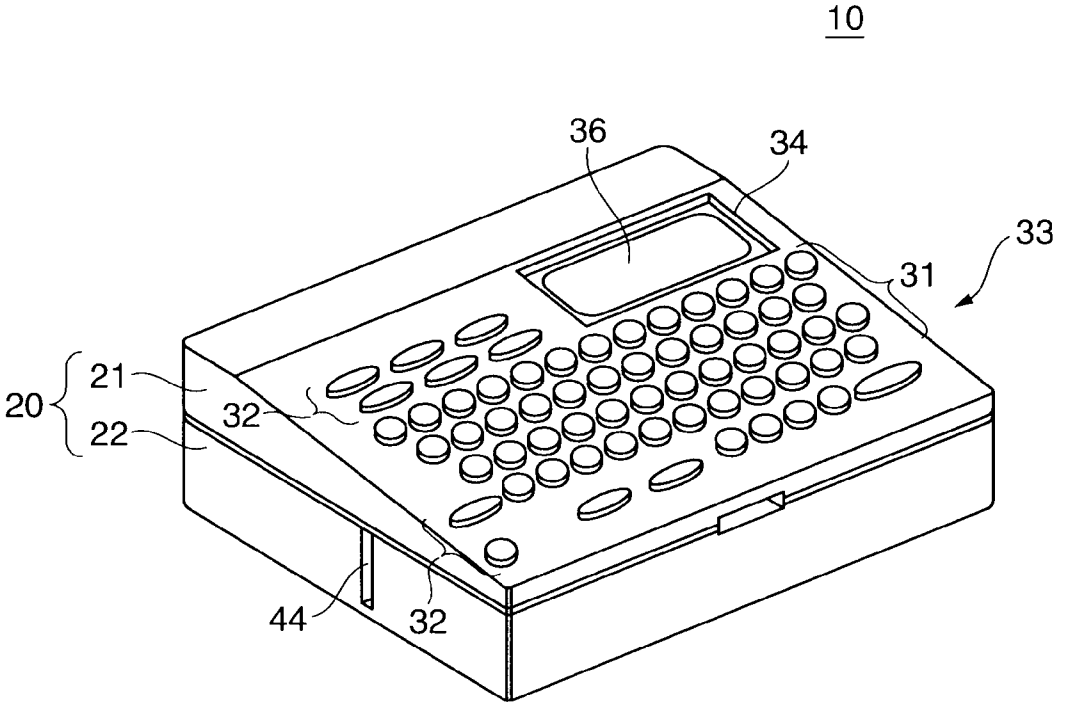


FIG. 1

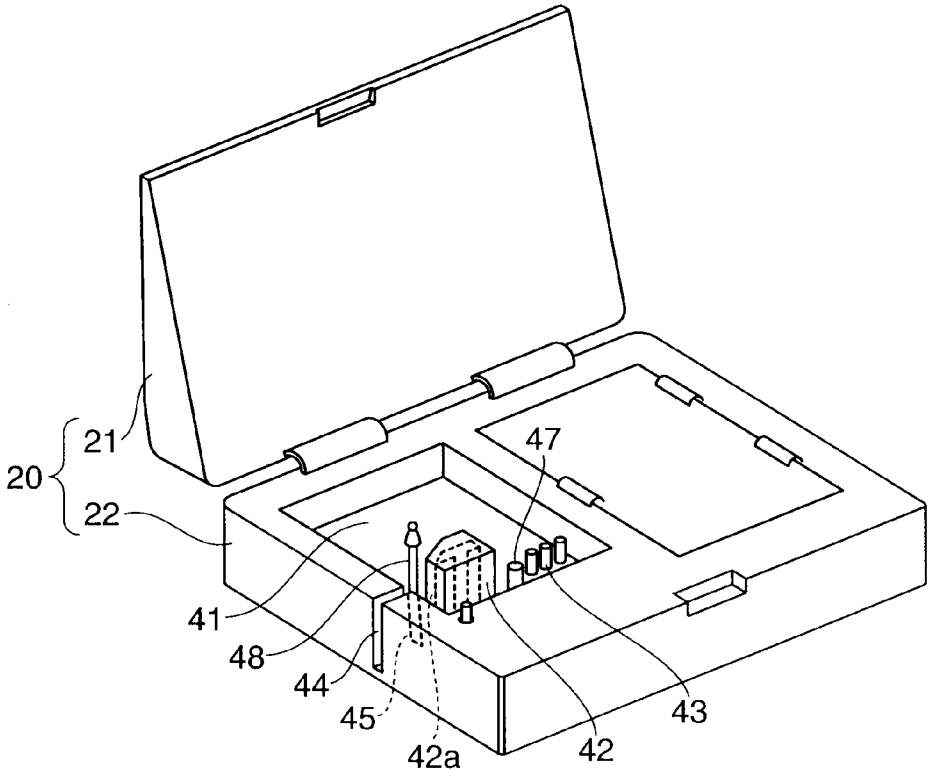


FIG. 2A

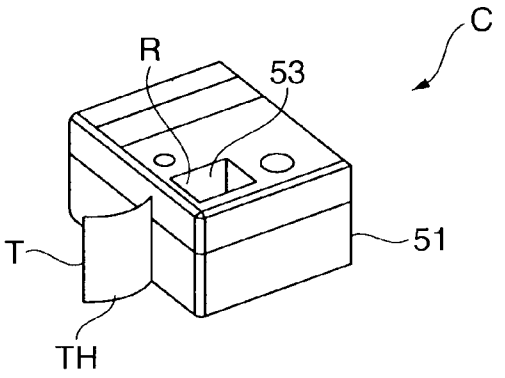


FIG. 2B

FIG. 3A

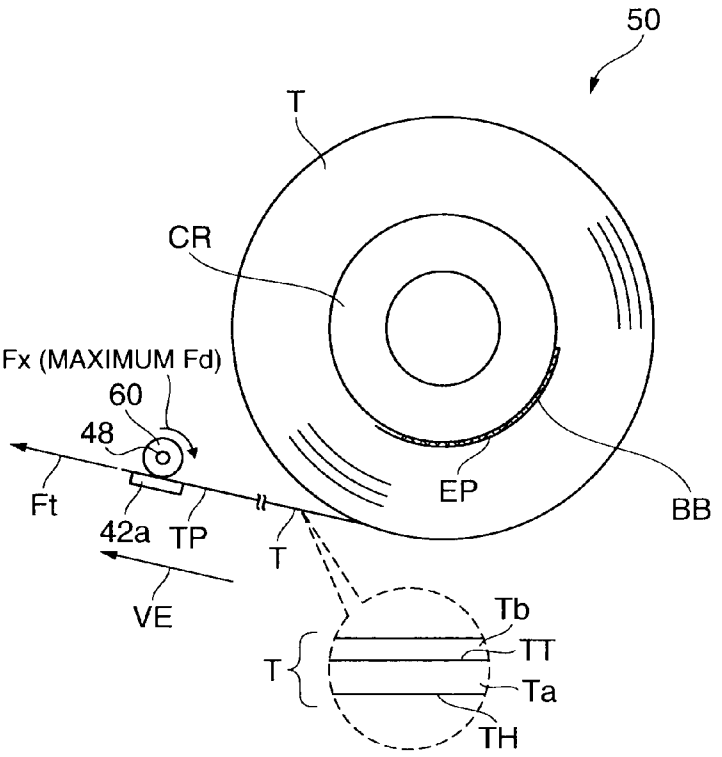


FIG. 3B

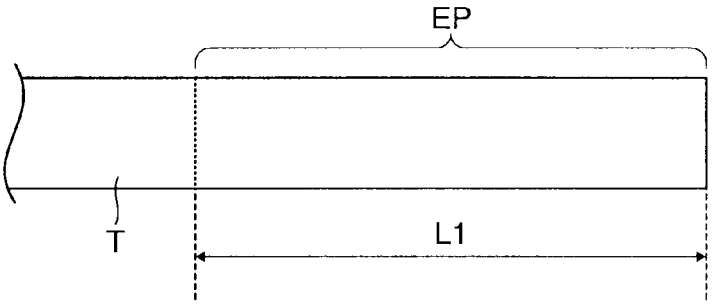
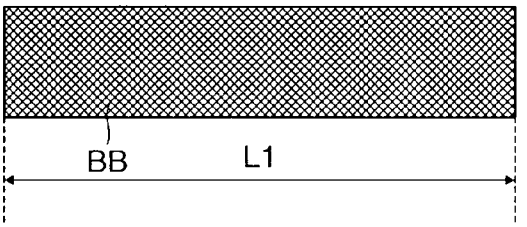


FIG. 3C



