Nov. 26, 1968 D. H. SMITH ETAL 3,412,839

MULTI-COLORED RIBBON SYSTEM

Filed April 26, 1966 2 Sheets-Sheet 1

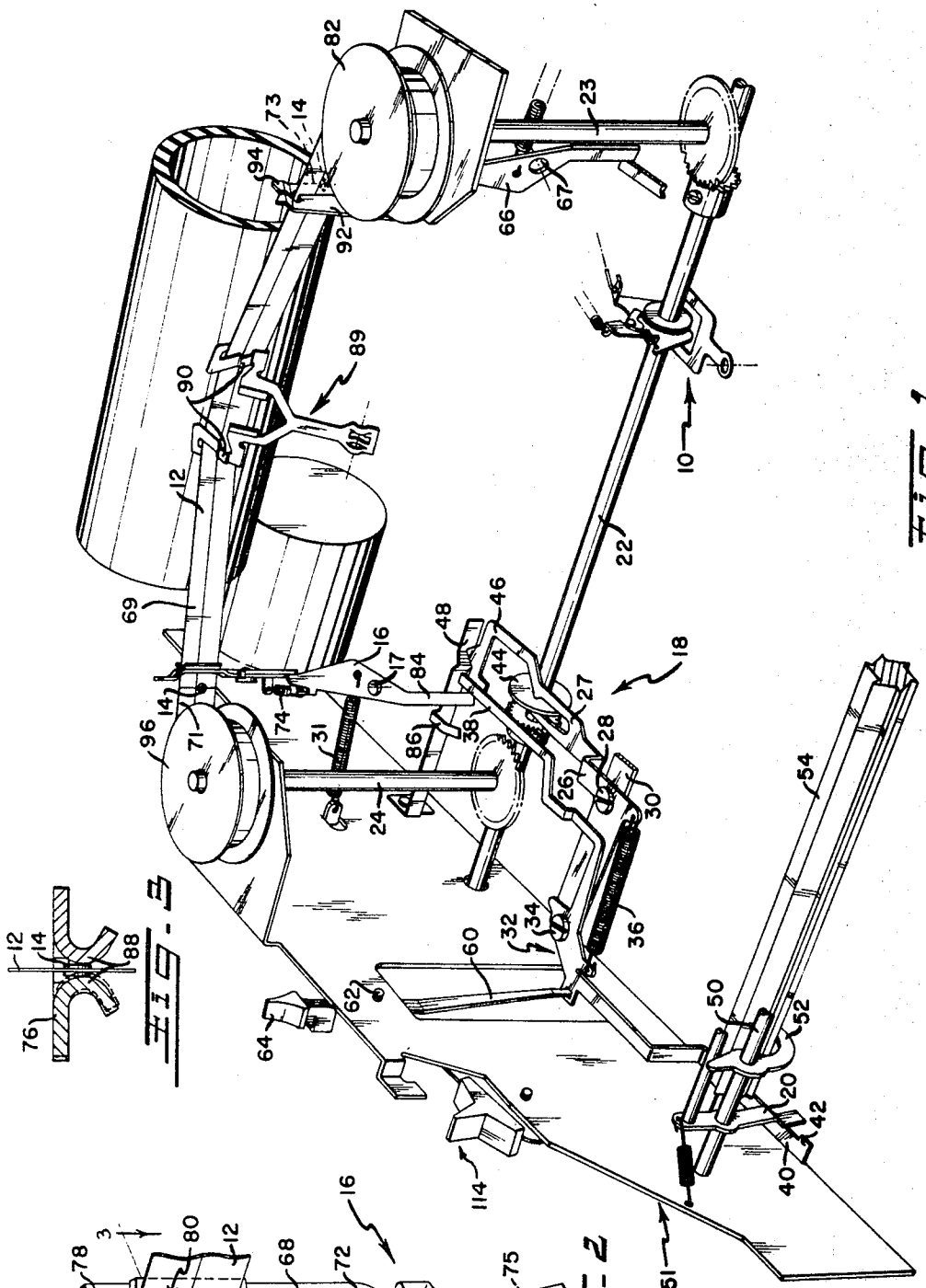


FIG. 1

FIG. 3

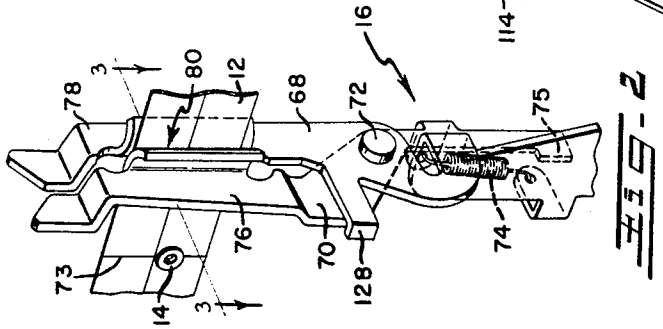


FIG. 2

INVENTORS
DAVID H. SMITH
SAMUEL D. CAPPOTTO
Kenneth W. Gulb
AGENT

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Filed April 26, 1966 2 Sheets-Sheet 2

