

Sept. 24, 1963

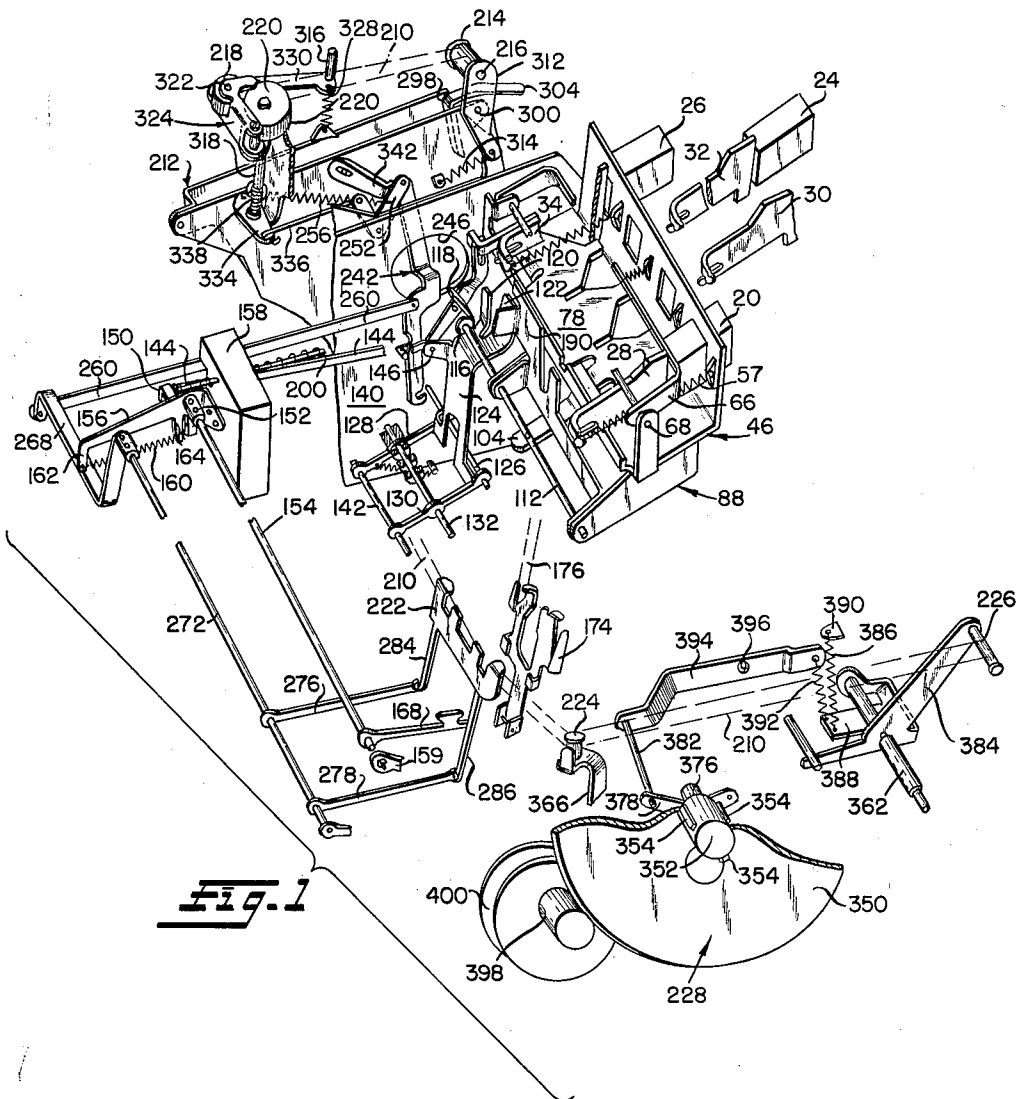
F. H. CANNY ET AL

3,104,750

RIBBON MECHANISM

Filed Dec. 6, 1960

6 Sheets-Sheet 1



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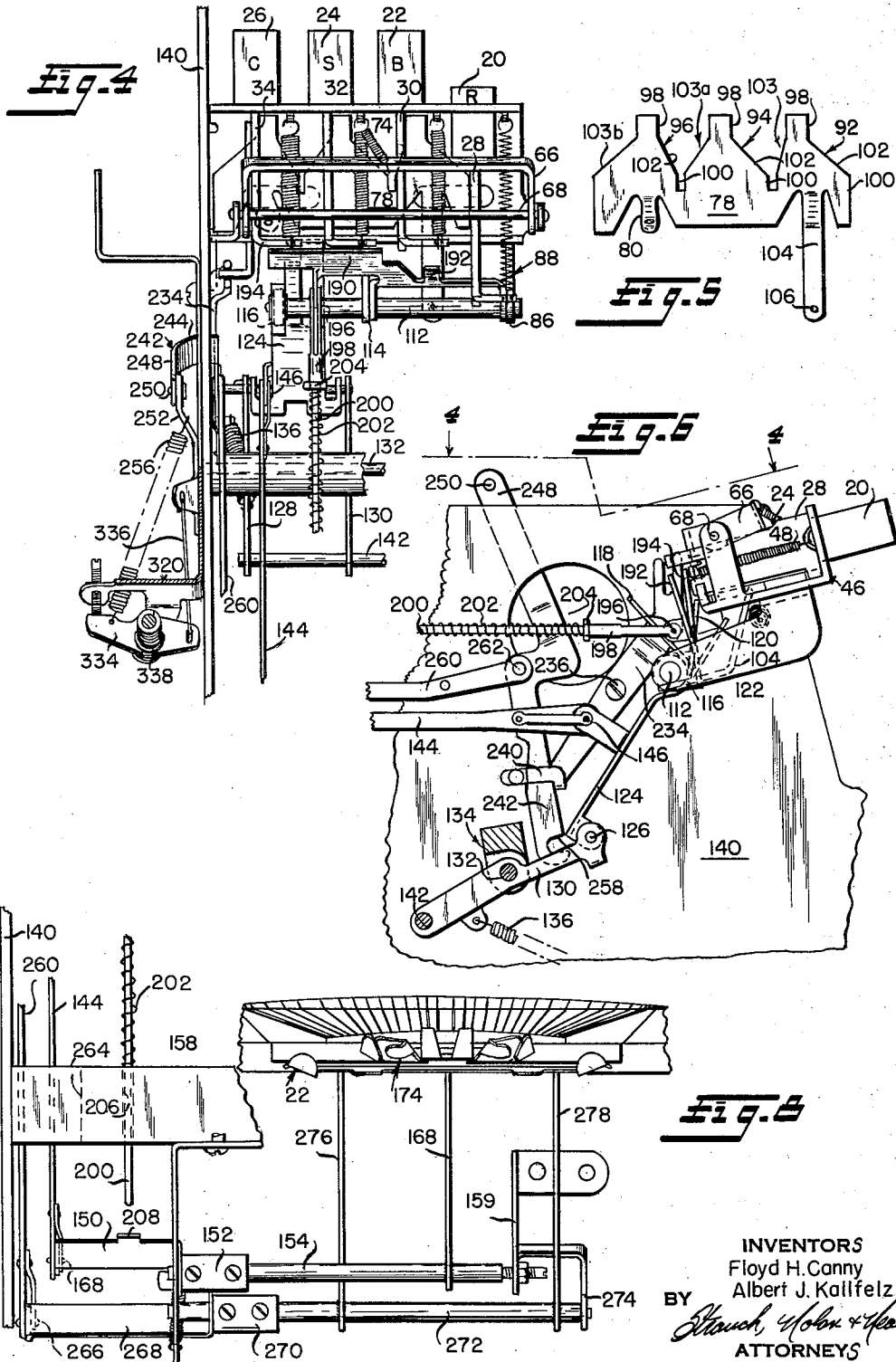
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RIBBON MECHANISM