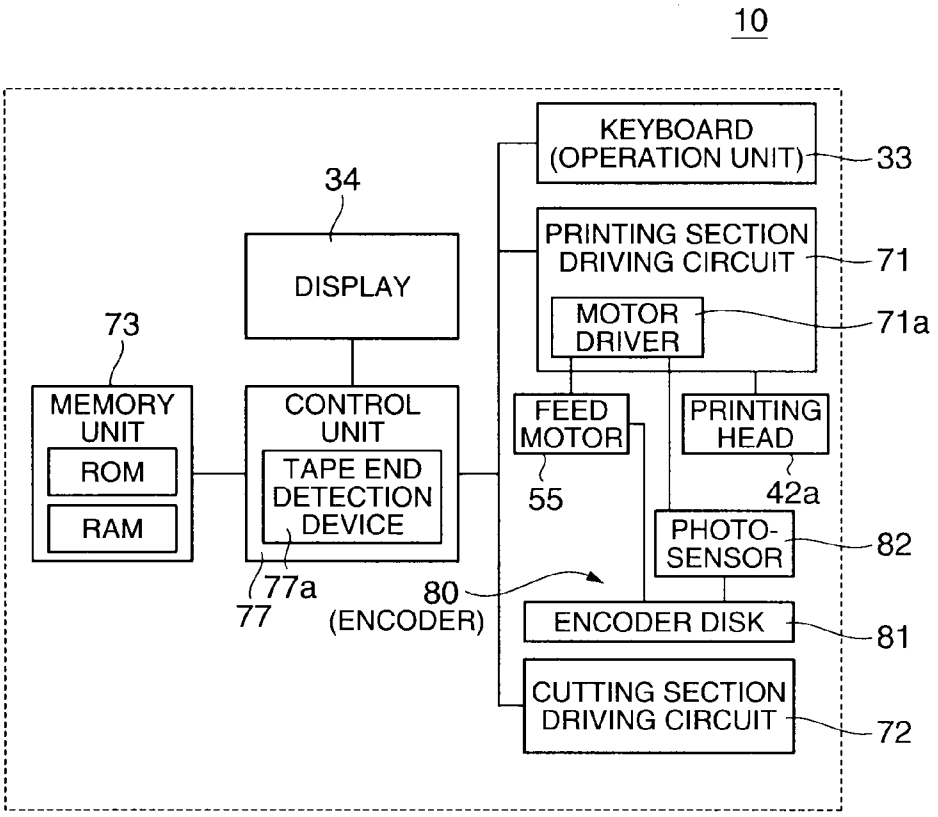

10
KEYBOARD (OPERATION UNIT)
33
34
DISPLAY
PRINTING SECTION DRIVING CIRCUIT
71
MOTOR DRIVER
71a
73
MEMORY UNIT
ROM
RAM
CONTROL UNIT
TAPE END DETECTION DEVICE
FEED MOTOR
55
PRINTING HEAD
42a
PHOTO-SENSOR
82
77a
77
80
(ENCODER)
ENCODER DISK
81
CUTTING SECTION DRIVING CIRCUIT
72