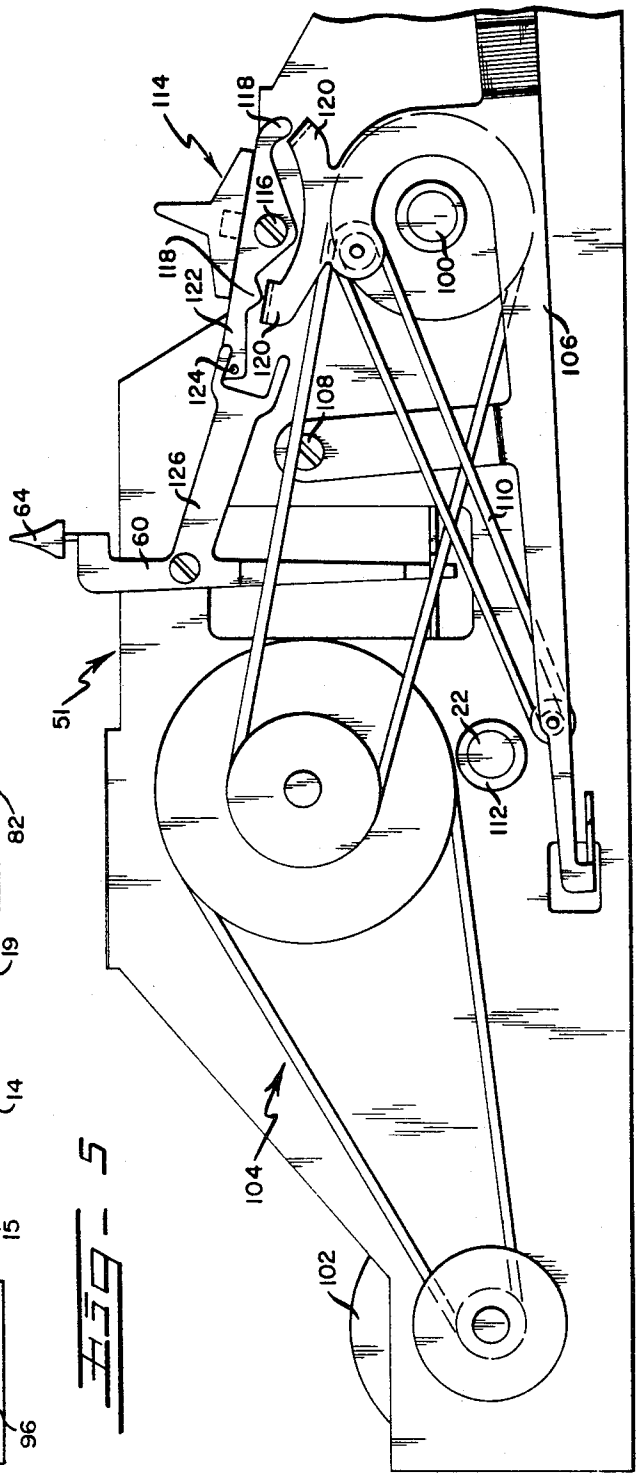


FIG. 4

FIG. 5

INVENTORS
DAVID H. SMITH
SAMUEL D. CAPPOTTO
Kenneth H. Bat
AGENT

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MULTI-COLORED RIBBON SYSTEM

David H. Smith, Cortland, and Samuel D. Cappotto, Syracuse, N.Y., assignors to SCM Corporation, New York, N.Y., a corporation of New York

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5 Claims. (Cl. 197—165)

ABSTRACT OF THE DISCLOSURE

A ribbon system for a typewriter including a four color ribbon having on each half of its length a different color combination and having a ribbon reverse abutment attached to the ribbon at the point where the two color combinations meet and including a ribbon reverse lever adjacent each spool having a pivotal arm and a ribbon carrier having channel shaped forms therein to allow the abutment to bypass the reverse levers and ribbon carrier when changing from one color combination of the ribbon at the print point to the other color combination. The ribbon system further includes a key controllable motor driven belt for power driving the ribbon reverse abutment through the reverse levers and ribbon carrier.

