March 31, 1970 J. P. SANTO 3,503,483

RIBBON DISCRIMINATOR

Filed Feb. 5, 1968

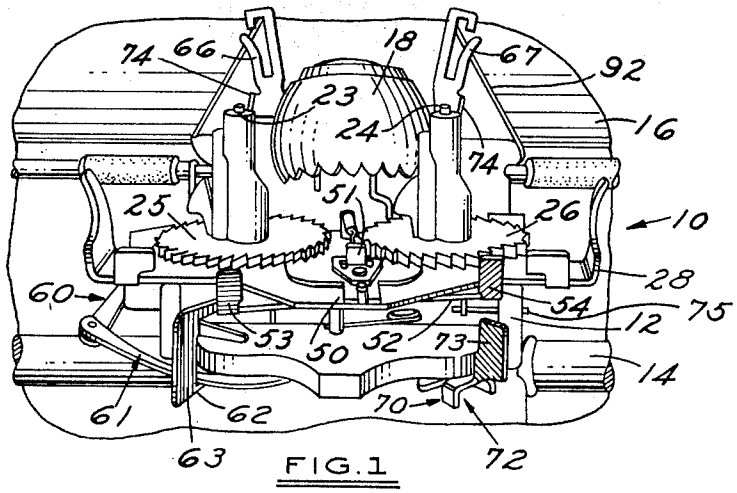


FIG. 1

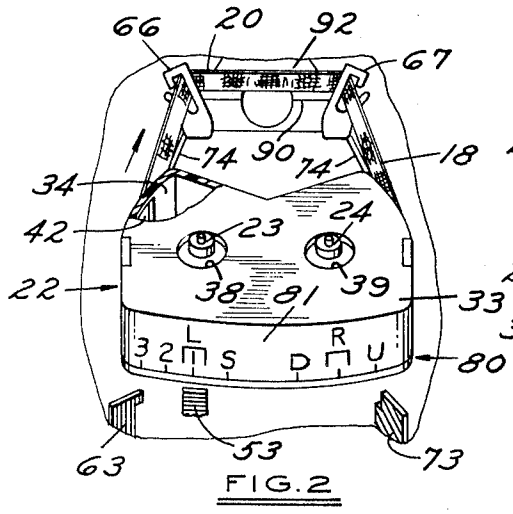


FIG. 2

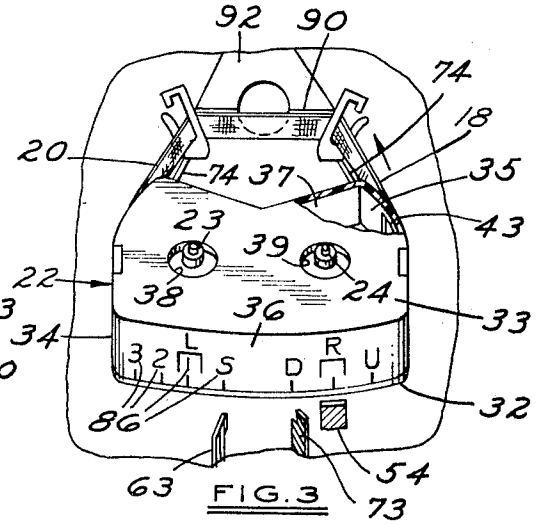


FIG. 3

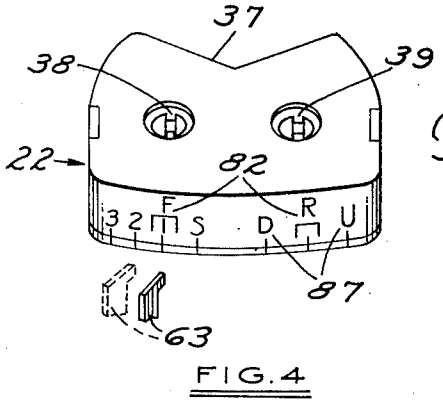


FIG. 4

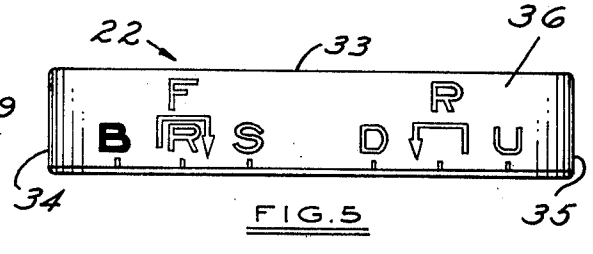


FIG. 5

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RIBBON DISCRIMINATOR

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U.S. Cl. 197—151 10 Claims

ABSTRACT OF THE DISCLOSURE

A ribbon discriminator for a typewriting machine with a printing head and ribbon carrier which traverses the paper carrier in the line of the printing. The discriminator includes indexing means for changing the position of the ribbon with respect to the printing head and/or the direction of feed of the ribbon and distinguishing means on the ribbon carrier cooperating with the indexing means and distinctly relating the several positions thereof to the positions and/or feed directions of the ribbon.

BACKGROUND OF THE INVENTION

The invention relates to a ribbon discriminator particularly suited for use in a printing machine of the single printing element variety.

One form of machine of this character employs a generally globe or ball shaped printer element that is rotatable and tiltable for selection from the machine keyboard of any one of a plurality of printing characters located in spaced bands about the surface of the print head element. The printer element is transported on a carrier traveling in tabulation, return and letter space movements parallel to the printing line or along the length of the roll platen. In addition to the print element, the carrier also mounts a removable ribbon cartridge and includes various ribbon function and control mechanism for feeding and positioning the ribbon with respect to the printing head during printing.

While a ribbon function discriminator distinctly relating the several controls to the various ribbon functions effected thereby would enhance the utility of such machines, unlike the conventional traveling paper carriage machine in which the ribbon and its associated control mechanism is supported at the sides of and on a stationary base portion of the machine, the entire ribbon structure and the ribbon function and control mechanism in this class of printing device is carried on and moves with the traveling print element carrier. The provision of a ribbon function discriminator on a stationary portion of the subject class of machine would involve the use of coupling structure between the elements of the function discriminator and the ribbon function control mechanism on the traveling carrier that would further complicate the machine and could interfere with the operation thereof.

Accordingly, the present invention has as an object to provide a ribbon discriminator that will enhance the utility of printing machines of the described character without interferring with the operation thereof.

