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3,174,611

RIBBON HANDLING MECHANISM

Filed Oct. 17, 1962

2 Sheets-Sheet 1

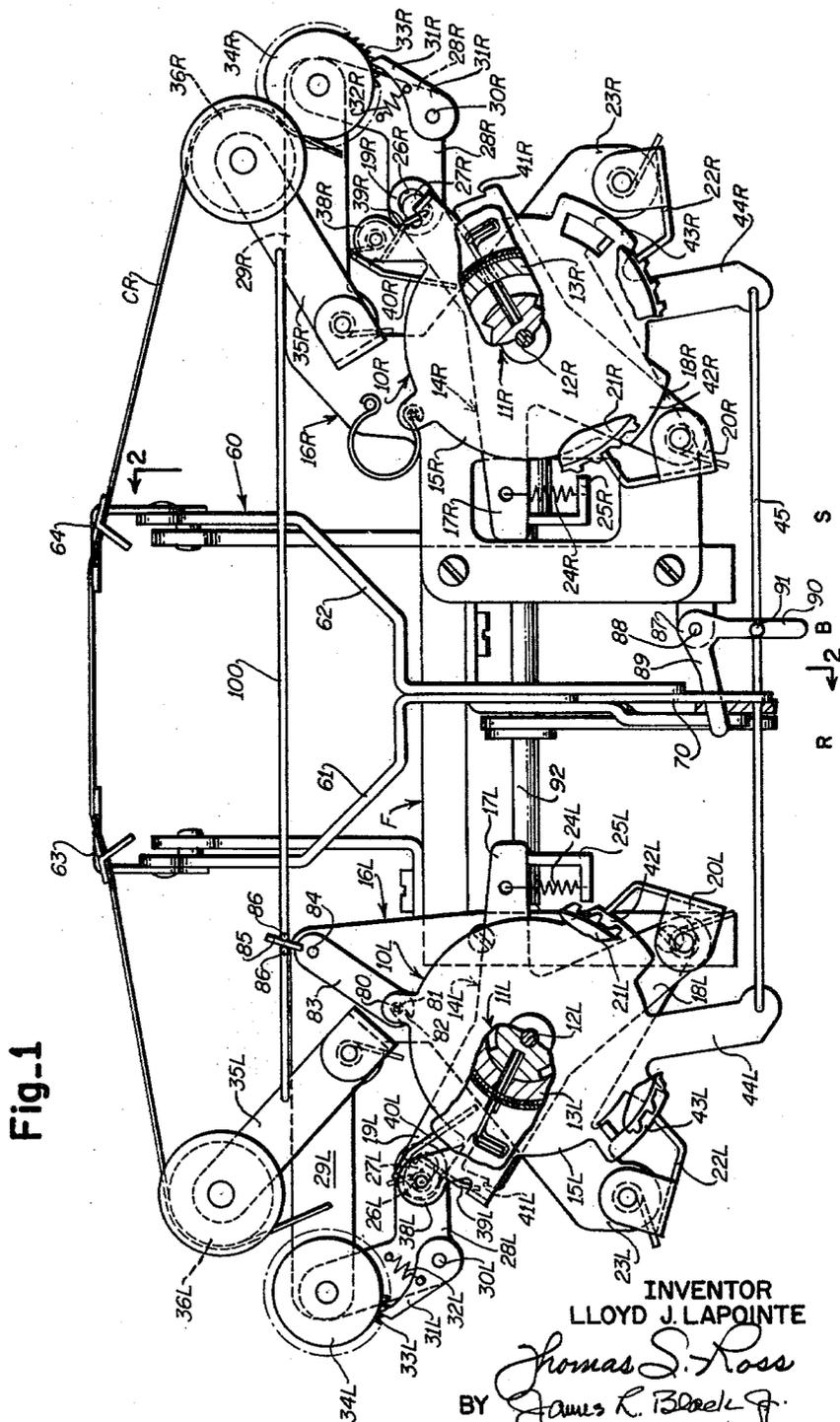


Fig. 1

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Fig. 2

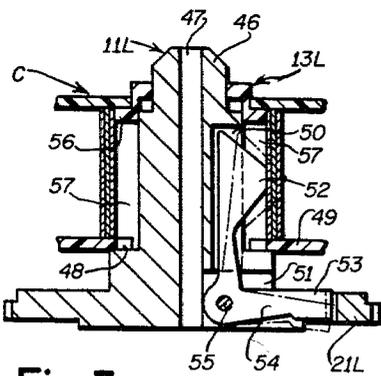
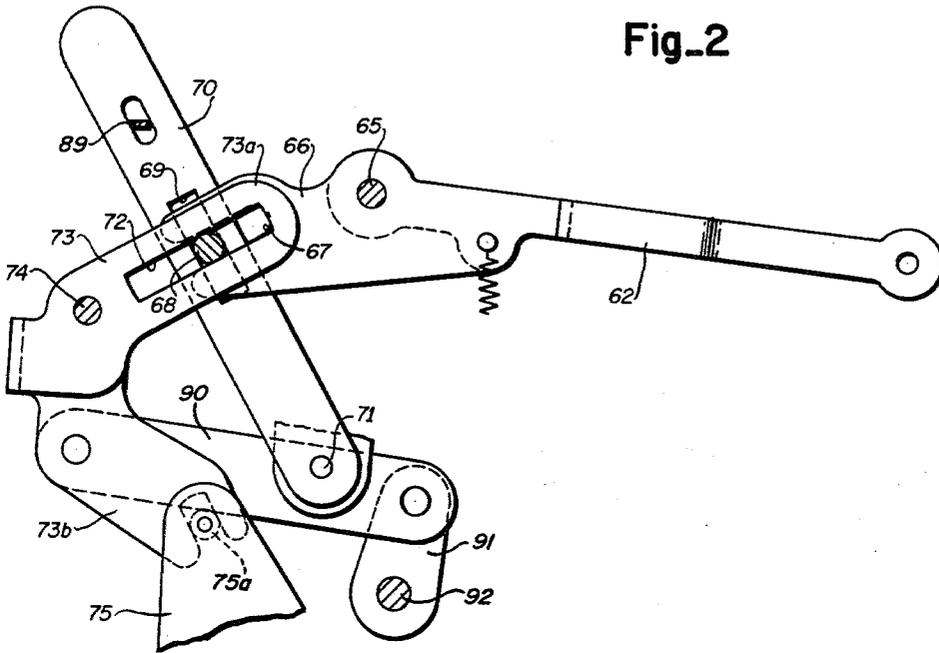


Fig. 3

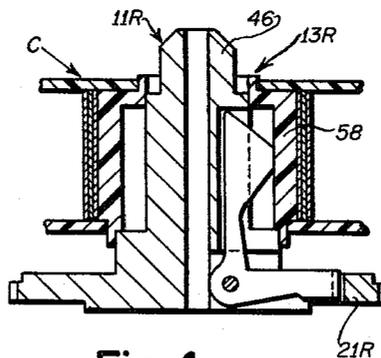


Fig. 4

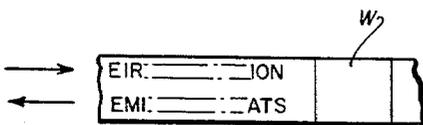


Fig. 5

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RIBBON HANDLING MECHANISM

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This invention relates to a mechanism for handling carbon ribbon in a typewriter of the matrix type, i.e. one having a single printing element or head that is horizontally traversed during operation of the typewriter.