FIG. 4A

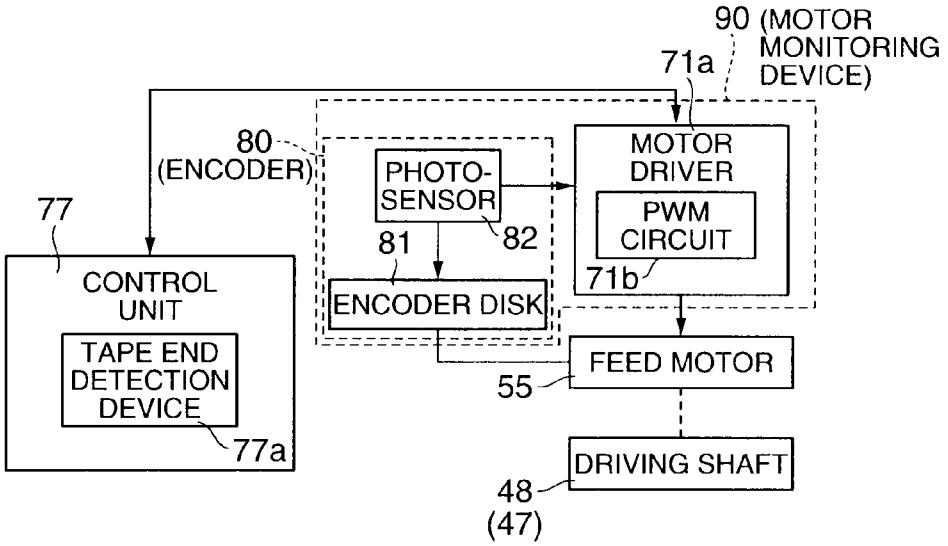

90 (MOTOR MONITORING DEVICE)
71a
80
(ENCODER)
PHOTO-SENSOR
82
MOTOR DRIVER
PWM CIRCUIT
71b
77
81
CONTROL UNIT
ENCODER DISK
TAPE END DETECTION DEVICE
77a
FEED MOTOR
55
DRIVING SHAFT
48
(47)