Another object is to provide a simple inexpensive ribbon discriminator for a traveling print head printing machine.

Another object is to provide a ribbon discriminator in accordance with the foregoing that is readily adapted to function with existing machines of this make and character without retrofitting thereof.

DESCRIPTION OF THE DRAWING

FIG. 1 is a front elevation view of a portion of a single printing element printing machine illustrating the traveling carrier and some of the mechanism thereof;

FIG. 2 is a perspective view of a ribbon function discriminator in accordance with the invention with the ribbon function control levers in one of their positions;

FIG. 3 is another view of the discriminator illustrating the levers in others of their positions;

FIG. 4 is another view showing the two other positional settings of the ribbon position control lever; and

FIG. 5 is an elevation view of a portion of a discriminator for use with a bi-chrome ribbon.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention is shown embodied in a known form of typewriting machine currently manufactured by the IBM Corporation of New York and described in various printed publications and patents thereof including U.S. Patents 2,902,136; 2,919,002; and 2,986,260, to which reference may be made for supplementing details of the machine briefly described herein. The machine, a portion of which is illustrated at **10** in FIG. 1 herein, is shown as having a carrier **12** guided for translatory movement on a shaft **14** parallel to the platen **16**, which is rotatable about its axis for vertical line spacing movement of a sheet or sheets of paper rolled thereon. The platen **16** remains stationary while a print element **18**, transported by the carrier, traverses the printing line in letter space, tabulation and return movements of the carrier effected from driving, escapement and control mechanism, as may be ascertained from the above patents. In addition to the printing element **18**, the carrier **12** transports a printing ribbon **20** partly within and partly without a cartridge **22** and on guide elements **66** and **67**. The carrier also includes various mechanism for effecting and controlling different functions or characteristics of the printing ribbon.

The print element **18** is a truncated globe or ball-shaped structure having a plurality of print characters located in spaced bands about the spherical surface portion thereof. The print head is rotatable and tiltable through coding mechanism, which is controlled from the machine keyboard (not shown) for selection of any one of the print characters thereon, and is actuated by the shaft **14**, which is oscillated once for each print stroke cycle, to impact against the sheet of paper on the platen and produce a printed impression thereon through the part of the inked ribbon **20** located between the print head and the paper.

