

[54] **RIBBON SHIFT ASSEMBLY**
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[22] Filed: **Jan. 8, 1971**
[21] Appl. No.: **105,053**

[52] U.S. Cl. **197/151, 197/156**
[51] Int. Cl. **B41J 33/14**
[58] Field of Search..... **197/151, 154, 156, 197/159, 16, 157, 158**

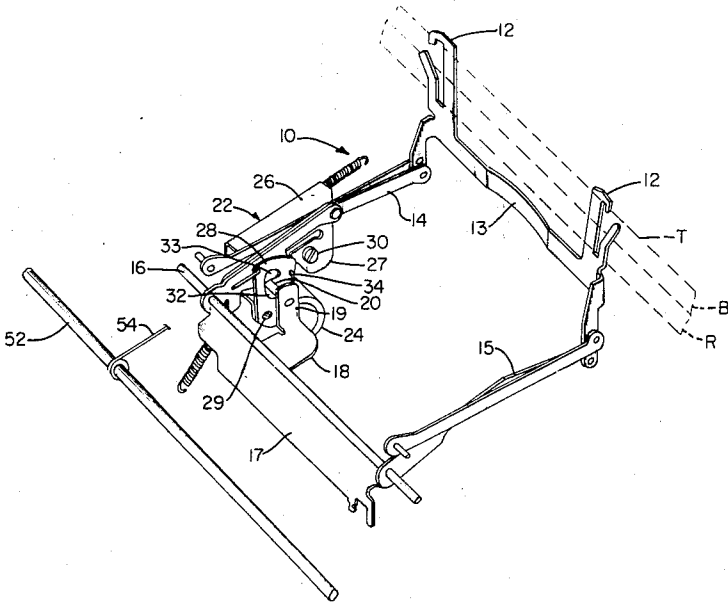
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[57] **ABSTRACT**
A solenoid-operated actuating bail affords a positive, direct means to control shifting of the lift arms in a ribbon-lift guide or carrier assembly for a keyboard printer or typewriter in selecting a desired ribbon color or level for printing.

3 Claims, 4 Drawing Figures



PATENTED JUN 26 1973

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FIG 1

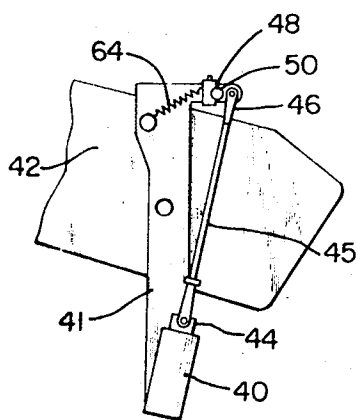
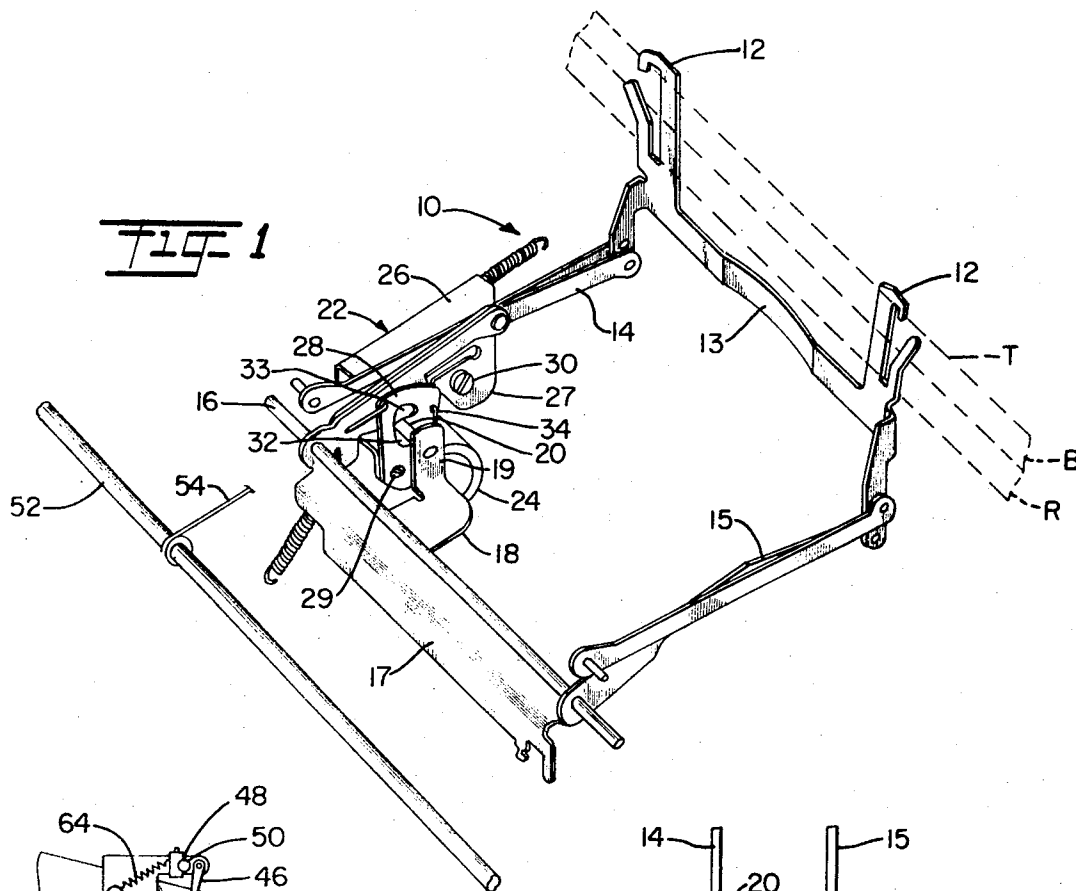