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6 Sheets-Sheet 3



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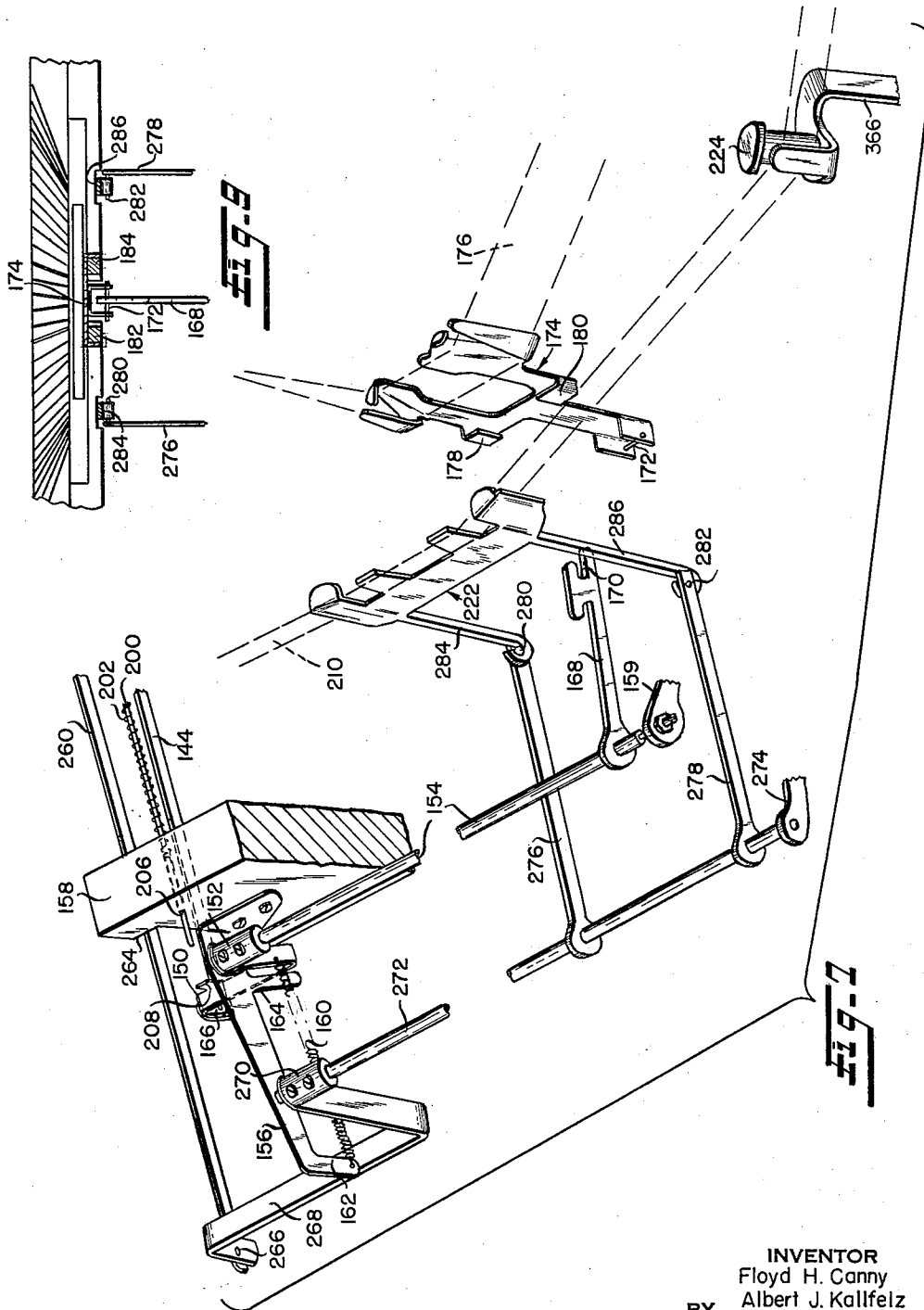
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RIBBON MECHANISM

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6 Sheets-Sheet 4



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RIBBON MECHANISM

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Fig. 11

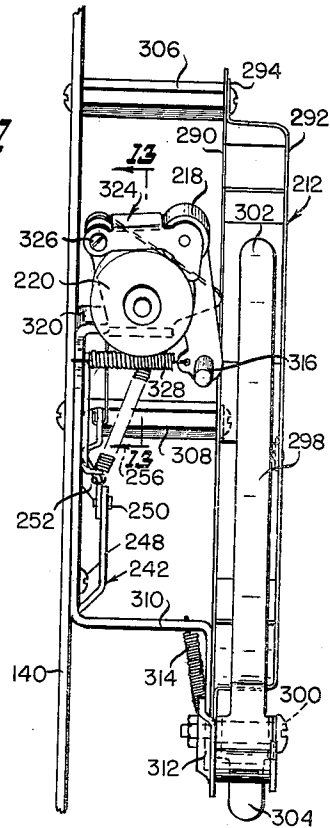


Fig. 12

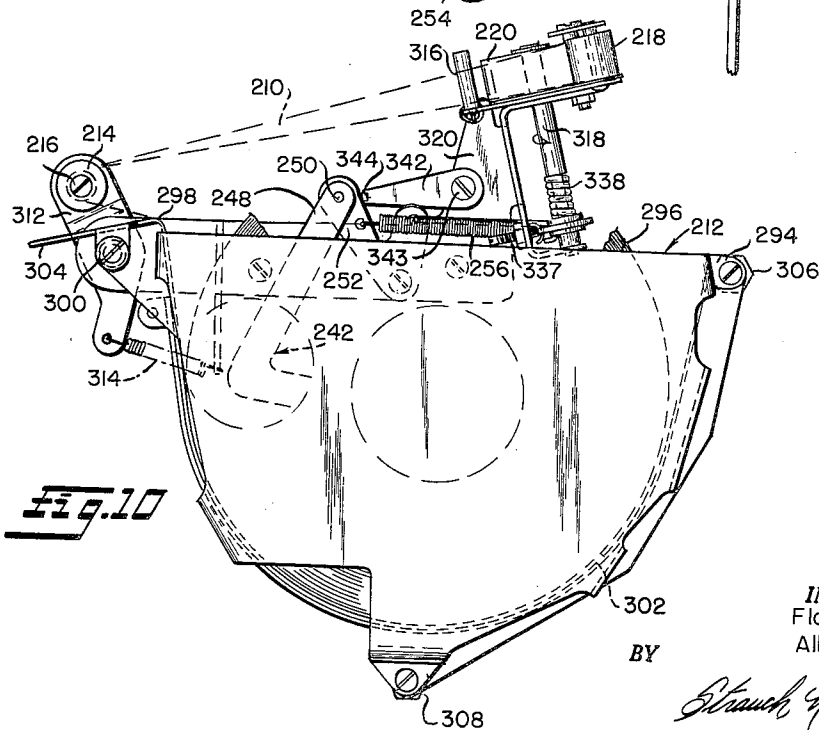
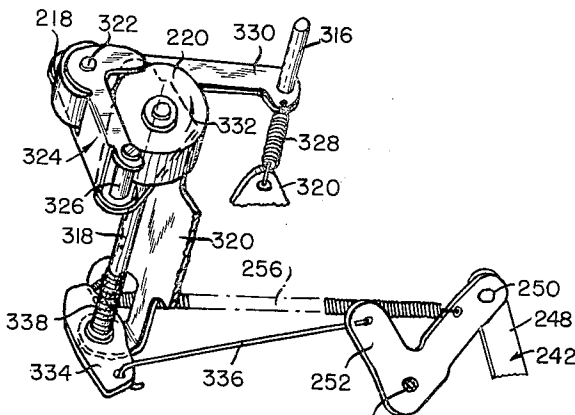


Fig. 10

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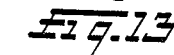
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RIBBON MECHANISM

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RIBBON MECHANISM

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14 Claims. (Cl. 197-156)

This invention relates to typewriters, and more specifically to ribbon feed mechanisms for power driven typewriters.