The ribbon cartridge **22** is removably mounted on a spaced pair of upstanding ribbon transporting spindles **23** and **24** on a platform portion **28** on the carrier **12**. The cartridge, which is of a molded plastic material construction, is an elongated two-piece receptacle having a bottom plate portion **32** and an inverted top cover portion **33** with depending end walls **34**, **35** and front and rear walls **36** and **37**, as shown. The cartridge houses the inked fabric ribbon **20**, which is contained on a spaced pair of flangeless spools or reels **38**, **39** that are freely rotatable within the cartridge. The ribbon is supplied from one spool **38** and extends rearwardly through an opening **42** in one of the curved end walls **34** of the receptacle toward the platen. A portion of the ribbon, extending behind the print element and parallel to the platen, is entrained through and guided by the laterally spaced pair of claw-shaped elements **66** and **67** forming a part of the ribbon guide and lift mechanism on the carrier. From the right-wardly located ribbon lift **67**, the ribbon extends forwardly and re-enters the cartridge through another rearwardly located opening **43** in the other curved end wall **35** of the receptacle to be taken up on the other spool **39**.

The ribbon function mechanism includes a ribbon feeding and reversing mechanism **50**, a ribbon shifting mech-

anism 60, and a ribbon changing mechanism 70, all provided on the carrier 12 of the machine 10.

The ribbon feeding and reversing mechanism 50 feeds the ribbon past the print element 18 and automatically reverses the direction of feed at the ends of the ribbon travel. The mechanism includes the upstanding spindles 23, 24, which are provided with toothed escapement wheels as 25, 26 at the lower ends thereof, and a drive pawl 51 that is reciprocated from a cam on the drive shaft 14 during each printing stroke of the printer to drive one or the other of the escapement wheels, thereby feeding the ribbon from the cartridge. A reversing control element in the form of a bell crank lever 52 that is pivotally mounted below the carrier platform portion 28 has a pair of upturned keys or terminal tab portions 53, 54, which are located at the opposite ends thereof and serve as holding pawls for selective engagement with one or the other of the escapement wheels depending upon the positional setting of the control lever 52. The disengaged one of the tabs of the lever 52 may be moved manually rearwardly to pivot the lever 52 and thus position drive pawl 51 into engagement with the opposite escapement wheel, thereby manually reversing the direction of the ribbon feed or travel.

The ribbon shifting mechanism 60 is actuated from a cam on the drive shaft 14 to raise and lower the ribbon lifts 66 and 67 in accordance with the positional setting of a ribbon position control lever 62 pivotally mounted on and extending under the carrier. The lifts are secured to the rearwardly located end of a laterally spaced pair of links 74—74, the forwardly extending end of each of which is fastened on a slender shaft 75 which is journaled in the carrier. Shaft 75 is oscillated by lifting the links intermediate their ends from the cam on shaft 14.

The lifts are moved during a printing cycle from a position in which the upper edge of the ribbon is located below the printing line to any one of several different selectable elevated positions to permit printing through any one of a plurality of printing zones of the ribbon and are returned to their lowermost position near the completion of the printing cycle. The printing zones extend longitudinally of the length of the ribbon, which, in the case of a monochrome ribbon, is of a width to accommodate three such zones or bands spaced apart in the direction of the width and between the marginal edges thereof.

The ribbon position selection control lever 62 is manually differentially positionable in any one of four different positions, one of which corresponds to a stencil cutting position and the remaining three positions to the three operating or printing zone positions of the ribbon. The lever is coupled to the ribbon lift mechanism through link 61 to change the fulcrum position of the ribbon lift links 74—74 to affect the swing or lift thereof.

The ribbon changing mechanism 70 includes a ribbon change lever 72, which is pivotally mounted on and extends below the carrier 12. The lever 72 is manually operated and movable between two positions independently of the operating ribbon position selection control lever 62 and machine operated shifting mechanism. The lever 72 operates the ribbon change mechanism 70 to raise the ribbon lifts 66 and 67 through the aforementioned links 74—74 on shaft 75 from the lowermost or normal position of the ribbon below the printing line to an extreme elevated position shown in FIGS. 1 and 2. The lifts are maintained in their elevated position, where they are accessible for removal or insertion of a ribbon loop from or on the lifts for cartridge change or installation purposes and are returned to their lowermost position in the other position of the lever 72.