Background of the invention

The only known prior art exists in a presently marketed typewriter that employs a multi-colored, or in this instance a four color ribbon, system which is comprised of two different color combinations, each of which occupy one half the ribbon length. This system has disadvantages when the operator desires to change color combinations in that she is required to wind a spool varying amounts three different times, pick up a ribbon to bypass a reversing lever two different times, remove the ribbon from the ribbon carrier, replace the ribbon in the ribbon carrier, and open and close the ribbon spool cover two different times. These steps are time consuming, laborious, and it is difficult to avoid getting soiled fingers.

In view of the foregoing it is the object of this invention to overcome these disadvantages by providing an improved four color ribbon system for typewriters that is quick and convenient to change from one color combination to the other.

Another object of this invention is to provide an improved four color ribbon system having a motor powered ribbon feed which requires no physical handling by the operator while changing from one color combination to the other.

Another object of this invention is to provide an improved multi-colored ribbon system that is operable from the machine keyboard.

Another object of this invention is to provide an improved multi-colored ribbon system having a reversing means that is operable by the ribbon abutments to reverse the ribbon feed during normal typing but is not operable by the ribbon abutments during color combination changes.

Further novel features and other objects of this invention will become apparent from the following detailed description, discussion and the appended claims taken in conjunction with the accompanying drawing showing a preferred structure and embodiment in which:

FIGURE 1 is a front perspective view of the multicolor ribbon system of the present invention and of the principle typewriter components associated therewith;

FIGURE 2 is a perspective view of a portion of one of the novel ribbon reversing levers with a portion of the ribbon extending therethrough;

FIGURE 3 is a sectional view taken along lines 3—3 of FIGURE 2;

FIGURE 4 is a left side elevational view of the machine power ribbon winding system; and

FIGURE 5 is an elevational view of the spools and the multi-color ribbon showing the conventional end ribbon reversing abutments and an additional abutment intermediate the end abutments.

Like the previously mentioned four color ribbon system, the present invention employs a ribbon that consists of two different color combinations, each of which occupies one half the ribbon length, with an abutment provided at the center of the ribbon length where the two color combinations meet. In combination with a conventional ribbon color selector mechanism, this provides the operator with a versatility of printing characters of any one of four colors on a work sheet. However, unlike the previously mentioned four color ribbon system, the present invention employs a novel reversing means that permits a change of color combinations simply by winding one particular ribbon spool.

This simple method of changing color combinations is useful for manual typewriters and particularly useful for a typewriter that is equipped with a power ribbon winding system in which the winding of the spool is accomplished by pushing a button.

The present invention employs a power winding system disclosed briefly herein and is the subject invention disclosed in detail in copending application, Ser. No. 509,776, filed Nov. 26, 1965, now Patent No. 3,363,738 issued Jan. 16, 1968 to Aaron C. Zeamer and Samuel D. Cappotto.

Referring now to the figures and more particularly to FIGURE 1, a conventional ribbon feeding mechanism **10** incrementally feeds the ribbon **12** past the printing point in response to key actuated printing actions until an abutment **14** on the ribbon pivots the novel reversing lever **16** clockwise about its pivot **17**. The pivoting motion of the lever **16** conditions a reversing mechanism generally indicated at **18** so that a key actuatable bail finger **20**, locaed near the front of the machine, causes the reversing mechanism **18** to laterally move the ribbon feed shaft **22** toward the left out of engagement with the right ribbon spool spindle **23** and into engagement with the left ribbon spool spindle **24**.

The reversing mechanism **18** is mainly comprised of a shifting fork **26** that is pivotally mounted by a shoulder screw **28** on a frame bracket **30** and of a conditioning bar **32** that is pivotally mounted by a shoulder screw **34** on the shifting fork **26**. A spring **36** interconnecting fork **26** and bar **32** biases the conditioning bar **32** counterclockwise about screw **34** to a limited position determined by rear extension **38** abutting the lower extension **84** of the reversing lever **16**. A forward extension **40** of the conditioning bar **32** has a step portion **42** that is normally held out of the path of the finger **20** by the reversing lever **16** being more heavily biased by spring **31** than the spring **36**. The shifting fork **26** has an extension **27** that straddles a rigid ribbon feed shaft disc **44** and has one of its arms **46** shaped to cooperate with a formed leaf spring **48** which provides a two positioned detent for the reverse mechanism **18**.