During recent years, the carbon ribbon has come into widespread use as an ink supply means for typewriters. A carbon ribbon may be used only once and is somewhat more expensive than the conventional ink fabric ribbon. In order to allow the typist to type a substantial length of time before a new ribbon must be installed in the machine, it is necessary to make provision for the storage of a large quantity of carbon ribbon within the typewriter. Prior typewriters having the carbon ribbon and the fabric ribbon installed in the machine at the same time have an inconvenient, uncertain position control knob for the selection mechanism. Such prior typewriters cannot store a standard size roll of carbon ribbon and the unloading of the used carbon ribbon is inconvenient in that it must be removed by the fingers.

It is the purpose of my invention to provide a ribbon feed mechanism for conventional typewriters which will enable the typist to use either a fabric ribbon or a carbon ribbon at the option of the typist.

The primary object of the invention is to provide a typewriter wherein the typist may change from fabric ribbon use to carbon ribbon use quickly and easily without touching the ribbons, preferably by merely pushing a button.

A further object of the invention is to provide a typewriter having dual ribbon guide mechanisms permitting the installation of a fabric ribbon and a carbon ribbon simultaneously in the same machine.

A further object of the invention is to provide a dual ribbon feed mechanism permitting the simultaneous installation of a fabric ribbon and a carbon ribbon in a typewriter wherein one ribbon will be maintained out of the way of the typewriter mechanisms during the use of the other ribbon.

A more specific object of the invention is to provide a carbon ribbon feed and take-up mechanism which will maintain the tension in the ribbon at all times whether or not the ribbon is in use and will feed the ribbon stepwise past the printing point incident to a printing stroke of said typewriter without a substantial change in the tension of the ribbon over the use of the entire spool.

Another specific object of the invention is to provide a selector mechanism for a typewriter which will allow the typist to select between the colors of a bichrome ribbon, the use of a carbon ribbon, or the use of no ribbon at all, merely by manipulation of a single control mechanism, such as a push button, located near the keyboard of the typewriter.

These and other objects and advantages of the present invention will become more fully apparent by reference to the appended claims and as the following description proceeds in reference to the accompanying drawings, in which:

FIGURE 1 is a schematic view of the entire duplex ribbon mechanism illustrating the paper, carbon ribbon feed, vibrator and take-up mechanisms and the cloth-linked ribbon vibrator mechanism;

FIGURE 2 is an exploded perspective view of the ribbon selector mechanism and the ribbon universal together with the carbon ribbon feed drive connection;

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FIGURE 3 is a rear elevation of the selector mechanism;

FIGURE 4 is substantially a top plan view of the selector mechanism and the carbon ribbon feed mechanism being a view taken along the line 4-4 of FIGURE 6;

FIGURE 5 is a detailed top plan view of the index slide of the selector mechanism;

FIGURE 6 is a side elevation view of the selector mechanism ribbon universal and carbon ribbon feed drive connection;

FIGURE 7 is an exploded schematic view of the ribbon vibrator drive trains and the ribbon carriers for the fabric and carbon ribbons;

FIGURE 8 is a top plan view of the ribbon carrier and ribbon vibrator mechanisms for both the carbon and fabric ribbon;

FIGURE 9 is a horizontal sectional view through the ribbon vibrator and carrier mechanisms;

FIGURE 10 is a side elevation of the carbon ribbon feed spool pocket and the carbon ribbon feed roll and drive mechanism as viewed from the right side of the typewriter;

FIGURE 11 is a top plan view of the carbon ribbon feed spool pocket together with the carbon ribbon feed roller;

FIGURE 12 is a perspective view of the carbon ribbon feed roller and drive mechanism;

FIGURE 13 is a fragmentary section taken on line 13-13 of FIGURE 11 showing the carbon ribbon feed roller and drive shaft in detail;

FIGURE 14 is substantially a right side elevation of the carbon ribbon take-up spool and drive means together with the tension-adjusting mechanism being a section along the line 14-14 of FIGURE 15; and

FIGURE 15 is a top plan view of the carbon ribbon take-up spool with the take-up drive and tension-adjusting mechanism.

Referring now to the drawings and particularly to FIGURE 2, at the right of the typewriter as viewed from the front thereof and above the level of the keyboard is mounted a ribbon selector control provided with four push buttons 20, 22, 24 and 26 having stems 28, 30, 32 and 34 respectively fixed thereto and projecting rearwardly therefrom. The keys 20-26, which are each of substantially square cross section, are guided for reciprocation respectively in apertures 36, 38, 40 and 42 of the upstanding portion 44 of a bracket 46 fixed to the machine frame. The stems 28, 30, 32 and 34 are guided for reciprocation in notches 48, 50, 52 and 54 (best shown in FIGURE 3) in an upstanding portion 56 at the rear of bracket 46. The keys 20-26 and the key stems 28-34 fixed respectively thereto, are biased to their inoperative forwardly retracted positions toward the front portion 44 of bracket 46 by tension springs 57, 58, 60 and 62 respectively. Forward motion of the keys 20-26 is limited by the engagement of stop surfaces 64 on each of the stems 28-34 with the rear face of the front portion 44 of the bracket 46 above the apertures 36-42 respectively. Any depressed one of the keys 20-26 is retained in its depressed position in opposition to the biasing force of the associated one of the springs 57-62 by a bail 66 pivotally mounted upon a shaft 68 supported by upstanding ears 70 and 72 at and integral with the opposite ends of the bracket 46. When any one of the 20-26 keys has been depressed to the position illustrated for key 20 in FIGURE 2, the bail 66 drops in front of the stop surface 64 under the biasing influence of a tension spring 74 connected between the center of bail 66 and the front portion 44 of bracket 46 and is thereby effective to prevent forward retractive movement of the key toward the front of the machine. Each of the key stems 28-34 is provided on its top edge with a cam surface 76. When

any one of the keys 20, 22, 24 or 26 is depressed, its cam surface 76 is effective to lift the bail 66 in opposition to the biasing force of the spring 74 to a height sufficient to disengage the bail 66 from the stop surface 64 of the stem of any previously depressed one of the keys 20, 22, 24 and 26. By partial depression of a key to a position in which the edge 77 thereof intermediate the stop 64 and cam surface 76 lies beneath the bail and then releasing that key, all of the keys 20-26 can be retracted.

The keys 20, 22 and 24 are effective to control the actuation of a bichrome cloth ribbon and key 26 is effective to control the actuation of a paper carbon ribbon. Depression of key 20 will, when a type bar is actuated to printing position, result in lifting of the cloth ribbon to its highest position relative to the typewriter printing position, and retain the carbon ribbon below the printing position. If the cloth ribbon is a bichrome ribbon this will result in printing in red by the typewriter. Depression of the key 22 will condition the cloth ribbon lift mechanism to lift the cloth ribbon to a lesser extent so that its upper half is in printing position and retain the carbon ribbon below the printing position and will result in printing in black from the cloth ribbon. Depression of the key 24 conditions the ribbon lift mechanism so that both the cloth and carbon ribbons remain below the level of the printing position and is used for stencil cutting. Depression of the carbon ribbon 26 will retain the cloth ribbon below the printing position and condition the carbon ribbon lift mechanism to lift the carbon ribbon to the printing position when a type bar is actuated.