The tab 53 or 54 on the bell crank lever 52 which is not then serving as a pawl is located adjacent and forward of the front wall 36 of the cartridge 22. Similarly located tabs 63 and 73 are provided on the levers 62 and 72 adjacent the front wall 36 of the cartridge 22 on which is provided distinguishing structure in a position to cooperate with the tabs 53 and 54, 63 and 73 on the levers 52, 62 and 72 to provide a ribbon discriminator in accordance with the present invention.

The discriminator is exemplified herein as a graduated instrument 80. The ribbon control levers constitute the indexing portion of the instrument, and distinguishing tokens 81 in the form of graduated scales, which are provided along the ribbon cartridge carrier, constitute the referencing or gauging portion of the instrument. The scales are positioned to cooperate with the control levers and serve to distinguish the levers and to relate or reference their positional settings to the various ribbon functions or characteristics selected or regulated thereby.

The identifying tokens are expressed in the form of calibrated scales as 82, 86 and 87 provided for respective ones of the control levers 52, 62 and 72 and may comprise graduations, characters and/or symbols, which have a fixed spatial relationship to each other corresponding to the different positional settings of the control levers. The scales are located directly above the levers, whose tabs or terminal portions are contained in vertical planes variously aligned with or inclined to the scales shown in the plane of the vertical front surface 36 of the cartridge.

Scale 86 cooperates with the ribbon position lever 62 and, as illustrated herein, is comprised of graduations and the group of spaced alpha-numeric characters "3," "2," "1," and "S," located on the left side of the front face 36 of the cartridge. Scale 87 cooperates with the ribbon change lever 72 and comprises the spaced characters "U" and "D" located on the right side of the front face of the ribbon cartridge. Scale 82 cooperates with the ribbon reversing lever 52 and comprises the spaced pair of inverted bracket symbols "⌐¬" which are located on opposite sides of the front face of the cartridge and are interspersed or intercalated with the characters of scales 86 and 87 straddled by scale 82.

Locating the scales directly on the ribbon cartridge, which thus serves as the carrier therefor, permits positioning the scales in close proximity and registry with the control levers and employing them directly as indexing elements without the addition of further structure thereto. Structural alteration of the carrier 12 and interference with the cartridge, levers and other parts of the machine is avoided, permitting incorporation of the discriminator device on existing machines of this make and character in a most efficient, convenient and inexpensive manner.

By molding the scales on or in the cartridge during the formation of the cartridge itself, the discriminator scales can be provided at little or no increase in the cost of the cartridge. The characters, symbols and/or graduations could be molded in a clearly distinguishable color, as white for example, different from the color of the cartridge casing itself, as may be accomplished by conventional molding processes employed in the formation of the key buttons of the machine keyboard. The levers can be further identified and distinguished by variously designating the indexing terminal portions thereof, the optical orientation of which with respect to their scales is enhanced by expressing the terminal portions as in different colors and/or shapes, for example, and similarly expressing their respective scales with tokens in matching colors and/or shapes. The distinguishing tokens could be expressed in the form of raised projections or ridges or relieved indentations or grooves to lend an additional dimension or detectable physical characteristic thereto and could be provided in or extend into the bottom plate portion 32 of the cartridge if desired.

FIGURE 2 illustrates a cartridge installed on the machine and expressed with discriminating tokens in the form of optically perceptible graduations, characters and symbols thereon. The ribbon change lever 72 is shown located in its rightmost position seting with its tab 73 aligned with the alphabetic character "U," which is provided on the right side of the front face of the

cartridge and clearly relates the proper position of the ribbon change lever **72** for cartridge unloading purposes. In this position of the lever, the ribbon lifts are raised thereby to their extreme uppermost position to enable access thereto for removal or insertion of the ribbon for cartridge change and installation purposes.

In FIG. 2 the tab **53** of the ribbon feed direction reversing lever **52** is out of engagement with the escapement wheel **25** and is substantially aligned with the forward or front edge of the cartridge, where it is located below the inverted bracket symbol, "⊓" on the left side of the frontal surface **36** of the cartridge. The bracket symbol, representing approximately the shape of an upturned one of the terminal tab or key portions of lever **52**, is shown as being of a width corresponding to the width of its corresponding tab pawl on the reversing lever. The shape and position of the symbol readily identifies its associated tab and lever and references or gauges the positional setting of the lever at the forwardly presented face of the cartridge to the ribbon feed direction desired or indicated.