FIG 3

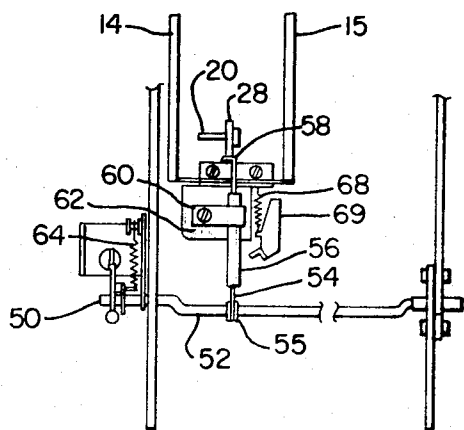


FIG 2

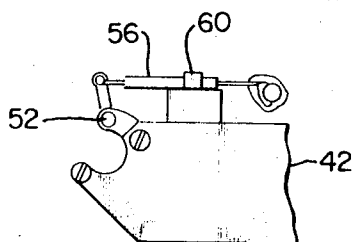


FIG 4

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RIBBON SHIFT ASSEMBLY

This invention relates to keyboard printers and more particularly relates to novel and improved means for shifting a ribbon lift assembly in a keyboard printer to present a selected color or ribbon level for printing.

It is customary to provide in typewriters for a ribbon shift mechanism which will cause a given area of the ribbon to be raised into position for printing. For example, the ribbon may have different color sections, such as, upper and lower, red and black color sections extending the length of the ribbon tape; and when threaded through the ribbon feed mechanism suitable means are provided in association with the ribbon feed mechanism to shift either of the color sections into position for printing.

In single element printing machines, such as, for example, the IBM Selectric I/O Keyboard Printer, the ribbon carrier assembly is shifted by a magnet-controlled, flexible cable trained over a series of pulleys at opposite ends of the typewriter, and the cable controls actuation of a ribbon lift arm assembly to set either desired color level for printing. It is proposed in accordance with the present invention to provide a more positive, direct means of actuation of the ribbon lift arm or guide assembly in place of the tape-pulley arrangement and which can be activated either manually or by code in a reliable, highly efficient manner.

It is therefore an object of the present invention to provide for a novel and improved ribbon shift control mechanism for a keyboard printer.

It is another object of the present invention to provide for a solenoid-operated ribbon shift control assembly to effect positive direct shifting of the ribbon carrier mechanism to present a desired color for printing and wherein the shift control assembly either can be activated by the operator or by remote code control.

It is a further object of the present invention to provide a novel and improved ribbon shift control mechanism which is highly simplified and readily installed to control shifting of the ribbon on the keyboard printer as the ribbon is fed through the printer to present a desired color for typing.