The mechanism by which the cloth ribbon is controlled and vibrated will be described first. The cloth ribbon is fed back and forth between supply and take-up spools by any conventional ribbon reversing and feeding mechanism (not shown).

Mounted upon bottom wall 83 of the bracket 46 between the portions 56 and 44 thereof and beneath the stems 28-34 is a slide 78 mounted for sliding movement transversely of the direction of movement of the key stems 28-34. Slide 78 is provided with an ear 80 projecting through an aperture 82 in the bottom wall 83 of the bracket 46 and is resiliently biased toward ear 70 of bracket 46 to the left as viewed from the front of the typewriter by a tension spring 84 (see FIGURE 3) interconnecting ear 80 of slide 78 with an arm 86 of a U-shaped bracket 88 fixed to the bottom of the bracket 46 by rivets 89 as is best shown in FIGURE 3.

The keys 20, 22 and 24, when depressed, are effective to move the slide 78 in varying amounts toward the ear 72 on the bracket 46 in opposition to the biasing force of the tension spring 84. For this purpose, each of the stems 28, 30 and 32 is provided with a downwardly extending projection 90 (FIGURE 2). The structure of the slide 78 is best illustrated in detail in FIGURE 5. As is therein shown, the slide 78 is provided with cam surfaces 92, 94 and 96 each having spaced parallel portions 98 and 100 extending perpendicular to the direction of movement of slide 78 and interconnected by diagonally extending portions 102. The cam surfaces 92, 94 and 96 are biased by spring 84 (FIGURE 3) into engagement with the downward projections 90 (FIGURE 2) of the key stems 28, 30 and 32 respectively. When key stems 28, 30 and 32 are in their forward retracted inoperative positions, as shown for key stems 30 and 32 in FIGURE 2, the cam surface portions 98 of the slide 78 are in contact with the sides of the respective downward projections 90 thereof. When one of the key stems 28, 30 or 32 is manually depressed to its operative rearward position as shown for key stem 28 in FIGURE 2 its projection 90 is in engagement with the cam surface portion 100 of the associated one of the cam surfaces 92, 94 and 96. Depression of any one of the keys 20, 22, or 24 is effective to shift the projection 90 of its key stem from engagement with the cam surface portion 98 into

engagement with the cam surface portion 100 along the diagonal cam surface portion 102 of the associated one of the cam surfaces 92, 94 or 96. In so doing, such key stem is effective to shift the slide 78 laterally an amount determined by the lateral spacing between the parallel cam surface portions 98 and 100 of the associated cam surface 92, 94 or 96. As is apparent from FIGURE 5 the lateral spacing between the cam surface portions 98 and 100 of the cam surface 92 is greater than the lateral spacing between the cam surface portions 98 and 100 of the cam surface 94 and the lateral spacing between the cam surface portions 98 and 100 of the cam surface 94 is greater than the lateral spacing between the cam surface portions 98 and 100 of the cam surface 96. As a result, the depression of the key 20 will impart a maximum lateral movement to the slide 78 in opposition to the biasing force of spring 84, depression of the key 22 will impart movement of intermediate magnitude to the slide 78 and depression of the key 24 will impart a minimum movement to the slide 78. Actually, it is not essential for key 24 to impart any movement so slide 78. Key stem 34 does not normally engage slide 78 when in either its retracted or depressed position. When all of the keys 20-26 are retracted, the slide 78 is in its extreme left position (as viewed from the front of the machine). As will become apparent presently when slide 78 is in this position, neither ribbon will be lifted to printing position. As is apparent from FIGURE 5, slide 78 is provided with complementary cam surfaces 103, 103a and 103b cooperating with key stems 30, 32 and 34 respectively to restore the slide 78 to its home position positively in the event of breakage of spring 84 or of slide 78 becoming stuck for any reason. Cam surfaces 103, 103a and 103b also provide a positive interlock preventing simultaneous depression of more than one of the keys 20-26.

As is most clearly shown in FIGURE 5 slide 78 has a downwardly and rearwardly extending arm 104 having an aperture 106 at the end thereof. Referring to FIGURE 2, the arm 104 extends through an aperture 108 in the base wall 83 of the bracket 46 and to the rear of bracket 46 and is connected by a spring-pin 110 to a shaft 112 mounted for axial displacement in the arms 86 and 114 of the U-shaped bracket 88. Shaft 112, at its free end, rotatably supports a roller 116 which, depending upon the axially shifted position of shaft 112 under control of the slide 78, is positioned for engagement with one of three cams 118, 120 and 122 of an actuator lever or crank 124. When key 20 is depressed, roller 116 is in alignment with cam 118; when key 22 is depressed roller 116 is in alignment with cam 120; and when either key 24 or 26 is depressed roller 116 is in alignment with cam 122.

The crank 124 is pivotally mounted upon a shaft 126 fixed between spaced parallel arms 128 and 130 which in turn are pivotally mounted by a shaft 132 journaled on the frame by a bearing structure 134. The arms 128 and 130 are biased in a counter clockwise direction as viewed in FIGURE 2 about the axis of shaft 132 by a tension spring 136 connected between the arm 128 and a spring stud 138 fixed to a side wall 140 of the typewriter frame. The arms 128 and 130 are interconnected rearwardly of the bearing structure 134 by a shaft 142 by which the arms 128 and 130 are actuated in a clockwise direction about the axis of shaft 132 in opposition of the biasing force of the spring 136 through a predetermined limited path on each occasion that a type bar of the typewriter is moved to printing position. The crank 124 is biased in a counter clockwise direction about the axis of the shaft 126 through a link 144 pivotally connected to the crank 124 by a pivot stud 146 as will be described presently. By this construction, crank 124 is always biased so that one of its cams 118, 120 or 122 is in engagement with the roller 116 on shaft 112. If key 20 is depressed so that roller 116 is in alignment with cam 118, clockwise

movement of the arms 128 and 130 about the axis of shaft 132 will depress crank 124 and cause it to pivot through the engagement of roller 116 and cam 118 in a clockwise direction about the axis of shaft 126 and pull the link 144 toward the front of the typewriter. Due to the relative curvatures of cams 118, 120 and 122, engagement of roller 116 with cam 118 will impart a maximum forward motion to the link 144. If key 24 is depressed so that roller 116 is in alignment with cam 120, the lowering of crank 124 under the influence of the arms 128 and 130 will impart clockwise pivotal movement to the crank 124 about the axis of shaft 126 and forward movement of the link 144 to a lesser extent than when roller 116 is in engagement with cam 118. When keys 24 or 26 are depressed, the roller 116 will be in alignment with the cam 122 of the crank 124. The cam surface 122 is so formed that when roller 116 is in engagement with it, lowering of crank 124 will not impart any pivotal movement to crank 124 to impart forward motion to the link 144.

Referring now to FIGURES 1, 7 and 8, the link 144 is connected at its rearward end to a pivot link 150. Pivot link 150 is a Z-shaped link which is fixed by a collar 152 to a shaft 154 which is journaled at its right hand end as viewed from the front of the machine upon a bracket 156 fixed to a portion of the frame structure 158 and at its left hand end by a frame mounted bracket 159 as shown in FIGURE 8. The link 150 and the shaft 154 are biased in a clockwise direction as viewed in FIGURES 1 and 7 by a tension spring 160 extending between a downwardly extending arm 162 of the bracket 156 and the pivot link 150. Clockwise rotation of the link 150 and the shaft 154 is limited by the engagement of the pivot link 150 with a stop arm 164 on bracket 156. As is most clearly shown in FIGURE 7, the pivot stud 166 interconnecting the Z-shaped link 150 with the link 144 is located below the axis of the shaft 154 so that forward movement imparted to link 144 resulting from the cam action of roller 116 upon either of the cams 118 or 120 as the crank 124 is depressed will impart counter-clockwise pivotal movement to the Z-shaped link 150 and the shaft 154. A ribbon vibrator link 168 is fixed to the shaft 154 adjacent its left hand end as viewed from the front of the machine and has a forwardly extending notch 170 which embraces a pin 172 upon the lower end of the cloth ribbon carrier 174. The cloth ribbon carrier 174 is formed with guide members 178 and 180 which, in assembly, embrace frame mounted guides 182 and 184 (FIGURE 9) respectively to guide the ribbon carrier 174 for vertical movement between its normal inoperative position below the printing position and its two operative positions in which the upper and lower portions of the ribbon 176 are positioned in alignment with the printing position.