FIG. 4B

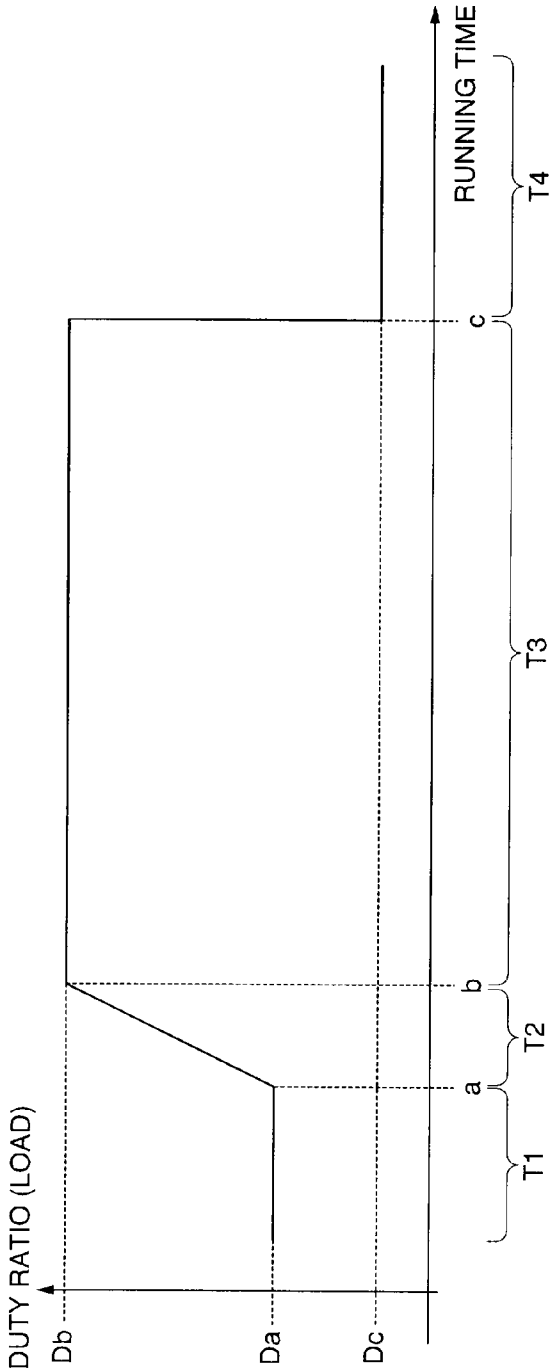


FIG. 5A

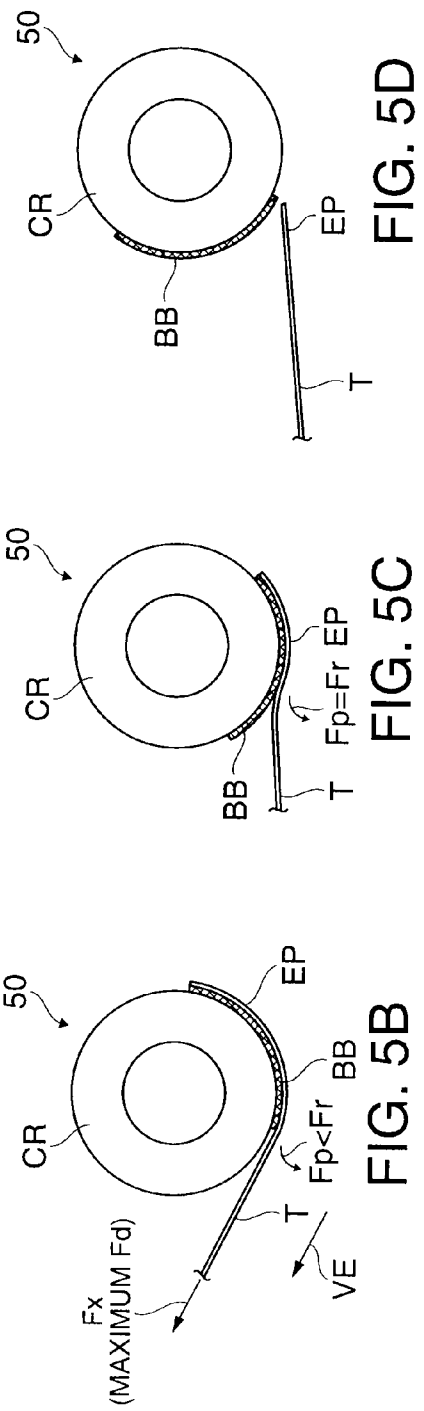


FIG. 5B

FIG. 5C

FIG. 5D

LONG MEDIUM FOR PRINTER

[0001] CROSS-REFERENCE TO RELATED APPLICATION(S)

[0002] The entire disclosure of Japanese Patent Application No. 2010-077503, filed on Mar. 30, 2010, is expressly incorporated by reference herein.

BACKGROUND

[0003] 1. Technical Field

[0004] The present invention relates to a long medium wound around a core to which an end portion of the long medium is affixed to be used as a medium for a printer.

[0005] 2. Related Art

[0006] Currently, as an example of a tape printer which uses a long medium such as an ink ribbon and a printing tape, a technology which detects an end or a near end of an ink ribbon for thermal transfer printing by sensing a transparent end portion of the ink ribbon using a photo-sensor is known (see JP-A-6-99651). In addition, a technology which provides a plurality of sensor marks on an ink ribbon or a printing tape for allowing a photo-sensor to detect an end portion is known as a technology similar to the above tape printer (see JP-A-9-300764).

[0007] However, for detecting the end of the long medium such as a ribbon and a tape by using the methods of the above tape printers, a component such as a sensor for detecting the end portion is required. Moreover, the necessity for adding a portion not for printing such as a light-transmissive film to the end portion of the long medium for allowing detection of the sensor as the method in JP-A-6-99651, and the necessity for providing the marks for the sensor as the method in JP-A-9-300764 complicate the structure of the long medium. In case of the technology which adds the marks for the sensor, such a long medium which has patterns on the entire area of the medium is difficult to be used, for example, for preventing malfunction in some cases.

SUMMARY

[0008] An advantage of some aspects of the invention is to provide a long medium for a printer as a medium used for printing while gradually delivering the leading end of the long medium wound around a core which realizes easy and accurate end detection without adding a sensor or the like for end detection to the printer.

[0009] A long medium for a printer according to a first aspect of the invention includes: a main body wound around a core to which an end portion of the main body is affixed; and a core stop tape portion which joins the core and the end portion. The bonding force of the core stop tape portion is larger than the drawing force for drawing the main body wound around the core from the core.

[0010] According to this long medium for the printer, the bonding force of the core stop tape portion for joining the core and the end portion is larger than the drawing force for drawing the main body wound around the core. In this case, a difference in the change of the load is produced between the delivery in the normal operation and the delivery of the end portion in the printer. Thus, the printer can relatively easily and securely detect the end of the long medium based on this difference. Moreover, since a component already equipped for monitoring the operation condition of a motor for feeding the long medium is used for detection of the end portion, the necessity for separately providing a component such as a sensor for detecting the end portion can be eliminated.

[0011] According to a specific aspect of the invention, the bonding force of the core stop tape portion is equal to or smaller than a maximum feeding force of a driving mechanism contained in the printer for feeding a leading end portion. In this case, since the end portion of the long medium is released from the core during delivery of the end portion, the end can be more securely detected by monitoring the increase and decrease of the load.

[0012] According to another aspect of the invention, the maximum feeding force is the maximum pulling force of a driving motor for feeding after subtraction of a loss produced by a transmission mechanism for transmitting the maximum pulling force to the leading end portion of the main body. In this case, the end can be more securely detected by providing the maximum feeding force considering the loss.

[0013] According to still another aspect of the invention, the core stop tape portion is an adhesive double coated tape which affixes one of the surfaces of the adhesive double coated tape to the core and affixes the other surface to the end portion to connect the core and the end portion. In this case, only the core side surface of the core stop tape portion can be left after release of the end portion from the core, for example, by controlling the core and the bonding force of the adhesive double coated tape as the core stop tape portion.

[0014] According to yet another aspect of the invention, the drawing force necessary for drawing the main body is the sum of a rotational moment around the core and a running load. In this case, the bonding force of the core stop tape portion can be raised to a force larger than the drawing force by consideration of the rotational moment and the running load. Thus, the end detection can be more securely achieved.

[0015] According to still yet another aspect of the invention, the main body is a tape-shaped material having a printing surface subjected to printing. In this case, a shortage of the tape-shaped material during printing can be avoided by detection of the end.

[0016] A long medium for a printer according to a second aspect of the invention includes: a main body wound around a core to which an end portion of the main body is affixed; and a core stop tape portion which joins the core and the end portion. The length of the end portion in the feeding direction is equal to or larger than the product of the detection time necessary for end detection during delivery of the end portion and the feeding speed of the main body.