In typewriters of this nature it is expedient to mount the carbon ribbon supply and take-up spools on the matrix carriage so as to traverse therewith and feed fresh ribbon to the printing position before each cyclic printing operation. Such spools, because of space limitations, are necessarily much smaller and accordingly have less ribbon carrying capacity than conventional carbon ribbon spools used on a typewriter having a traversable platen. These small spools accordingly require inconveniently and uneconomically frequent replacement as carbon ribbon, unlike fabric ribbon, cannot be reused. It is accordingly an object of this invention to provide a carbon ribbon handling mechanism that obviates such difficulties as well as others and efficiently presents fresh ribbon at the printing position over an extended period of time. Other objects will be in part apparent and in part pointed out hereinafter.

In the drawing wherein there is shown one embodiment of the invention and wherein similar reference characters refer to similar parts throughout the several views:

FIGURE 1 is a top plan view of the mechanism;

FIGURE 2 is an elevation, partly in section taken along the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged sectional elevation of one type of ribbon spool used in the mechanism;

FIGURE 4 is an enlarged sectional elevation of another type of spool used in the mechanism; and

FIGURE 5 illustrates the appearance of a carbon ribbon after used.

In accordance with my invention I provide a ribbon handling mechanism which has a substantial number of elements in common with the device disclosed in the co-pending application of Paul F. Page, Serial No. 223,159, filed September 12, 1962. In the Page device the ribbon is alternately elevated different amounts as it is fed so that the type impressions thereon are in staggered relation. For my mechanism I provide means for feeding a ribbon which may be approximately 1/2 inch wide in one direction during which imprints are made on the upper half of the ribbon and then automatically reversing the ribbon when the supply is exhausted and imprinting on the lower half thereof during the reverse feed thereby utilizing all of the ribbon and decreasing the frequency of ribbon renewal by one half.

As shown in FIGURE 1 right and left ribbon mounting and feeding assemblies are generally indicated at 10R and 10L respectively. As these devices have a number of similar elements, device 10R will first be described in detail as it is the one that has associated therewith several elements not found in device 10L, which elements come into use only when the mechanism is loaded with carbon ribbon. Device 10R accordingly comprises a ribbon spool mount, generally indicated at 11R which includes a spindle 12R adapted to receive a take-up spool 13R. Preferably this spool as well as a supply spool 13L form part of a cartridge C, which may be the same as or similar to that shown in the said Page application, comprising a unitary charge for the ribbon handling mechanism.

Spindle 12R is secured in any suitable manner to the frame F of the machine and rotatably carries a drive fork 14R and a reversing disc 15R. The spindle also extends through a base plate 16R which may be secured directly or indirectly to frame F in any desirable manner. Drive fork 14R includes a drive arm 17R, a pawl carrying arm 18R and a carbon ribbon feed drive arm 19R. A drive pawl 20R is rockably mounted on pawl arm 18R and is spring biased into driving relation with a ratchet 21R that is preferably integral with spool mount 11R. A no-back pawl 22R is rockably mounted on an arm 23R integral with base plate 16R and is spring biased into operative engagement with ratchet 21R to prevent reverse rotation thereof during driving operation of drive pawl 20R.

Fork drive arm 17R is held by a spring 24R against a lever 25R comprising part of the ribbon feed drive mechanism which may be the same as that shown in the said Page application. Briefly the ribbon feed drive mechanism comprises a link 90 (FIG. 2) having one end pivotally connected to end 73b of power arm 73. The other end of this link is pivotally connected to a crank or lever 91 fastened to a shaft 92 to which levers 25L and 25R are connected. Carbon ribbon feed drive arm 19R is provided with a slot 26R which receives a pin 27R carried by a lever 28R pivotally mounted on an arm 29R which is preferably integral with base plate 16R. Drive lever 28R pivotally supports, as by a pin 30R, a ribbon feed drive pawl 31R having connected thereto one end of a spring 32R, the other end of which is connected to arm 28R. Pawl 31R is adapted to drive a rotatable ratchet 33R counterclockwise, this ratchet being mounted on base plate arm 29R and carrying a carbon ribbon feed spool 34R. An arm 35R rotatably supports a carbon ribbon pressure roller 36R, the arm being spring biased clockwise thus to force roller 36R against feed roller 34R to grip a carbon ribbon CR threaded therebetween. It may now be seen that with the parts so far described in the positions shown in FIGURE 1, operation of lever 25R, as described in said Page application, oscillates drive fork 14R through its drive arm 17R. As the fork oscillates, its drive pawl 20R drives ratchet 21R clockwise incrementally thus to cause take-up spool 13R to wind ribbon being fed to it by rollers 34R and 36R in a manner now to be described.