In summary, therefore, when roller 116 (FIGURE 1) is in engagement with cam 118 in response to depression of the key 20, the maximum amount of forward movement will be imparted to the link 144 resulting in a maximum pivotal movement of the shaft 154 and the ribbon vibrator 168 and maximum lift of the ribbon carrier 174. With continued reference to FIGURE 1, depression of key 22 will position roller 116 in alignment with the cam 120 which upon depression of the crank 124 will result in a lesser forward motion of link 144 and lesser pivotal movement of shaft 154 and ribbon vibrator 168 and a lesser lift of the ribbon carrier 174. When either key 24 or 26 is depressed, the roller 116 will be positioned in alignment with the cam 122 and upon depression of the crank 124 no forward motion of link 144 will result. The shaft 154, the ribbon vibrator 168 and the ribbon carrier 174 will thus remain in their normal inoperative positions as determined by the engagement of the stop 164 with the pivot link 150.

Referring now to FIGURES 2, 3, 4 and 6, a ribbon carrier overthrow gate 190 is pivotally mounted upon the shaft 112 between the arms 86 and 114 of the bracket 88. Overthrow gate 190 has a first portion 192 disposed

in the rearward path of movement of the key stem 30 and a further and larger portion 194 disposed in the rearward paths of movement of key stems 32 and 34. As is most clearly illustrated in FIGURES 4 and 6 the portions 192 and 194 are relatively angularly off-set with respect to the axis 112 so that engagement of the key stem 30 with the portion 192 will impart a first pivotal motion to the overthrow gate 190 and engagement of either stem 32 or 34 with the portion 194 of the overthrow gate 190 will impart a greater degree of angular movement of overthrow gate 190 about the axis of shaft 112. The key stem 28 upon depression, will not engage the overthrow gate 190 as is most clearly illustrated in FIGURE 3. Referring again to FIGURES 4 and 6, overthrow gate 190 is pivotally connected by a stud 196 to a yoke 198 fixed to the forward end of a push rod 200 which, over the major portion of its length, is surrounded by a compression spring 202 compressed between a nut 204 fixed to the rod 200 at its forward end and the frame member 158 (FIGURES 7 and 8) through an aperture 206 of which rod 200 is guided at its rearward end. The rearward end of the rod 200 projecting through the member 158 is in alignment with an upwardly extending tab 208 on the Z-shaped pivot link 150. Spring 202 normally biases rod 200 toward the front of the machine out of the path of movement of the tab 208. When key 22 is depressed, it will, as shown in FIGURE 4, engage the portion 192 of the overthrow gate 190 to pivot overthrow gate 190 slightly to the rear of the machine and thereby shift rod 200 rearwardly into the path of movement of the tab 208 (FIGURE 7) of the link 150. Portion 192 of overthrow gate 190 is so located that the motion imparted to rod 200 upon depression of key 22 will prevent overthrow of the ribbon carrier 174 to a position in which any portion of the lower half of the ribbon 176 would be in alignment with the printing position. This assures that, when a bi-chrome ribbon is used, no part of the lower red half of the ribbon will be in the printing position when the black upper portion of the ribbon has been selected by depression of the key 22.

Referring again to FIGURE 4, depression of either key 24 or 26 will, by engagement of the ends of their respective stems 32 and 34 with the portion 194 of the overthrow gate 190, shift rod 200 toward the rear of the machine to a greater extent than resulted from the depression of key 22. Referring to FIGURE 7 this places the end of the rod 200 closely adjacent the inoperative position of the tab 208 of the Z-shaped link 150 to be certain that no material motion is imparted to the link 150 and the ribbon carrier 174 when either the stencil key 24 or the carbon ribbon key 26 has been depressed.

The cloth ribbon 176 is fed longitudinally through the ribbon guide 175 step by step with each type bar actuation between supply and take-up spools disposed on the machine at opposite sides of the ribbon guide 174 by any conventional automatically reversing ribbon feed mechanism.

Referring to FIGURE 1, the carbon paper ribbon 210 is fed from a supply roll disposed within a supply roll container 212 over a guide roll 214 disposed for rotation upon a horizontal shaft 216 between a pair of feed rolls 218 and 220 through a carbon ribbon guide 222 around guide pins 224 and 226 to a power driven take-up reel 228. As is customary, the carbon ribbon is used but once and then disposed of and replaced. When the key 26 is depressed to effect selection of the carbon ribbon, the cloth ribbon 176 is de-activated by positioning roller 116 in alignment with cam 122 as described heretofore, the carbon ribbon feed mechanism is activated and the carbon ribbon guide is vibrated to printing position upon each character key actuation as will now be described.

Considering first the mechanism for vibration of the carbon ribbon, the key stem 34 (FIGURE 2) has a laterally extending projection 230 extending through an elongated notch 232 in the upper end of a lever 234

pivoted upon the frame side member 140 by a pivot stud 236. At its lower end, lever 234 is provided with a pair of arms 238 and 240 which are interconnected at their opposite ends and define an opening through which a link 242 extends for free relative sliding movement. Link 242 has a laterally bent portion 244 extending through an aperture 246 in the frame side member 140 and an upwardly extending portion 248 by which link 242 is pivotally suspended by pivot stud 250 from the forwardly extending arm of a bellcrank 252. Bellcrank 252 is pivotally mounted on the frame side member 140 at 254 and is resiliently biased in a counterclockwise direction, as viewed in FIGURE 2, about that pivot 254 by a tension spring 256 as will be more fully explained presently. For the present, it will suffice to understand that the link 242 is pivotal about the pivot 250 under control of the lever 234 and is free to move vertically between the arms 238 and 240 of the lever 234 as bellcrank 252 is pivoted about its pivot 254 in opposition to spring 256.

Pivotal movement of the lever 234 in a counterclockwise direction about its pivot 236 upon depression of the key 26 pivots the link 242 in a counterclockwise direction about the pivot 250 to a position in which a notch 258 at the lower end of link 242 embraces the laterally projecting end of the shaft 126 upon which the crank 124 is pivoted. It will be recalled, that shaft 126 is pivoted in a clockwise direction about the axis of shaft 132 in opposition to the biasing force of spring 136 each time a type character is actuated to the printing position in engagement with the platen. This movement of shaft 126, when shaft 126 is in engagement with the notch 258 of link 242, will pivot bellcrank 252 in a clockwise direction about its pivot 254 for a purpose to be explained presently and a pull a link 260 pivotally connected to the link 242 at 262 toward the front of the machine. As is most clearly illustrated in FIGURES 7 and 8, link 260 extends parallel to link 144 to the rear of the machine through a notch 264 in the frame member 158 and at its rearward end is pivotally connected at 266 to a Z-shaped link 268 which is fixed by a collar 270 to a shaft 272. Shaft 272, which is parallel to shaft 154, is journaled at its right hand end as viewed from the front of the machine upon the bracket 156 and at its left hand end, as so viewed, upon a bracket 274 fixed to bracket 159. Fixed to shaft 272 intermediate brackets 274 and 156 are a pair of ribbon vibrator arms 276 and 278 pivotally connected at 280 and 282 respectively to the vertically extending arms 284 and 286 of the carbon ribbon guide 222. This entire linkage is normally biased to its inoperative position in which the carbon ribbon 210 is below the printing position by the action of tension spring 256 (FIGURE 2) acting upon the bellcrank 252 to bias it in a counter-clockwise direction about its pivot 254. By this construction, when the carbon ribbon key 26 is depressed to pivot link 242 into engagement with the shaft 126, the actuation of any type bar to printing position results in pivotal motion of the shaft 126 in a clockwise direction about the axis of shaft 132 and through the action of link 260, imparts upward motion to the carbon ribbon carrier 222 as shown in FIGURE 7.