[0017] According to this long medium for the printer, the length of the end portion in the feeding direction is large enough for securing a detection time necessary for the end detection. Thus, the printer can detect the end of the long medium relatively easily and securely.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The invention will be described with reference to the accompanying drawings, wherein like numbers reference like elements.

[0019] FIG. **1** is a perspective view illustrating the external appearance of a tape printer in which a long medium according to an embodiment of the invention is incorporated.

[0020] FIG. **2**A is a perspective view illustrating the external appearance of the tape printer whose cover is opened.

[0021] FIG. **2**B is a perspective view illustrating the external appearance of a tape cartridge attached to the tape printer.

[0022] FIG. **3**A schematically illustrates a condition of a tape during feeding of the tape.

[0023] FIGS. **3**B and **3**C show an end portion of the tape and a core stop tape portion.

[0024] FIG. **4**A is a block diagram showing an entire control system of the tape printer.

[0025] FIG. **4**B is a block diagram showing a part of the control system as the part associated with detection of the tape end.

[0026] FIG. **5**A is a graph showing a change of a load during tape feeding.

[0027] FIGS. **5**B through **5**D schematically illustrate the conditions of the tape end in correspondence with the change of the load.

DESCRIPTION OF EXEMPLARY EMBODIMENT

[0028] A tape printer in which a long medium is incorporated is hereinafter described with reference to the drawings as a premise of the explanation of a long medium according to an embodiment of the invention.

[0029] As illustrated in FIGS. **1**, **2**A and **2**B, a tape printer **10** has a device case **20** divided into two parts on the upper side and the lower side for constituting the external casing of the tape printer **10**. The device case **20** has an upper case **21** as an open/close cover, and a lower case **22** which contains mechanical sections such as a pocket **41** to which a tape cartridge C is attached. A winding tape **50** as a long medium schematically shown in FIG. **3**A is contained within the tape cartridge C.

[0030] A keyboard **33** and a display **34** are provided on the front part and the right rear part, respectively, of the upper surface of the upper case **21**. The upper case **21** is closed during use except for the time when the tape cartridge C is attached and detached.

[0031] The keyboard **33** is an unit through which information such as data and commands is inputted as information transmitted to a microcomputer chip or the like as a control system contained in the lower case **22**. The keyboard **33** includes a group of character keys **31** used when inputting text information such as characters, symbols, and numerals, a group of function keys **32** used when specifying various types of operation mode and the like, and other keys arranged on the surface.

[0032] The display **34** has a display screen **36** which can display n rows×m lines (n and m are appropriate natural numbers) of arbitrary character strings and the like in the horizontal direction and the vertical direction, and can display process results and commands produced by the microcomputer chip and others as the control system contained in the lower case **22**. More specifically, the display **34** is used when an user selects or edits character strings and others after inputting data, various commands and requests and the like through the keyboard **33**, or visually recognizes the results and others.

[0033] The lower case **22** has the pocket **41** to which the tape cartridge C is attached. The tape cartridge C is attached to and detached from the pocket **41** with the upper case (open/close cover) **21** opened. The tape cartridge C contains a tape T and an ink ribbon R each having a constant width inside a cartridge case **51**. The tape cartridge C further has a through hole **53** into which a head unit **42** provided on the pocket **41** is inserted.

[0034] The tape T is a tape-shaped material as a printing target and constitutes the main body of a winding tape **50** described later in detail as illustrated in FIG. **3**A. As shown in an enlarged part in FIG. **3**A, the tape T has a tape main body Ta and a released paper Tb. A printing surface TH is formed on the front surface of the tape main body Ta, and an adhesive surface TT is formed on the back surface of the tape main body Ta. The adhesive surface TT is covered by the released paper Tb. The tape T and the ink ribbon R overlap with each other while traveling through the through hole **53**. Then, only the tape T is discharged to the outside, and the ink ribbon R is wound inside.

[0035] The head unit **42** provided at an appropriate position of the pocket **41** contains a printing head **42***a* having a thermal head. The printing head **42***a* is disposed in such a position as to contact the back surface of the ink ribbon R exposed through the through hole **53** of the tape cartridge C when the tape cartridge C is attached to the pocket **41**. In this condition, desired characters and the like can be printed on the printing surface TH on the surface of the tape T by the heating operation of the printing head **42***a*.

[0036] A tape outlet port **44** connecting the pocket **41** and the outside of the device is formed on the left side surface of the lower case **22**. The tape outlet port **44** faces to a tape cutter **45** for cutting the delivered tape T. A ribbon driving shaft **47** and a roller driving shaft **48** engaging with a driven part of the attached tape cartridge C are provided on the pocket **41**. The ink ribbon R and the tape T within the tape cartridge C are delivered by the driving shafts **47** and **48** driven by a built-in feed motor **55** (see FIG. **4**B and other figures) as a driving source. Simultaneously, the printing head **42***a* is operated in synchronization with the driving shafts **47** and **48** for performing printing. After completion of printing, the delivery of the tape T is continued until the cutting position determined for the tape T reaches the position of the tape cutter **45**.

[0037] According to a typical method for using the tape printer **10** having this structure, the user attaches the tape cartridge C to the pocket **41**, and requests printing by inputting printing information such as desired characters and symbols through the keyboard **33** while checking the input/edition results shown on the display **34**. In response to this request, the tape T is drawn from the tape cartridge C, and the desired printing is performed on the tape T by the operation of the printing head **42***a*. Then, the printed portion is sequentially discharged through the tape outlet port **44** to the outside. After completion of printing, the tape feeding is continued until the tape T reaches the position of the tape length including a margin, where the tape T is cut at a predetermined position to be formed into a label.