When the reversing lever **16** is pivoted clockwise by ribbon abutment **14**, the conditioning bar **32** is biased counterclockwise by spring **36** and the conditioning bar forward extension step portion **42** is positioned in the path of the oscillating bail finger **20**. The bail finger **20** is pivoted on a fixed shaft **50**, and is rocked clockwise every time a key actuator **52** (one of which is shown) is rocked clockwise about shaft **50** by a power driven snatch roll **54**. This motion of actuator **52** is explained in detail by Patent Re. 25,011.

Clockwise movement of the bail finger **20** following counter-clockwise movement of step portion **42** drives the

bar **32** forward. This pivots the shifting fork **26** counterclockwise and shifts the ribbon feed shaft **22** to the left, which transfers the key actuated incremental rotative motion from the right ribbon spool spindle **23** to the left ribbon spool spindle **24**.

A manual ribbon reverse lever **60**, that is pivotally mounted to the side frames **51** by a screw **62** and extends through an opening in the conditioning bar **32**, provides the operator the option of manually shifting the ribbon feed shaft **22** to either its right or left position by moving the manual reverse button **64** to the appropriate position.

A like mechanism (not shown) for reversing mechanism **18** is disposed near the right end of ribbon feed shaft **22** and cooperates with the right reversing lever **66** in a like manner as described for the left reversing mechanism to automatically shift the shaft **22** to the right when the ribbon abutment pivots the right reversing lever **66** counter-clockwise about pivot **67**.

It is important to note that when an abutment contacts and pivots its appropriate reversing lever, the automatic reversing of the ribbon feed occurs only by virtue of a typing action which pivots finger **20** merely rotating shaft **22** when the reverse lever **16** or reverse lever **66** is pivoted will not actuate the reverse mechanism **18**.

The two color combinations of the ribbon **69** and **71**, which are joined at a position **73**, are individually comprised of two different colored sections that are arranged the same as are the colors of a conventional red and black ribbon wherein one color occupies the upper half of the ribbon and the other color occupies the lower half of the ribbon. In addition to the abutment **14** that is located centrally of the ribbon length, two other abutments **15** and **19** are provided, each of which is located near each ribbon end. The intermediate abutment **14** is of a thickness that is greater than the ribbon thickness but less than the thickness of either end abutment. The three abutments provide normal automatic reversing of whichever color combination is in use.

FIGURE 1 is shown with the color combination on the right half of the ribbon **69** being used with the ribbon being fed to the right and the intermediate abutment **14** about to contact the left reversing lever **16**.

Referring now to FIGURE 2, the novel reversing lever **16** is comprised of a main member **68** and a movable member **70**. The movable member **70** is pivotally mounted on the main member **68** by pin **72** and is biased in a clockwise direction about its pivot by spring **74** with its lower extension **75** limiting against the lower portion of main member **68**. The upper formed extension **76** of the movable member **70** cooperates with the similar shaped upper extension **78** of the main member **68** to form an aperture **80** for guiding the ribbon. The aperture width is slightly larger than the ribbon thickness but smaller than the thickness of the intermediate abutment **14**.

It can now be seen from FIGURE 1 that if the right ribbon spool **82** is wound in a clockwise direction, the intermediate abutment **14** will pivot reversing lever **16** until the reversing lever lower extension **84** contacts rigid member **86**. Since the abutment **14** is normally restricted from passing through the narrower aperture **80** and since the force exerted by the abutment **14** against the curved aperture defining lips **88** (FIGURE 3) is greater than the force applied by spring **74**, the movable member **70** pivotally yields momentarily and allows the abutment **14** to pass through the aperture **80**.

As the ribbon spool **82** is further wound, the abutment **14** is able to pass through the ribbon carrier **89** by means of two channel shaped forms **90** in the carrier arms and contacts the right reversing lever **66**. Because the right reversing lever **66** is similar in shape and construction as is the left reversing lever **16**, the movable member **92** of the right reversing lever **66** momentarily yields away from its mating main member **94** as the abutment **14** passes through the aperture and is wound onto the right ribbon spool **82**.

The color combination occupying the left half of the ribbon is now positioned at the printing point and normal typing will automatically reverse the direction of ribbon feed when either the left end ribbon abutment (not shown) contacts the left reversing lever **16** or when the intermediate abutment **14** contacts the right reversing lever **66**.

When it is desired to return to the original color combination, the manual reverse lever **60** is positioned such that the left ribbon spool **96** may be wound until the intermediate abutment **14** has passed through the right reversing lever **66**, the ribbon carrier **89**, and the left reversing lever **16**.

FIGURE 4 illustrates the power ribbon winding system as disclosed in the previously identified copending application which will now be described briefly for convenience.