Referring to FIGURES 10 and 11, the ribbon supply roll receptacle or container 212 is an open top receptacle having spaced parallel side walls 290 and 292 interconnected by a formed tab 294. The ribbon supply roll 296, as is best shown in FIGURE 10, rests upon an elongated curved finger 298 pivotally mounted at 300 and extending into the receptacle 212 under the roll 296 to the point indicated at 302. Finger 298 is provided with a forwardly projecting thumb tab 304 which, upon manual depression, is effective to pivot the finger 298 about the pivot 300 to lift the usual paper hub of the supply roll 296 from the receptacle 212 when the carbon ribbon supply has been exhausted.

The receptacle 212 is mounted in spaced parallel relation to the frame side wall 140 by spacers 306 and 308

and a bracket 310 as is best shown in FIGURE 11. The carbon ribbon feeds from beneath the roll 296 along the finger 298 as a guide and around the roller 214 journaled on the stud 216 about an axis parallel to the axis of roll 296 when in receptacle 212. The stud 216 is fixed to the upper arm of a bellcrank 312 pivoted on the pivot stud 300 and resiliently biased in a counterclockwise direction about pivot stud 300 by a spring 314 tensioned between the bellcrank 312 and the bracket 310 to maintain the carbon ribbon 210 under slight tension.

From the roller 214, the ribbon 210 is twisted through 90° and passes around an upstanding guide stud 316 and then between the rollers 218 and 220. Roller 220 is fixed to a shaft 318 that is journaled upon a bracket 320 fixed to the frame side wall 140. As is best illustrated in FIGURE 12, roller 218 is journaled by a shaft 322 extending parallel to the shaft 318 upon a bellcrank 324 pivotally mounted upon a pivot shaft 326 on the bracket 320 and biased by a tension spring 328 tensioned between the arm 330 of bellcrank 324 and the bracket 320 as is best illustrated in FIGURE 11. Spring 328 thus biases roller 218 into rolling engagement with the carbon ribbon feed roller 220 with the ribbon 210 being fed therebetween as the roller 220 is driven in a counter-clockwise direction about the axis of shaft 318 as indicated by the arrow 332 in FIGURE 12. The ribbon 210 passes to the left of stud 316 as viewed in FIGURE 11 so that, if the supply roll 296 (FIGURE 10) becomes jammed for any reason, the tension upon the ribbon 210 will force guide pin 316 to the right as viewed in FIGURE 11 in opposition to the biasing force of the spring 328 to cause the bellcrank 324 to pivot in a counter-clockwise direction about the pivot stud 326 to disengage roller 218 from feed roll 220 to permit the feed roll 220 to continue to intermittently rotate without imparting drive tension to the ribbon 210.

The mechanism by which the shaft 318 is intermittently advanced is best illustrated in FIGURES 12 and 13. Referring to FIGURE 12, it will be recalled that with the carbon ribbon key 26 depressed, the link 248 is pulled down each time a type bar is moved to printing position and imparts clockwise pivotal movement to the bellcrank 252 about its pivot 254. Bellcrank 252 is connected to a lever 334 pivotally mounted upon the bracket 320 concentric with the shaft 318 by a pull rod 336 at one side of the axis of shaft 318 and by the tension spring 256 at the opposite side of the axis of the shaft 318. The limit of motion of lever 334 in the direction opposite to that of arrow 332 under the biasing force of tension spring 256 is established by engagement of lever 334 with an adjustable stop screw 337 as shown in FIGURE 10. Referring again to FIGURE 12, by this construction, when bellcrank 252 is pivoted in a clockwise direction the lever 334 will be pivoted in the direction indicated by arrow 332 and spring 256 will be simultaneously tensioned. When link 242 is released, the spring 256 will contract to restore bellcrank 252 and lever 334 to their original positions as determined by stop screw 337. Lever 334 is connected to the shaft 318 by a unidirectionally operative spring stepping clutch as is best illustrated in FIGURE 13. This spring clutch comprises a coil spring 338 surrounding the shaft 318 and fixed to the bracket 320 at its upper end and to a bushing 340 at its lower end. The bushing 340 is fixed to the lever 334 and rotatable about the shaft 318. By this construction, each pivotal movement of the lever 334 from stop 337 will wrap the coils of the spring 338 tightly upon the shaft 318 and impart a predetermined angular stepping movement to the shaft 318 in the direction of arrow 332 in FIGURE 12. As lever 334 is restored to its original position, the coils of the spring 338 will expand and shaft 318 will remain in its new position. The home position of bellcrank 252 in the direction to which it is biased under the influence of spring 256 is determined by a stop member 342 adjustably

mounted to the bracket 320 by means of an elongated aperture (not shown) for its mounting screw 343 and having an end portion 344 disposed in the return path of movement of the bellcrank 252. The adjustment provided by screw 343 provides a variable inoperative position for bellcrank 252 such that notch 258 of link 242 may engage rod 126 freely when button 26 is depressed.

By this construction, each time a type character is moved to its printing position, the carbon tape 210 will be advanced by the roller 220 a predetermined distance toward the carbon ribbon guide 222, this predetermined distance being substantially equal to the width of the maximum size type character.

Referring again to FIGURE 1, it will be recalled that the carbon ribbon 210 passes through the ribbon guide 222 about ribbons guides 224 and 226 to a take-up reel 228. The carbon ribbon take-up mechanism is best illustrated in FIGURES 14 and 15. As is shown in those figures, the take-up reel 228 comprises a circular disc 350 having at one side a central hub 352 and a plurality of equiangularly spaced fingers 354 extending parallel to the periphery of the hub in closely spaced relation thereto. The ribbon 210, as is best shown in FIGURE 14, passes from the guide 226 to the hub 352 of the disc 350 and is wound thereon being initially folded back beneath one of the fingers 354 to provide a driving engagement between the ribbon 210 and the hub 352. Referring to FIGURE 15, the reel 228 is disposed between an exterior plate 356 and the machine frame left side wall 358, the plate 356 being fixed to the frame side wall 358 by spacer assemblies 360, 362 and 364 and having an upwardly and outwardly angularly inclined guide lip portion 365 to act as a guide for installing the reel 228 in slot 374. The plate 356 has an arcuate cut out or notch 367 extending beneath lip portion 365 which provides an opening in plate 356 through which the operator can with the tips of her thumb and forefinger place the end of the carbon ribbon in a reverse bend about one of the fingers 354 with its end extending between that finger 354 and the hub 352 in the direction opposite to the direction of rotation of reel 228 to provide a drive connection between the end of the carbon ribbon and reel 228. The ribbon guide 224 is fixed to an intermediate plate 366 fixed to the frame side wall 358 by brackets 368, 370 and 372. As is best shown in FIGURE 15, the reel 228 is disposed between the intermediate plate 366 and the exterior plate 356. Referring to FIGURE 14, the intermediate plate 366 is formed with a downwardly extending notch 374 which receives a guide stud 376 fixed concentrically to the disc 350 on the side thereof opposite hub 352. Stud 376 rests upon a lever 378 pivoted on the plate 366 at 380 and connected at its opposite end to a pull rod 382. Counterclockwise movement of the lever 378 about the pivots 380 will lift the stud 376 in the slot 374 and thereby lift the disc 350 of the take-up reel 228. The position of lever 378 is controlled by the bellcrank 384 upon which the ribbon guide 226 is mounted and which is pivotally mounted on the spacer 362. Bellcrank 384 is normally biased in a counterclockwise direction about the axis of the spacer 362 by a tension spring 386 tensioned between the lower tab 388 of bellcrank 384 and a spring support bracket 390 fixed to the mounted bracket 372. Bellcrank 384 is connected to lever 378 through a tension spring 392, a lever 394 pivoted on the frame member 358 by a pivot stud 396 and the pull rod 382. By this construction, if the tension upon the ribbon 210 becomes sufficient to overcome the biasing force exerted on bellcrank 384 by the tension spring 386, bellcrank 384 will pivot lever 394 in a counterclockwise direction about its pivot 396 as viewed in FIGURE 14, lift the pull rod 382, pivot the lever 378 in a counterclockwise direction about its pivot 380 and thereby lift the stud 376 and the entire take-up reel 228 in the slot 374. The