The instant invention is best exemplified by describing its use in controlling the ribbon shift assembly on the ribbon carrier of a single element printer machine, for example, the Selectric I/O Keyboard Printer manufactured by International Business Machines of Armonk, New York. For example, when the color ribbon; that is, a ribbon divided into two different color levels along its length, is passed through guide slots of a ribbon carrier the ribbon carrier is shiftable about a horizontal axis between an upper and lower print position. Specifically in a single element print machine, all of the characters of the type font are on a single printing head which is selectively tiltable and rotatable to present a selected character for printing in response to depression of a given key lever. In this form of typewriter, the print head is advanced with respect to a stationary platen, and the ribbon carrier as well as the shift mechanism is advanced with the print head. The color level or print position of the ribbon selected for typing is determined by the extent of displacement of the shift mechanism, which is associated with the ribbon carrier, about a horizontal axis when it is engaged in each print cycle by a ribbon lift cam. Specifically, a cam follower associated with the lift arm assembly includes a pivotal latch member or keeper which in one position will limit

the displacement of the lift arm assembly when the cam follower is engaged by the cam so as to cause the ribbon to be shifted only a limited distance for printing along one color level; and in a second position will allow the cam follower to be freely movable under the influence of the cam to shift the ribbon for printing along the second color level.

In accordance with the present invention, linkage is provided between a solenoid and the cam follower latch to effect a more positive direct control over movement of the latch to either of the desired positions for shifting of the ribbon and to that end, essentially comprises an actuating link arm operated off the armature of the solenoid to pivot a bell crank which is keyed for rotation of an actuating bail. The bail has an axially offset portion traversing the length of travel of the ribbon carrier and a control line from the bail into the cam follower latch so that when the bail is rotated it will retract the control line to effect pivoting of the latch to one of the print positions; and when the solenoid is de-energized, the latch is spring-loaded to return to the other print position. Thus, through a minimum of working parts, the ribbon shift mechanism can be positively controlled either manually or by electrical signals, the actuating means of the present invention being further characterized by being readily installable on existing keyboard printers and operable with a minimum of wear, adjustment or maintenance necessary.

The above and other objects, advantages and features of the present invention will become more readily appreciated and understood from the following detailed description of a preferred form of invention when taken together with the accompanying drawings, in which:

FIG. 1 is a perspective view of a portion of a ribbon shift assembly incorporating the actuating mechanism of the present invention.

FIG. 2 is a top plan view of the actuating mechanism shown in FIG. 1.

FIG. 3 is an end view thereof; and

FIG. 4 is an opposite end view thereof.

Referring in more detail to the drawings, there is shown by way of illustrative example in FIG. 1 a conventional ribbon shift mechanism assembly designated 10 which is employed in the Selectric typewriter manufactured and sold by International Business Machines of Armonk, New York. In the conventional mechanism, the typewriter ribbon T is divided into red and black sections designated R and B, respectively, and the ribbon is threaded through open, slotted supports 12 on opposite sides of a ribbon-lift guide or carrier assembly 13. Ribbon lift arm 14 and 15 extend forwardly from connection to the guide assembly, are supported at their forward ends on a shaft 16, and are joined together at their forward ends by a common bracket 17 which is spaced and located directly beneath the shaft 16. An extension plate 18 is arranged for rearward extension from the bracket 17 and has an upright support arm 19 which serves to support a stud 20 which extends transversely of the lift arms 14 and 15 in spaced parallel relation to the supporting shaft 16. The stud 20 cooperates with ribbon-lift cam mechanism 22 to control vertical swinging movement of the lift arms and guide assembly 13 about the shaft 16 to properly locate either the red or black ribbon sections in the path of the type font for typing in a manner to be presently described.