A sleeve **100** is rotated counterclockwise by the motor **102** through a suitable drive train **104**. By pivoting a lever **106** clockwise about screw **108**, an endless belt **110** simultaneously and frictionally engages both sleeve **100** and sleeve **112** which is rigidly assembled on shaft **22** for rotating the shaft **22** counterclockwise.

FIGURE 4 further illustrates a novel keyboard control button **114** that automatically moves the shaft **22** endwise to engage the shaft **22** with the proper ribbon spool spindle before rotating the shaft **22**. This insures that a specific winding direction is obtained for the desired color combination.

To accomplish this, the keyboard control button **114** is pivotally mounted on the frame **51** by screw **116** and has a pair of projections **118** that cooperate with a pair of formed extensions **120** of lever **106** to rotate the lever clockwise regardless of which direction the control button **114** is pivoted. An extension **122** of the control button **114** has a rigid pin **124** that cooperates within the arms of a bifurcated extension **126** on lever **60** to correctly position the reverse lever in response to the pivoted direction of the control button **114**. As a result, when the button **114** is pivoted clockwise, toward the operator, the ribbon is wound on the left spool, and when the button **114** is pivoted counterclockwise, away from the operator the ribbon is wound on the right spool.

A stop **128** formed from main member **68** is located to limit the pivotable movement of movable member **70**. The amount of pivotable movement is such as to allow the intermediate abutment **14** to pass through the reverse lever **16** but to prevent the end abutment from passing through due to the end abutment having a greater thickness than the intermediate abutment **14**. This provides a safety measure to prevent the end of the ribbon from being pulled off the spool when the operator holds the power rewind feature in operation until the ribbon is all wound on one spool. When an end abutment is stopped by a respective reverse lever, the endless belt **110** will slip against sleeve **100** which prevents damage to the ribbon system.

This novel keyboard control button, when provided with appropriate indicating means such as color coded decals, enables the operator to simply move the button in the direction indicated by the desired color coded decal and wait for the color combination to appear at the printing point.

What is claimed and desired to be secured by Letters Patent is:

1. A multi-color ribbon system for printing machines comprising:

(a) a ribbon mechanism (**10, 22, 23, 24**) including a pair of spools (**82, 96**) for feeding the ribbon across a printing point in response to printing actions;

(b) the ribbon (**12**) having a portion of its length at least one color and having another portion of its length a different color than said one color;

(c) an abutment (**14**) carried by the ribbon and located substantially at the position where said one color portion changes to said different color portion;

(d) a reverse means (**54**, **52**, **50**, **20**, **40**, **26**, **44**) for reversing the feeding direction of said ribbon mechanism;

(e) a lever (**16**) positioned adjacent one spool (**96**) and operable by said abutment when the abutment is located between the spool and the lever to condition said reverse mechanism for actuation in response to printing actions; and

(f) an arm (**70**) mounted on said lever for movement relative thereto from a first position in which the arm cooperates with said lever to form a guide operable by said abutment to condition said reverse mechanism for actuation in response to printing actions to a second position in which said arm moves relative to said lever by said abutment for said abutment to bypass said lever in response to winding the ribbon from one spool toward the other spool.

2. A ribbon system as defined in claim **1** further comprising a spring (**74**) interconnecting said lever and said arm for biasing said arm to said first position.

3. A ribbon system as defined in claim **1** further comprising:

(a) a ribbon carrier (**89**) for carrying the ribbon to and from the print point having channel forms (**90**) for said abutment (**14**) to pass therethrough;

(b) a second lever (**66**) positioned adjacent the second spool (**82**) and operable by said abutment (**14**) when the abutment is located between said second lever and the second spool to condition said reverse mechanism for actuation in response to printing actions; and

(c) an arm (**92**) mounted on said second lever for movement relative thereto by said abutment when said abutment passes through said channel forms and

contacts said arm and thereafter moves said arm relative to said lever for said abutment to bypass said lever to position said abutment between said second lever and the second spool in response to winding the ribbon from one spool to the second spool.

4. A ribbon system as defined in claim **3** further comprising a power means (**104**, **100**, **110**, **112**) for winding said one color portion onto one spool until said abutment (**14**) bypasses one of said levers (**16**) and said ribbon carrier (**89**) and the other of said levers (**66**) for positioning said different color portion at the print point.

5. A ribbon system as defined in claim **4** wherein said power means includes a keyboard controllable means (**114**, **122**, **60**) operatively connected to said reverse means (**32**, **18**) for selectively conditioning said reverse means for winding the ribbon in one of two directions.

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ROBERT E. PULFREY, *Primary Examiner.*

ERNEST T. WRIGHT, *Assistant Examiner.*