[0038] The tape T contained in the tape cartridge C shown in FIG. **2**B, and the winding tape **50** as a long medium including the tape T as the main body are now described with reference to FIG. **3**A and other figures. The winding tape **50** has a core CR, an adhesive double coated tape BB as a core stop tape portion, and the tape T as the main body. An end portion EP of the tape T is affixed to the core CR by the adhesive double coated tape BB, and wound around the core CR. As illustrated in FIGS. **3**B and **3**C, the tape T and the adhesive double coated tape BB constitute a tape-shaped material having a substantially constant width. One of the surfaces of the adhesive double coated tape BB adheres to the core CR, and the other surface adheres to the end portion EP of the tape T such that the core CR and the end portion EP can be connected by a bonding force of certain strength produced

by the adhesive double coated tape BB as the core stop tape portion. The degree of the bonding between the core CR and the end portion EP is determined, and thus a releasing force necessary for releasing the bonding is determined according to the adjustment of the bonding force of the adhesive double coated tape BB. The tape T is drawn by the roller driving shaft **48** of the tape printer **10**. More specifically, a leading end portion TP of the tape T is sandwiched between a platen roller **60** engaging with the roller driving shaft **48** as the driven part of the tape cartridge C and the printing head **42***a* urged toward the platen roller **60**, and is drawn out in accordance with the rotation of the platen roller **60** driven by the roller driving shaft **48**. Thus, the roller driving shaft **48** and the platen roller **60** driven by the roller driving shaft **48** function as a feeding section for feeding the tape T.

[0039] A force for feeding the tape T produced by the rotations of the platen roller **60** and the roller driving shaft **48** driven by the driving mechanism is herein referred to as a feeding force Fx. The maximum of the feeding force Fx, i.e., a maximum feeding force Fd corresponds to the maximum pulling force of the feed motor **55** as the feeding driving motor (see FIG. **4**B and other figures) after subtraction of a loss produced by the platen roller **60**, the roller driving shaft **48** and the like as the transmission mechanism for transmitting the maximum pulling force to the leading end portion TP of the tape T.

[0040] Also, a force necessary for drawing the tape T wound around the core CR out of the core CR during printing in the normal operation is referred to as a drawing force Ft. In this case, in the condition shown in FIG. **3**A, the drawing force Ft is a force corresponding to the sum of the rotational moment of the winding tape **50** around the core CR and the running load. The tape printer **10** maintains the speed for feeding the tape T at a constant speed VE by controlling the feeding force Fx such that the feeding force Fx becomes substantially equal to the drawing force Ft.

[0041] In this embodiment, the length of the end portion EP of the tape T affixed to the adhesive double coated tape BB, that is, a length L**1** of the adhesive double coated tape BB is approximately ¼of the entire circumference of the core CR, for example. Since each of the end portion EP and the adhesive double coated tape BB has the length L**1** as a certain length in the drawing direction of the tape T, a sufficient time is secured for detecting a tape end which corresponds to a state coming to the used up condition of the winding tape **50** within a short period after drawing all the wound tape T and delivering the end portion EP. More specifically, the length L**1** is determined as a length equal to or larger than the product of the detection time necessary for detecting the tape end and the speed VE as the feeding speed of the tape T at the time of detection of the tape end.

[0042] The bonding force produced by the adhesive double coated tape BB to adhere to the end portion EP, that is, the releasing force is set at a force equal to or smaller than the maximum feeding force Fd produced by the driving mechanism equipped within the printer for feeding the leading end portion TP. Thus, the end portion EP can be securely released from the adhesive double coated tape BB.

[0043] The structure of a control system of the tape printer **10** shown in FIG. **1** and other figures is now explained with reference to FIG. **4**A. The tape printer **10** includes the keyboard **33** and the display **34** functioning as the interface with the user as described above, and further includes a printing section driving circuit **71** for driving the printing head **42***a* and the feed motor **55** as the feeding section driving motor, an encoder disk **81** fixed to a rotation shaft of the feed motor **55** to detect the rotation condition of the rotation shaft, a photo-sensor **82** which detects ON/OFF timing corresponding to the rotation of the encoder disk **81** and transmits the detection result to a motor driver **71***a* of the printing section driving circuit **71**, a cutting section driving circuit **72** which allows the tape cutter **45** to perform cutting, a memory unit **73** which stores data, calculation results and the like, and a control unit **77** which controls and operates the respective circuits in appropriate manners.

[0044] In this structure, the printing head **42***a* and the printing section driving circuit **71** function as a printing section for performing printing on the tape T. The encoder disk **81** and the photo sensor **82** function as an encoder **80** for detecting the condition of the rotation speed of the feed motor **55**.

[0045] The motor driver **71***a* of the printing section driving circuit **71** controls the feed motor **55** based on signals received from the photo-sensor **82** such that the speed for feeding the tape T as the printing target can be maintained at the constant speed VE (see FIG. **3**A and other figures). Thus, the motor driver **71***a* performs feedback control of the feed motor **55** as a DC motor by using the encoder **80**.

[0046] The control unit **77** includes a microcomputer chip and others. The memory unit **73** includes an IC having ROM and RAM. The control unit **77** operates according to a control program contained in the ROM of the memory unit **73** to control the overall operation of the tape printer **10**. For example, the control unit **77** receives inputs of various commands, various detection signals and the like from the keyboard **33** and others, processes various data and the like received from the RAM of the memory unit **73**, and outputs control signals to the display **34**, the printing section driving circuit **71**, the cutting section driving circuit **72** and others to allow the display screen **36** to display necessary indications and allow the printing head **42***a* to perform printing on the tape T in a predetermined printing condition by controlling the printing head **42***a*. The control unit **77** particularly obtains information concerning the feedback control, more specifically, information about the load on the feed motor **55** and the like from the motor driver **71***a*. The control unit **77** has a tape end detection device **77***a* for determining whether the present condition is in a tape end condition based on this information.