When fork 14R is oscillated as described above, its drive arm 19R oscillates, pawl 31R drives ratchet 33R and accordingly carbon ribbon feed roller 34R counterclockwise in increments of the same amount as the type character spacing afforded by suitable escapement mechanism (not shown). This roller together with pressure roller 36R accordingly feed carbon ribbon from supply spool 13L to take-up spool 13R through the vibrator arm ribbon supports described herein below, the ribbon being wound on the take-up spool as described above.

The left hand ribbon mounting and feed assembly 10L includes ribbon spool mount 11L, spindle 12L, drive fork 14L, reversing disc 15L, base plate 16L, arm 19L, drive pawl 20L, ratchet 21L, no-back pawl 22L, spring 24L, lever 25L and the carbon ribbon feed mechanism comprising the parts 28L, 29L, 30L, 31L, 32L, 33L, 34L, 35L and 36L, all of which are substantially similar in construction and operation to their counterparts in right hand assembly 10R. Accordingly fork 14L includes drive arm 17L, which is driven by lever 25L, and arm 18L which carries drive pawl 20L which drives ratchet 21L when the fork is oscillated by lever 25L. Discs 15L and 15R include ears 38L and 38R which pivotally carry reversing fingers 39L, 40L and 39R, 40R respectively, the left hand fingers being spring biased clockwise and the right hand ones counterclockwise re-

spectively. Fingers 39L and 39R are respectively swingable so as to engage shoulder 41L or 41R on drive forks 14L and 14R to rotate the discs one way or the other depending on which finger is operative, to reverse the direction of ribbon feed in a manner to be described. When carbon ribbon is being used, only the left hand fingers are operative to effect carbon ribbon reversal whereas, when fabric ribbon is in the machine, both sets of fingers are alternatively operative to effect alternate ribbon feed reversal as described in said Page application.

Arms 35L and 35R are interconnected by a reversing link 100 whereby the arms operate in unison to effectuate one or the other of the carbon ribbon feed devices in a manner to be described. Thus if link 100 is moved to the right, ribbon will be fed right to right; if it is moved to the left, the ribbon will be fed right to left. When the ribbon is to be fed right to left, rollers 34L and 36L are engaged and rollers 34R and 36R are disengaged, fork 14L being oscillated in the same manner as fork 14R so that its drive arm 19L oscillates lever 28L by virtue of the pin and slot connection 27L-26L. As this lever oscillates, pawl 31L drives ratchet 33L and accordingly feed roller 34L clockwise in increments of the same amount as the type character spacing afforded by the escapement mechanism (not shown). This roller together with pressure roller 36L accordingly feed the carbon ribbon from spool 13R, which is now the supply spool, to spool 13L, which has become the take up spool, through the vibrator arm ribbon supports, described below, the ribbon being wound on spool 13L as described above in connection with spool 13R.

Discs 15L and 15R are provided with pawl baffles 42L and 42R adapted to disable one or the other of drive pawls 20L or 20R depending on the direction of movement of the discs. These discs also include baffles 43L and 43R adapted to disable one or the other of no-back pawls 22L or 22R at the same time the associated drive pawl is disabled. Thus for a given direction of ribbon feed, left to right for example, pawls 20L and 22L are swung out of operative relation with ratchet 21L by baffles 42L and 43L. Discs 15L and 15R also include arms 44L and 44R that are interconnected by a link 45 whereby the discs move in unison.