A directional symbol or other designation could be employed on or in place of or in addition to the bracket, such as the letter "L" or "F," for example, shown located above the bracket in FIG. 2 to signify a Left to right or Forward direction of feed of the ribbon when the tab **53** is aligned therewith. FIG. 5 illustrates a form of directional signal designation that may be employed on or in conjunction with the bracket symbol.

In FIG. 2 the ribbon position lever **62**, is shown in its extreme left positional setting with its terminal tab or key portion **63** aligned with the numerical character "3" on the left side of the ribbon position discriminator scale **86** on the cartridge. The indicated character is located on the cartridge in a position to cooperate with the tab **63** of lever **62** and clearly relate the position of the lever to the lower printing zone of a single colored inked fabric ribbon used with this machine.

In FIGURE 3, the ribbon change lever **72**, has been moved leftwardly to its other position in which its indexing key or terminal tab portion **73** is in substantial alignment with the character "D" of scale **87**. The designated character relates the proper position of the lever **72** and signifies the lower or Down position of the ribbon lifts after the cartridge has been loaded and installed in the machine. In this position, the ribbon is located at a position in which the upper edge of the ribbon is below the printing line **90** indicated on a translucent card holder element **92** that is provided on the carrier **12** of the machine. The ribbon position lever **62** is shown at a setting with its tab **63** in substantial alignment with the character "S," whose location on the scale or cartridge on the carrier corresponds to and indicates the position of the lever **62** for stencil cutting purposes.

The ribbon feed reversing lever **52** has been moved from its position indicated in FIGURE 2 to its other position indicated in FIGURE 3 to engage tab pawl **53** with its escapement wheel and to disengage tab pawl **54** from its escapement wheel. Tab **54** is then located at the front edge of and below the cartridge in substantial alignment with another inverted bracket symbol "⊓" located on the right side of the frontal surface **36** of the cartridge. Other symbols and/or indicia may be employed in lieu of or in addition to the bracket, such as the character "R" shown located above the bracket and signifying or signalling a Right to left or Reversed feed direction of the ribbon when the tab **54** is positioned in alignment therewith.

FIGURE 4 illustrates two other settings of the ribbon position lever **62** in one of which its tab **63** is shown in mechanical positional alignment with the numeral "1" contained within the first mentioned inverted bracket on the cartridge relating the position of the lever to the upper printing zone of a single colored ribbon. In its dotted position, the tab **63** of the keyed lever **62** is aligned with the numeral "2" in which position it enables the selection and signifies the use of the middle or intermediate zone of a monochrome ribbon.

FIGURE 5 illustrates a set of scales that may be provided on the front side surface **36** of cartridge **22** for a bi-chrome ribbon. The adjacent set of characters "B" and "R," shown on the left side of the front wall of the cartridge, represent the positional settings of the ribbon position lever **62** for selection of the Black or Red printing zone portion of the bi-colored ribbon and could be expressed in corresponding colors identifying the colors of the ribbon.

Admittedly, other characters, symbols, marks, signs or signals may be employed, as the present invention is drawn to the novel implimentation in a machine of the described character of a ribbon function discriminator that differentiates the control keys and their positional settings and facilitates the selection of desired positions and feed directions of the ribbon. The provision of distinguishing identifying structure located on the cartridge and in positions thereon to cooperate directly with the control keys creates a novel physical relationship of these parts to provide a useful instrument device in a most advantageous manner.

While the invention has been described herein with respect to a form of ribbon discriminator that may be readily fitted to existing printing machines of the character described, the invention comprehends that the terminal portions of at least some of the control levers may be redesigned, if desired, to provide indexing structure in the form of upstanding pointers or indicators of various forms and shapes integrally formed, or detachably mounted as extensions, on the levers.

I claim:

1. In a printing machine of the type having a print head and ribbon carrier traversing the line of printing, a ribbon containing receptacle mounted on the carrier, means on the carrier for positioning the ribbon in different positions with respect to the print head, and means on the carrier for feeding the ribbon longitudinally past the print head and for reversing the direction of feed thereof; ribbon discriminator means facilitating the positioning of the ribbon into a desired position with respect to the print head and the feeding thereof in a desired direction past the print head comprising a ribbon position control lever coupled to said ribbon positioning means and movable between two positions representative of the different feed directions of the ribbon, a ribbon reversing control lever coupled to said ribbon feeding and reversing means and movable between two positions representative of the different feed directions of the ribbon, and distinguishing structure in the form of a plurality of identifying tokens located on the ribbon receptacle in positions to cooperate with said ribbon control levers, said discriminator means differentiating the several control levers and distinctly relating the proper orientation thereof for a desired position and a desired feed direction of the ribbon.