purpose of this is to dis-engage the disc 350 of the reel 228 from its drive. When the reel 228 is in its lowermost position in respect to slot 374, the periphery of the disc 350 is in frictional driving engagement with a drive roller 398 fixed to a V-belt pulley 400 on a power distribution shaft 402 of the power operated typewriter. The pulley 400 is driven through a V-belt drive from an electric motor in a conventional manner. By this construction, the drive roller 398 is continuously driven and the disc 358 remains in driving engagement with the roller 398 to wind the carbon ribbon 210 upon the hub 352 of the take-up reel 228 so long as the tension upon the carbon ribbon 210 is not sufficient to overcome the biasing force on the bellcrank 384 of the spring 386. When this tension in the tape 210 becomes excessive the disc 350 of the reel 228 will be lifted by the lever 378 from driving engagement with the driving roll 398. The tension of the spring 386 is adjusted so that the tension in the carbon ribbon 210 cannot become sufficiently great to break the carbon ribbon.

The reel 228 and any used carbon wound thereon may be lifted from its support at any time. When the carbon ribbon supply is exhausted, and the used carbon ribbon completely wound upon take-up reel 228, the operator merely lifts reel 228 from its support and slips the used ribbon roll from the end of hub 352. No dis-connection or connection of parts of the machine is necessary for carbon ribbon replacement.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

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

1. In a ribbon vibrating mechanism for typewriters, first and second juxtaposed ribbon carriers each independently movable to present ribbon bands to the typing line and at least said first carrier being movable to present different bands of a ribbon carried thereby to the typing line, first and second actuating members operatively connected to said first and second carriers respectively, an actuator operable by typing instrumentalities, selectively operable means for drive connecting said first member or said second member to said actuator and for controlling the amplitude of motion imparted to said first member when said first member is drive connected to said actuator to determine the magnitude of motion of said first carrier with respect to the typing line, said motion controlling means including means for imparting motion of predetermined, selectively variable magnitude to said actuator and overthrow means independent of said actuator for positively limiting the motion of said first member, a ribbon feed mechanism operable when actuated to advance a ribbon longitudinally through said second ribbon carrier, and means drive connecting at least a portion of said ribbon feed mechanism to said second member for actuation therewith, said ribbon feed mechanism comprising a ribbon supply reel support, a ribbon take-up reel support and ribbon guide structure for guiding a ribbon from a supply reel on said reel support through said second carrier to a take-up reel on said take-up reel support, said ribbon feed mechanism portion comprising a ribbon feed control device interposed in said ribbon guide structure in operative relation to said supply reel and said second ribbon carrier and operative to intermittently permit feed of ribbon toward said second ribbon carrier.

2. The mechanism defined in claim 1 wherein said ribbon feed mechanism further comprises means for maintaining tension of a predetermined magnitude upon

the portion of a ribbon in said ribbon guide structure intermediate said take-up reel and said ribbon feed device.

3. In a ribbon vibrating mechanism for typewriters, first and second juxtaposed ribbon carriers each independently movable to present ribbon bands to the typing line and at least said first carrier being movable to present different bands of a ribbon carried thereby to the typing line, first and second actuating members operatively connected to said first and second ribbon carriers respectively, an actuator operable by typing instrumentalities, and a pair of selectively and alternatively operable means for drive connecting either said first member or said second member to said actuator and for controlling the amplitude of motion imparted to said first member when said first member is drive connected to said actuator to determine the motion of said first carrier with respect to the typing line, said motion controlling means including means for imparting motion of predetermined, selectively variable magnitude to said actuator and overthrow means independent of said actuator for positively limiting the motion of said first member, said selectively operable means including a plurality of manually actuatable control devices each operative when actuated to establish a distinct condition of operation of said selectively operable means.

4. In a ribbon vibrating mechanism for typewriters, first and second juxtaposed ribbon carriers each independently movable to present ribbon bands to the typing line and at least said first carrier being movable to present different bands of a ribbon carried thereby to the typing line, first and second actuating members operatively connected to said first and second ribbon carriers respectively, an actuator operable by typing instrumentalities, and selectively operable means for drive connecting either said first member or said second member to said actuator and for controlling the amplitude or motion imparted to said first member when said first member is drive connected to said actuator to determine the motion of said first carrier with respect to the typing line, said means including a selectively positionable control member operable in one position to interconnect said second member and said actuator and disestablish the drive connection between said actuator and said first member and in said second and third positions to disestablish the drive connection between said actuator and said second member and to establish distinct drive connections between said actuator and said first member, the drive connection and said first member in said second position being effective to impart an amplitude of motion to said first member different from the amplitude of motion imparted to said first member by its drive connection to said actuator when said control member is in said third position, the drive connection between said first member and said actuator including a pair of cams connected to said first member and a cam follower positioned by said control member in operative engagement with one of said cams when said control member is in said second position and with the other of said cams when said control member is in said third position.

5. The mechanism defined in claim 4 wherein said selectively operable means further comprises at least three manually actuatable control devices and means connecting said control devices to said control member to position said control member in a distinct one of said first, second and third positions in response to actuation of each of said control devices.

6. The mechanism defined in claim 5 wherein said control devices comprise a plurality of push-buttons.

7. The mechanism defined in claim 5 wherein said control devices are located at the front of the typewriter above the keyboard thereof.

8. In a ribbon feed mechanism for typewriters, a supply reel support comprising a supply reel receptacle adapted to receive and support a ribbon supply reel for rolling movement about a horizontally disposed axis, said

receptacle having a supply reel supporting bottom wall mounted for movement into and out of said receptacle and manually operable means disposed externally of said receptacle for moving said bottom wall to lower a supply reel into and lift an exhausted supply reel from said receptacle.

9. In a ribbon feed mechanism for type bars, a vibratable ribbon carrier movable to present a ribbon to the typing line, an actuator operable by typing instrumentalities to vibrate said carrier, a ribbon supply reel support, a ribbon take-up reel support, a ribbon guide structure for guiding a ribbon from a supply reel on said supply reel support through said carrier to a take-up reel on said take-up reel support, and a ribbon feed device operatively connected to said actuator and interposed within said ribbon guide structure intermediate said supply reel support and said ribbon carrier for controlling the rate of ribbon feed to said carrier, means for maintaining tension of a predetermined magnitude upon the portion of a ribbon in said ribbon guide structure intermediate said take-up reel and said ribbon feed device, said tension maintaining means comprising a power driven rotatable member engageable by a take-up reel on said take-up reel support, a ribbon tension sensing device, and means controlled by said tension sensing device to vary the position of said take-up reel support relative to said power driven rotatable member to establish a drive connection between a take-up reel on said take-up reel support when the ribbon tension is below a predetermined magnitude and to disestablish said drive connection when the ribbon tension is at least equal to such predetermined magnitude.