When carbon ribbon is used, supply spool 13L is of the type shown in FIGURE 3 while the take-up spool is like that shown in FIGURE 4 whereas when fabric ribbon is used both spools are of the FIGURE 3 type. As shown in FIGURE 3 spool mount 11L includes a core 46 provided with an axial hole 47 and a seat 48, the hole being provided to receive spindle 12L and the seat providing a support for the bottom flange 49 of spool 13L. Core 46 and ratchet 21L are slotted as at 50 and 51 to receive the arms 52 and 53 of a reversing flipper 54 pivotally secured to the core by a pin 55 and preferably being spring biased clockwise in any suitable manner, the flipper being movable between the full and broken line positions. Spool 13L includes a reel 56 having opposed slots 57 therein, one or the other of which is adapted to register with core slot 50 when the spool is installed with a frictional fit on core 46.

Spool 13R (FIGURE 4) includes an unslotted reel 58 adapted to be frictionally received on mount core 46. When carbon ribbon is used, the left hand end thereof is secured to reel 58 in any suitable manner, this end of the ribbon preferably being provided with a white tell-tale W (FIGURE 5) or the like to signal the typist when the supply of ribbon is exhausted.

With reference to FIGURE 1 a vibrator and ribbon support assembly is generally indicated at 60 which may be the same as that disclosed in said Page application, this assembly accordingly including a pair of vibrator arms 61 and 62 on which ribbon supports 63 and 64 are respectively mounted. As shown in FIGURE 2, the arms are pivotally mounted on a shaft 65 secured to the machine frame in any suitable manner, and arm 62 includes

a bifurcated shoulder 66 providing a slot 67 in which a drive pin 68 is adjustably disposed. Pin 68 is slidably mounted in a slot 69 formed in a bichrome lever 70 pivotally mounted on the machine frame by a pin 71. Drive pin 68 is also received in a slot 72 formed in one end 73a of a power arm 73 pivotally mounted on a pin 74 carried by the machine frame. Power arm 73 includes a bifurcated end 73b in which is disposed a connecting rod 75a secured to a crank 75 which may be rocked forth and back by any suitable drive means (not shown) thus to oscillate power arm 73 which in turn oscillates vibrator arms 61 and 62 by virtue of the driving connection afforded by pin 68. Depending on the position of pin 68 in slot 67, the vibrator arms are rocked a full stroke, a half or partial stroke, or not at all. Thus if pin 68 is positioned at the extreme right hand end of a slot 72 a full vibrator stroke results to position the lower portion of the ribbon, carbon or fabric, at the printing line. When pin 68 is positioned as shown in FIGURE 2 a partial stroke results to position the upper portion of the ribbon at the printing line. If the pin is at the extreme left of slot 72 it is withdrawn from slot 67 and is accordingly out of driving relation with arm shoulder 66 to immobilize the vibrator arms, as when it is desired to cut a stencil.

When carbon ribbon is used it is reversed after its traverse from left to right (FIGURE 1) whereby the upper half of the ribbon is used during its initial traverse, the lower half being used during the reverse traverse so that the used ribbon has the appearance illustrated in FIGURE 5. The mechanism for effecting this operation will now be described.

Reversing disc 15L includes a lug 80 carrying a drive pin 81 which extends through a slot 82 in one end of a lever 83 pivotally mounted on a pin 84 carried by the frame. The other end 85 of lever 83 is disposed between a pair of pins 86 mounted on link 100. A bell crank lever 87 is pivotally mounted on a pin 88 secured to the frame and has two arms 89 and 90, the former extending through a slot in bichrome lever 70 and the latter being separably connected in any suitable manner to reversing link 45 by a manually operable member 91 which is accessible to the typist.