2. Ribbon discriminator means in accordance with claim **1** wherein the control levers are expressed with distinguishing tokens correlated to the distinguishing tokens on the ribbon container.

3. In a printing machine of the type having a print head carrier element movable along the line of printing, a ribbon container removably mounted on the carrier and including an inked ribbon of a width providing a plurality of printing zones extending longitudinally of the length thereof, means on said carrier for feeding the ribbon longitudinally past the print head and for reversing the ribbon feed direction, means on said carrier for shifting the position of the ribbon with respect to the print head for printing through any one of the printing zones of the ribbon, and ribbon changing means on said carrier for raising and lowering the position of the ribbon with respect to the print head for removal and installation of a ribbon container from and on the carrier; a ribbon

function discriminator facilitating the positioning of the ribbon into desired positions with respect to the print head and the feeding thereof in desired directions past the print head comprising a ribbon reversing control lever coupled to said ribbon feeding and reversing means and movable between two positions representative of the different feed directions of the ribbon, a ribbon position control lever coupled to said ribbon positioning means and movable between a plurality of different positions representative of the different printing zones of the ribbon, a ribbon changing control lever coupled to said ribbon changing means and movable between two positions representative of the raised and lowered positions of the ribbon for removal and installation of a ribbon container on the carrier, said ribbon control levers having terminal portions adjacent the ribbon container, and a plurality of scales located on the ribbon container bearing distinguishable tokens in positions to cooperate with the terminal portions of the several control levers, said discriminating means identifying the several control levers and distinctly relating the different positions thereof to the respective printing zones and the feed directions of the ribbon and to the raised and lowered positions of the ribbon for removal and installation of the ribbon container.

4. A ribbon function discriminator in accordance with claim 3 above wherein said scales include a first scale containing a plurality of spaced tokens identifying and relating the several positions of the ribbon position control lever to the respective printing zones of the ribbon a second scale containing a pair of spaced tokens identifying and relating the several positions of the ribbon changing control lever to the raised and lowered positions of the ribbon for ribbon container removal and installation purposes, and a third scale containing a pair of spaced tokens identifying and relating the several positions of the ribbon reversing control lever to the respective feed directions of the ribbon.

5. A ribbon function discriminator in accordance with claim 4 above wherein said second scale is spaced from said first scale and the tokens on the third scale are intercalated with the tokens of the first and second scales.

6. A ribbon function discriminator in accordance with claim 3 above wherein the terminal portions of the control levers are expressed with distingiushing tokens correlated to the distinguishng tokens on different ones of the scales.

7. A ribbon function discriminator in accordance with claim 3 above wherein the container is a cartridge which presents a generally vertically extending frontal surface

portion when mounted on the carrier in the machine and the token bearing scales are located on the said frontal surface of the cartridge.

8. A ribbon function discriminator in accordance with claim 7 above wherein the cartridge is of molded construction and the token bearing scales are integrally molded in the said frontal surface of the cartridge.

9. In a printing machine of the type having a print head and ribbon carrier traversing the line of printing, a ribbon container mounted on the carrier accommodating an inked ribbon having a plurality of longitudinally extending printing zones thereon, and means on the carrier for positioning the ribbon with respect to the print head for printing through any one of the printing zones of the ribbon; a ribbon position discriminator facilitating the positioning of the ribbon with respect to the print head for printing through a desired printing zone thereof and comprising the combination of a ribbon position control lever coupled to said ribbon positioning means, said lever having a terminal portion adjacent the ribbon container and movable relative thereto between a plurality of different positions representative of different positions of the ribbon with respect to the print head, and a plurality of distinguishing tokens located along the ribbon carrier in positions to cooperate with the terminal portion of said ribbon position control lever and distinctly relate the proper orientation thereof positioning the ribbon with respect to the print head for printing through the desired printing zone thereof.

10. A ribbon discriminator in accordance with claim 9 above wherein the container is a cartridge, which is of molded construction and presents a generally vertically extending frontal surface portion when mounted on the carrier in the machine, and the distinguishing tokens are integrally molded in the frontal surface portion of the cartridge.

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