10. In a ribbon feed mechanism for typewriters, a vibratable ribbon carrier movable to present a ribbon to the typing line, an actuator operable by typing instrumentalities to vibrate said carrier, a ribbon supply reel support, a ribbon take-up reel support, a ribbon guide structure for guiding a ribbon from a supply reel on said supply reel support through said carrier to a take-up reel on said take-up reel support, and a ribbon feed device operatively connected to said actuator and interposed within said ribbon guide structure intermediate said supply reel support and said ribbon carrier for controlling the rate of ribbon feed to said carrier, said supply reel support comprising a supply reel receptacle having a supply reel supporting bottom wall mounted for movement into and out of said receptacle and manually operable means disposed exteriorly of said receptacle for moving said bottom wall to lower a supply reel into and to lift an exhausted supply reel from said receptacle.

11. In a ribbon vibrating mechanism for typewriters, first and second juxtaposed ribbon carriers each independently movable to present ribbon bands to the typing line and at least said first carrier being movable to present different bands of a ribbon carried thereby to the typing line, first and second actuating members operatively connected to said first and second carriers respectively, an actuator operable by typing instrumentalities, selectively operable means for drive connecting said first member or said second member to said actuator and for controlling the amplitude of motion imparted to said first member when said first member is drive connected to said actuator to determine the magnitude of motion of said first carrier with respect to the typing line, a ribbon feed mechanism operable when actuated to advance a ribbon longitudinally through said second ribbon carrier, and means drive connecting at least a portion of said ribbon feed mechanism to said second member for actuation therewith, said ribbon feed mechanism comprising a ribbon supply reel support, a ribbon take-up reel support and ribbon guide structure for guiding a ribbon from a supply reel on said reel support through said second carrier to a take-up reel on said take-up reel support, said ribbon feed mechanism portion comprising a ribbon feed device interposed in said ribbon guide structure intermediate said supply reel support and said second ribbon carrier, said ribbon

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feed device comprising a pair of resiliently engaged ribbon feed rollers and a unidirectional clutch mechanism operatively interposed between one of said feed rollers and said second member to impart a rotative step to said one feed roller in response to each actuation of said second member.

12. In a ribbon vibrating mechanism for typewriters, first and second juxtaposed ribbon carriers each independently movable to present ribbon bands to the typing line and at least said first carrier being movable to present different bands of a ribbon carried thereby to the typing line, first and second actuating members operatively connected to said first and second carriers respectively, an actuator operable by typing instrumentalities, selectively operable means for drive connecting said first member or said second member to said actuator and for controlling the amplitude of motion imparted to said first member when said first member is drive connected to said actuator to determine the magnitude of motion of said first carrier with respect to the typing line, a ribbon feed mechanism operable when actuated to advance a ribbon longitudinally through said second ribbon carrier, and means drive connecting at least a portion of said ribbon feed mechanism to said second member for actuation therewith, said ribbon feed mechanism comprising a ribbon supply reel support, a ribbon take-up reel support and ribbon guide structure for guiding a ribbon from a supply reel on said reel support through said second carrier to a take-up reel on said take-up reel support, said ribbon feed mechanism portion comprising a ribbon feed device interposed in said ribbon guide structure intermediate said supply reel support and said second ribbon carrier, said ribbon feed mechanism further comprising means for maintaining tension of a predetermined magnitude upon the portion of a ribbon in said ribbon guide structure intermediate said take-up reel and said ribbon feed device, said tension maintaining means comprising a power driven rotatable member engageable by a take-up reel on said take-up reel support, a ribbon tension sensing device, and means controlled by said tension sensing device to vary the position of said take-up reel support relative to said power driven rotatable member to establish a drive connection between a take-up reel on said take-up reel support when the ribbon tension is below a predetermined magnitude and to dis-establish such drive connection when the ribbon tension is at least equal to such predetermined magnitude.

13. In a ribbon vibrating mechanism for typewriters, first and second juxtaposed ribbon carriers each independently movable to present ribbon bands to the typing line and at least said first carrier being movable to present different bands of a ribbon carried thereby to the typing line, first and second actuating members operatively connected to said first and second carriers respectively, an actuator operable by typing instrumentalities, selectively operable means for drive connecting said first member or said second member to said actuator and for controlling

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the amplitude of motion imparted to said first member when said first member is drive connected to said actuator to determine the magnitude of motion of said first carrier with respect to the typing line, a ribbon feed mechanism operable when actuated to advance a ribbon longitudinally through said second ribbon carrier, and means drive connecting at least a portion of said ribbon feed mechanism to said second member for actuation therewith, said feed ribbon mechanism comprising a ribbon supply reel support, a ribbon take-up reel support and ribbon guide structure for guiding a ribbon from a supply reel on said reel support through said second carrier to a take-up reel on said take-up reel support, said supply reel support comprising a supply reel receptacle having a supply reel supporting bottom wall mounted for movement into and out of said receptacle and manually operable means disposed externally of said receptacle for moving said bottom wall to lower a supply reel into and to lift an exhausted supply reel from said receptacle.

14. In a ribbon feed mechanism for typewriters, a vibratable ribbon carrier movable to present a ribbon to the typing line; an actuator operable by typing instrumentalities to vibrate said carrier; a ribbon supply reel support; a ribbon take-up reel support; ribbon guide structure for guiding a ribbon from a supply reel on said supply reel support through said carrier to a take-up reel on said take-up reel support; a ribbon feed device comprising a pair of resiliently engaged ribbon feed rollers and a unidirectional clutch mechanism including a pair of relatively rotatable members and a coil spring surrounding one of said members and fixed at one end to the other of said members operatively interposed between one of said feed rollers and said actuator to impart a rotative step to said one feed roller in response to each actuation of said actuator when said unidirectional clutch mechanism is connected to said actuator, said ribbon feed device being operatively connectable to said actuator and interposed within said ribbon guide structure and located entirely intermediate said supply reel support and said ribbon carrier for controlling the rate of ribbon feed to said carrier; and means operative upon the ribbon at the outlet side of said carrier for maintaining the ribbon under constant tension from said ribbon feed device through said carrier.

References Cited in the file of this patent

UNITED STATES PATENTS

837,031	Brown	Nov. 27, 1906
851,143	Stickney	Apr. 23, 1907
2,554,028	Helmond	May 22, 1951
2,815,110	Carlson	Dec. 3, 1957
2,868,346	Kamp	Jan. 13, 1959
2,919,785	Newman et al.	Jan. 5, 1960

FOREIGN PATENTS

1,029,648	France	Mar. 11, 1953
553,708	Italy	Jan. 2, 1957

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,104,750

September 24, 1963

Floyd H. Canny et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 21, for "so" read -- to --; column 6, line 53, for "175" read -- 174 --; line 69, for "fed" read -- feed --; column 7, line 28, for "basing" read -- biasing --; line 34, strike out "a", first occurrence; column 9, line 16, for "ribbons" read -- ribbon --; column 10, line 40, for "mechaniscm" read -- mechanism --; column 11, lines 22 and 23, for "controll" read -- control --.

Signed and sealed this 14th day of April 1964.

(SEAL)

Attest:

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