[0047] An example of the operation for monitoring the feed motor **55** and the operation for detecting the tape end based on the monitoring result executed by the tape printer **10** is now explained with reference to FIG. **4**B as one of the printing operation performed by the tape printer **10**. FIG. **4**B shows a part of the whole control system shown in the block diagram in FIG. **4**A as the part of the control system associated with the monitoring of the feed motor **55** and the detection of the tape end corresponding to the used up condition of the tape T.

[0048] The motor driver **71***a* included in the circuit part in FIG. **4**B provides feedback control based on the information received from the encoder **80**. More specifically, the encoder disk **81** axially rotates with the rotation shaft of the feed motor **55**, and the photo-sensor **82** detects the rotation of the encoder disk **81** and outputs information on the rotation speed (number of revolutions) of the feed motor **55** to the motor driver **71***a*. The motor driver **71***a* performs calculation based on the detection information obtained from the photo-sensor **82**, and outputs a PWM waveform control signal corresponding to the calculation result. That is, when the rotation speed (number of revolutions) of the feed motor **55** deviates from a target value,

the duty ratio of the PWM waveform, i.e., the proportion of the power source ON period is varied such that the deviation can be corrected. More specifically, when the rotation speed decreases, the duty ratio of the PWM waveform is raised by the amount corresponding to the decrease. When the rotation speed increases, the duty ratio of the PWM waveform is lowered by the amount corresponding to the increase.

[0049] Accordingly, the motor driver **71***a* determines a necessary standard duty ratio of the PWM waveform based on the detection information outputted from the photo-sensor **82** and the conditions such as the specification of the feed motor **55** and the resistance of the feeding section, and drives the feed motor **55** while changing the standard duty ratio such that increase and decrease in the rotation speed is not produced so as to keep the number of revolutions of the feed motor **55** constant. That is, the motor driver **71***a* controls the load condition of the feed motor **55** which is the drive motor of the feeding section such that the feeding force Fx shown in FIG. **3**A becomes substantially equal to the drawing force Ft, thereby keeping the rotation speed of the feed motor **55**, i.e., the speed VE for feeding the tape T substantially constant . In this case, the motor driver **71***a* and the encoder **80** can be considered as components functioning as a motor monitoring device **90** which monitors the load condition of the feed motor **55**.

[0050] The tape end detection device **77***a* of the control unit **77** receives the information about the rotation of the feed motor **55** as the monitoring result from the motor monitoring device **90**. More specifically, the tape end detection device **77***a* sequentially reads the duty ratio of the PWM waveform obtained by the motor driver **71***a* as the load on the feed motor **55**, and determines whether the tape T is in the tape end condition based on this information. When it is determined that the tape T is in the tape end condition, the control unit **77** starts a process for displaying the tape end. In this case, the change of the duty ratio corresponds to the change of the feeding force Fx.

[0051] At the time of the tape end corresponding to the used up condition of the tape T after completion of delivery of the tape T, the level of the load on the feed motor **55**, i.e., the level of the feeding force Fx detected by the tape end detection device **77***a* based on the monitoring result obtained by the motor driver **71***a* changes in the manner shown in FIG. **5**A. The horizontal axis in FIG. **5**A indicates the running time or the running length of the tape T. The vertical axis indicates the duty ratio which corresponds to the load imposed on the motor in this embodiment. In this period, the condition of the winding tape **50** changes with steps as illustrated in FIGS. **5**B through **5**D. As explained above, the end portion EP of the tape T wound around the core CR in the winding tape **50** can be gradually released from the adhesive double coated tape BB by setting a bonding force Fr of the adhesive double coated tape BB equal to or smaller than the maximum feeding force Fd. During this period which starts when delivery of the tape T reaches the end portion EP, the load increases to a level sufficient for separating the end portion EP from the adhesive double coated tape BB, and finally achieves complete release of the end portion EP. The change of the load, i.e., the change of the feeding force Fx during this period is shown in FIG. **5**A. The bonding force of the surface of the adhesive double coated tape BB adhering to the core CR and the bonding force of the surface of the adhesive double coated tape BB adhering to the end portion EP are controlled such that only the core CR and the adhesive double coated tape BB are finally left. Thus, almost all part of the tape T including the end portion EP released from the core CR can be used.

[0052] The relationship between the tape T of the winding tape **50** and the load on the feed motor **55** under the tape end condition is now specifically explained.

[0053] FIG. **5**B illustrates a condition in which an effect produced by the bonding force Fr of the adhesive double coated tape BB for connecting the tape T and the core CR starts to be recognized on the feeding force Fx. This condition corresponds to a condition in a term T**2** from a point a to a point b as time points in FIG. **5**A. During the normal delivery necessary for feeding the tape T as in a term T**1** before the point a, for example, the load is a substantially constant load Da. However, in the term T**2**, a releasing force Fp equivalent to the bonding force Fr of the adhesive double coated tape BB as a force necessary for releasing the tape T from the adhesive double coated tape BB is required as the feeding force Fx. Thus, the feeding force Fx increases to such a level that the releasing force Fp becomes equivalent to the bonding force Fr. That is, during the term T**2**, the motor driver **71***a* detects a rapid rise of the load within a short period.

[0054] FIG. **5**C shows a condition in which the end portion EP of the tape T is being released from the adhesive double coated tape BB. This condition corresponds to a term T**3** from the point b to a point c in FIG. **5**A. Under this condition, the feeding force Fx is kept high for continuing the release of the end portion EP, and thus the motor driver **71***a* detects the state in which a high load Db is maintained. The feeding force Fx in this condition is chiefly constituted by the releasing force Fp for releasing the tape T from the adhesive double coated tape BB. The level of the releasing force Fp is equivalent to the level of the bonding force Fr between the tape T and the adhesive double coated tape BB. In this embodiment, the level of the bonding force Fr is controlled in such a manner as to become larger than the drawing force Ft necessary for drawing the tape T out during the normal operation.