In the ribbon-lift cam mechanism 22, ribbon lift cam 24 extends transversely beneath a ribbon-lift cam follower 26 for the purpose of engaging the lower extremity 27 of the cam follower in each revolution of the cycle shaft in a printing cycle. Thus the cam follower 26 is urged upwardly by the cam and will impart a similar motion to cam follower latch 28, the latter positioned intermediately between the lift arm 14 and the support arm 20 and attached to the forward end of the cam follower 26 by a suitable screw 29. The opposite rear end of the cam follower 26 is attached at 30 to a stationary frame, not shown, but which is disposed just outwardly of the lift arm 14 and permanently attached to the typewriter frame. It will be seen that the cam follower latch 28 is provided with intersecting vertical and horizontal slots 32 and 33, respectively, with the horizontal slot extending rearwardly from the upper end of the vertical slot 32. The cam follower 26 is biased rearwardly by return spring 34. In turn, the cam follower latch is free to pivot independently of the cam follower 26 about the pivot 29 and is normally biased in a rearward direction by a latch spring 68 affixed at one end to bracket 17 and at its opposite end to a stationary support 69, as shown in FIG. 2, so that the stud 20 is normally aligned with and inserted in the vertical slot 32. In this position, when the cam follower latch is engaged by the cam in each printing cycle to raise the cam follower 26 and follower latch 28 about the pivot point 30 the stud 20 will move through the vertical slot and accordingly the follower mechanism will pivot independently of the lift arm and guide assembly. As a result, the ribbon T will be lifted only to present the black section B along the upper half of the ribbon for typing. In accordance with conventional practice, by drawing the cam follower latch forwardly, independently of the cam follower 26, about its lower pivot point 29, the stud 20 is positioned in the horizontal slot 33. In this second position, when the cam follower 26 and latch 28 are pushed up by the cam 24 the stud 20 will be forced to rise with the latch thereby causing the extension plate 18 and attached lift arms 14 and 15 to rise to an extent lifting the typewriter ribbon T into a raised position so that the lower red section of the ribbon is aligned in the path of the print characters for typing.

An important feature of the present invention resides in a novel and improved mechanism for shifting the follower latch 28 to the forward position in order to lift the red section of the ribbon T into position for typing. To this end, as best shown in FIGS. 2 to 4, a ribbon shift solenoid 40 is mounted on a vertical plate 41 attached to typewriter frame 42, and when energized, the solenoid activates plunger 44 to draw link arm 45 downwardly. The link arm 45 operates through clevis 46 which is pivotally connected to the plunger, and the opposite end of the clevis is pivotally connected to the free end of a bell crank 48 which is located directly adjacent the bracket or plate 41 inwardly of the clevis and is keyed to the end of a ribbon shift bail 50. The bail 50 is in the form of a solid shaft or rod traversing the width of the typewriter having an intermediate offset portion 52, and opposite ends of the bail are journaled in the upper extremities of brackets 41 which are located at opposite ends of the typewriter.

A follower latch-actuating cable or control line 54 is connected by means of grommet 55 to the offset portion 52 of the bail 50 and extends rearwardly through

a sleeve 56 for connection to the upper end of the follower latch 28. Specifically, the rearward extremity of the cable has a hooked end portion 58 which is inserted in an aperture at the upper end of the follower latch and the cable is freely slidable within the sleeve 56 to follow movement of the offset portion 52 of the shift bail. Here the sleeve 56 is mounted by a suitable spring clip 60 to a flange 62 which is attached to the bracket 17 at the forward ends of the lift arms 14 and 15. In this relation it will be apparent that rotation of the shift bail 50 in a direction away from the follower latch will draw the cable forwardly whereby to draw the follower latch 28 forwardly and position the stud 20 in the upper horizontal slot 33 of the follower latch. Normally, however, the bell crank is spring-loaded by means of a return spring 64 to rotate the bail in a direction toward the follower latch so that the cable 54 will not resist biasing of the follower latch by its own latch spring 68 rearwardly to normally position the stud in the vertical slot 32.

In use, the ribbon lift cam 24 will rotate one revolution in each printing cycle when a key lever is depressed on the typewriter so as to impart a lifting motion to the cam follower 26 and latch 28 in each cycle to present the desired red or black section of the typewriter section T for printing. Normally, when the shift solenoid 40 is not energized, as previously mentioned, the follower latch 28 is urged by its latch spring to a rearward position causing the stud 20 to be freely slidable with respect to the latch when the follower is lifted in accordance with the guide lift assembly and raised only to a position to locate the black section of the ribbon in the path of a character. However, when the solenoid 40 is energized either by depression of a key lever to close an electrical circuit into the solenoid or by code control during automatic printing, the solenoid will activate the plunger 45 to rotate the bell crank 48 and shift bail 50 in a direction causing the offset portion 52 to rotate in a direction away from the follower latch. Again the cable 54 is drawn forwardly with the shift bail to overcome the urging of the latch spring 34 and draw the follower latch 28 forwardly in position with the stud in the upper horizontal slot 33. Free disposition of the follower latch is effected just prior to lifting of the follower in each cycle so that the lifting motion imparted to the follower and its latch will cause lifting of the lift arm and guide assembly through the greater distance necessary to position the red section of the ribbon in the path of the character. When the solenoid is deenergized, the shift bail is returned to its original disposition under the urging of its return spring and the follower latch is also returned by the latch spring.