It will now appear that in operation the carbon ribbon that is initially wound on supply spool 13L is trained between rollers 34L and 36L, through ribbon supports 63 and 64, between rollers 34R and 36R, is suitably secured to take-up spool 13R and member 91 is manipulated to interconnect bell crank 90 and link 45 and is set at position B. At this position bichrome lever 70 is adjusted so that the vibrator arms 61 and 62 position the upper half of the ribbon at the printing position during left to right ribbon feed and the ribbon feed reversing mechanism is set to the FIGURE 1 condition. Thus when spool 13L is substantially exhausted of carbon ribbon, reversing flipper 54 rocks clockwise thus dropping its foot 53 to a position where it will engage finger 40L and disc 15L and rock its associated finger 39L into the path of movement of shoulder 41L on fork 14L. When this shoulder engages the finger, reversing disc 15L is rotated clockwise causing clockwise movement of disc 15R by way of connecting link 45. Also link 100 is driven to the left causing rollers 34L and 36L to close and grip the ribbon trained therebetween and causing rollers 34R and 36R to separate and accordingly release the carbon ribbon. Oscillation of fork 14L now drives pawl 31L and its associated ratchet 33L to cause rollers 34L and 36L to feed ribbon from right to left to spool 13L which is now driven to take up used ribbon. Movement of link 45 to the left rocks bell crank 89 clockwise to position R and shifts bichrome lever to its full stroke position causing vibrator arms 61 and 62 to elevate the ribbon to such an extent that the lower half thereof is presented at the printing position.

The mechanism may also be used to handle two color fabric ribbon in the manner described in said Page ap-

plication. When so used, member 91 is disconnected from lever 89 and is manually adjusted to positions R, B or S for red, black or stencil.

It may now be seen that I have provided a typewriter ribbon handling mechanism that attains the several objects set forth above in a thoroughly practical and efficient manner.

As other embodiments of the invention may be made and as modifications are possible in the one disclosed, all without departing from the scope of the invention, it is to be understood that the foregoing should be interpreted as illustrative and not in a limiting sense.

I claim:

1. A carbon ribbon handling mechanism for an electric typewriter, in combination,
 - a frame,
 - a vibrator having ribbon supporting members thereon and pivotally mounted on said frame for elevating a ribbon to the printing position in the typewriter,
 - a pair of ribbon spool spindles mounted on said frame,
 - a pair of ribbon spools rotatably mounted on said spindles, respectively,
 - a power arm,
 - means forming a variable driving connection between said vibrator and said power arm and shiftable for imparting full or partial strokes to said vibrator whereby different portions of the ribbon are elevated to the printing position,
 - a pair of drive forks respectively rockably mounted on said spindles,
 - means forming a driving connection between said power arm and said drive forks,
 - means forming a severable driving connection between each of said forks and its associated spool,
 - a pair of reversing discs respectively rockably mounted on said spindles and including means for establishing or severing said severable driving connection,
 - means associated with one of said spools and its associated fork and disc and responsive to a substantially exhausted supply of ribbon on said one spool to establish a driving connection between said associated fork and disc whereby said disc is driven to its reverse position when the ribbon on said one spool is substantially exhausted,
 - a link interconnecting said discs whereby they rock together when one of them is driven by its associated fork,

means connected to said link and to said variable connection and driven by said link upon disc reversal to shift said variable driving connection to vary the stroke of said vibrator, a ribbon feeding device associated with each of said spools and including a feed roller and a driving mechanism therefor connected so as to be driven by its associated fork, each of said feeding devices also including a pressure roller mounted for movement toward and away from its associated feed roller, and

means interconnecting said pressure rollers and connected to one of said discs whereby when said one disc is reversed one of said pressure rollers is moved toward its associated feed roller while the other of said pressure rollers is moved away from its associated feed roller thereby reversing the direction of ribbon feed at the time of alteration of the vibrator stroke.

2. Mechanism according to claim 1 wherein each of said ribbon feeding devices includes a lever rockably mounted on said frame and pivotally connected to its associated fork, and

pawl and ratchet means associated with said lever and its associated feed roller for rotating said feed roller when said lever is rocked.

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