[0055] FIG. **5**D shows a tape end condition in which the end portion EP of the tape T starts to be delivered after released from the adhesive double coated tape BB and separated from the core CR. This condition corresponds to a condition in a term T**4** after the point c in FIG. **5**A. In this condition, no load is produced after separation between the tape T and the adhesive double coated tape BB, and also the load of the rotational moment for rotating the winding tape **50** required for drawing the necessary tape T in the normal delivery is not generated. Thus, the motor driver **71***a* detects a load decrease at the point c, that is, a load Dc after the point c lower than the load Da before the point a as the normal load. In this case, the feeding force Fx becomes smaller than the drawing force Ft in the normal condition. Accordingly, the change of the load can be securely produced, allowing the tape end to be detected by the tape printer **10**.

[0056] According to the tape printer **10** which uses the winding tape **50** as the long medium in this embodiment, therefore, the tape end can be detected based on the change of the feeding force Fx detected as the change of the load. More specifically, the bonding force Fr of the adhesive double coated tape BB for connecting the core CR and the end portion EP is larger than the drawing force Ft necessary for drawing the tape T out. In this case, a difference in the change of the load is produced between the delivery in the normal operation and the delivery of the end portion EP in the tape printer **10**. Thus, the tape printer **10** can relatively easily and securely detect the end of the winding tape **50** based on this

difference. Moreover, since the motor monitoring device **90** as the component already equipped for monitoring the operation condition of the feed motor **55** for feeding the tape T is used for detecting the end portion EP, the necessity for separately providing a component such as a sensor for detecting the end portion EP is eliminated. Also, the necessity for forming a transparent material or the like used for end detection on the end portion EP is eliminated, allowing almost the entire part of the tape T to be used as the printing target.

MODIFIED EXAMPLES AND OTHERS

[0057] The invention is not limited to the embodiments described herein but may be practiced in various other ways without departing from the scope of the invention. For example, the following modifications may be made.

[0058] According to the embodiment, the bonding force Fr of the adhesive double coated tape BB, the length L**1** of the end portion EP and the like may be set at appropriate values. In this case, the length L**1** may be arbitrarily determined as long as the length L**1** lies within the range of at least the length corresponding to 1 pulse necessary for recognizing the change of the load by the motor monitoring device **90**, and at most one round of the core CR, that is, the entire circumference of the core CR.

[0059] According to the embodiment, the long medium as the winding tape **50** having the tape T as the main body has been discussed. However, the end of the ink ribbon R can be detected by using the main body of the long medium having the same structure as the ink ribbon R within the cartridge C.

[0060] According to the embodiment, the change of the load is checked for tape end detection by monitoring the change of the duty ratio. However, the tape end can be detected by monitoring the change of the effective voltage, the change of the current and the power consumption or others.

What is claimed is:

1. A long medium for a printer, comprising:

a main body wound around a core to which an end portion of the main body is affixed; and

a core stop tape portion which joins the core and the end portion;

wherein the bonding force of the core stop tape portion is larger than the drawing force for drawing the main body wound around the core from the core.

2. The long medium for the printer according to claim **1**, wherein the bonding force of the core stop tape portion is equal to or smaller than the maximum feeding force of a driving mechanism contained in the printer for feeding a leading end portion of the main body.

3. The long medium for the printer according to claim **2**, wherein the maximum feeding force is the maximum pulling force of a driving motor for feeding after subtraction of a loss produced by a transmission mechanism for transmitting the maximum pulling force to the leading end portion of the main body.

4. The long medium for the printer according to claim **1**, wherein the core stop tape portion is an adhesive double coated tape which affixes one of the surfaces of the adhesive double coated tape to the core and affixes the other surface to the end portion to connect the core and the end portion.

5. The long medium for the printer according to claim **1**, wherein the drawing force necessary for drawing the main body is the sum of a rotational moment around the core and a running load.

6. The long medium for the printer according to claim **1**, wherein the main body is a tape-shaped material having a printing surface subjected to printing.

7. The long medium for the printer according to claim **1**, wherein the length of the end portion in the feeding direction is equal to or larger than the product of the detection time necessary for end detection during delivery of the end portion and the feeding speed of the main body.

8. A long medium for a printer, comprising:

a main body wound around a core to which an end portion of the main body is affixed; and

a core stop tape portion which joins the core and the end portion;

wherein the length of the end portion in the feeding direction is equal to or larger than the product of the detection time necessary for end detection during delivery of the end portion and the feeding speed of the main body.

9. The long medium for the printer according to claim **8**, wherein the bonding force of the core stop tape portion is larger than the drawing force for drawing the main body wound around the core from the core.

10. The long medium for the printer according to claim **8**, wherein the bonding force of the core stop tape portion is equal to or smaller than the maximum feeding force of a driving mechanism contained in the printer for feeding a leading end portion of the main body.

11. The long medium for the printer according to claim **8**, wherein the maximum feeding force is the maximum pulling force of a driving motor for feeding after subtraction of a loss produced by a transmission mechanism for transmitting the maximum pulling force to the leading end portion of the main body.

12. The long medium for the printer according to claim **8**, wherein the core stop tape portion is an adhesive double coated tape which affixes one of the surfaces of the adhesive double coated tape to the core and affixes the other surface to the end portion to connect the core and the end portion.

13. The long medium for the printer according to claim **9**, wherein the drawing force necessary for drawing the main body is the sum of a rotational moment around the core and a running load.

14. The long medium for the printer according to claim **8**, wherein the main body is a tape-shaped material having a printing surface subjected to printing.

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