From the foregoing, utilization of a rigid rod or shaft in combination with the cable affords more direct and positive control over actuation of the follower latch while eliminating use of complicated pulley and cable or tape arrangements in present day use.

It is to be understood from the foregoing that various modifications and changes may be made in the construction and arrangement of elements comprising the preferred form of the present invention, such as, for example, use in other forms of printer apparatus than that described, without departing from the spirit and scope of the present invention.

What is claimed is:

1. In a typewriter having a support frame, a ribbon-lift guide assembly including lift arms for supporting a

typewriter ribbon which is provided with upper and lower printing levels, means pivotally supporting said guide assembly for vertical movement to present a selected printing level on the ribbon for typing, a cam, cam follower means responsive to movement of the cam in each printing cycle to undergo vertical movement, an extension member carried by the lift arms selectively engageable with the cam follower means in a first position of the cam follower means to transmit up and down movement of the cam follower means to the lift arms to establish a first printing level of the ribbon and in a second position permitting free independent movement of the cam follower means with respect to the lift arms to establish a second printing level on the ribbon, the combination therewith comprising:

an elongated substantially rigid and rotatable shift bail traversing substantially the width of said typewriter and journaled for rotation at opposite ends on said support frame for extension across the typewriter in a direction perpendicular to the lift arms including an axially offset portion between said opposite ends selectively movable in a direction normal to its length upon rotative movement of the shift bail so as to be rotated toward and away from the cam follower means in response to rotation of said bail in advancing the cam follower means between the first and second positions,

a draw cable secured by connecting means to the axially offset portion and extending between the axially offset portion on said shift bail and the cam follower means and operative to advance said cam follower means to one of the first and second positions in response to actuation and rotation of the axially offset portion of said shift bail toward the cam follower means and to advance said cam follower means to the other of the first and second positions in response to rotation of the axially offset portion away from said cam follower means,

actuating means operatively connected to said shift bail and being selectively activated for rotation of the axially offset portion about the axis of said shift bail in advancing the axially offset portion toward and away from said cam follower means, and return means associated with said shift bail and operative to return the cam follower means to the other of the first and second positions when said actuating means is not activated.

2. In a typewriter according to claim 1, said actuating means defined by a solenoid including a plunger, and a bell crank keyed to one end of said shift bail to effect rotation of said shift bail when said solenoid is energized

to advance the offset portion on said shift bail in a direction away from the cam follower means.

3. In a keyboard printer having a support frame, a ribbon-lift guide assembly for supporting a typing ribbon which is provided with upper and lower printing levels of different colors wherein said guide assembly has lift arms extending forwardly and pivotally supported for vertical movement of said guide assembly to present a selected printing level on the ribbon for typing, a rotatable cam member spaced beneath said guide assembly, a cam follower mechanism including a cam follower latch in which the cam follower mechanism is responsive to engagement by the rotatable cam in each printing cycle to cause the cam follower latch to be lifted, an extension arm carried by the lift arms on said guide assembly including a stud inserted in horizontal and vertical intersecting slots on the cam follower latch, the latch being pivotal to a first position in which the stud is disposed in the vertical intersecting slot so as to permit free, independent movement of the latch with respect to the lift arms and position the ribbon at a first printing level and a second position in which the stud is disposed in the horizontal lifting slot to transmit lifting movement of the latch to the lift arms and guide assembly so as to raise the typing ribbon to a second printing level; the combination therewith comprising:

a shift bail extending the substantial width of the printer and including opposite end portions journaled for rotation on said support frame and having a shift portion axially offset with respect to the ends of said bail and extending transversely of the direction of pivotal movement of the cam follower latch, draw cable means extending between the offset portion on said shift bail and the cam follower latch and operative to advance the cam follower latch to the first position in response to rotation of said shift bail,

actuating means for selectively rotating said shift bail to pivot the cam follower latch to the first position, said actuating means including a solenoid, a plunger operatively connected to the solenoid for axial movement thereby, and a bell crank operatively connected to said plunger and keyed to one end of said shift bail to effect rotation of said shift bail when said solenoid is energized to advance the offset portion on said shift bail to said first position, and

return means for returning said shift bail to the second position when said actuating means is not activated.

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