

[54] TYPEWRITER RIBBON LOADING
ARRANGEMENT TO FACILITATE
REPLACEMENT OR SUBSTITUTION OF
RIBBON

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[51] Int. Cl. B41j 33/14
[58] Field of Search 197/151, 157, 158, 159,
197/160

[56] References Cited

UNITED STATES PATENTS

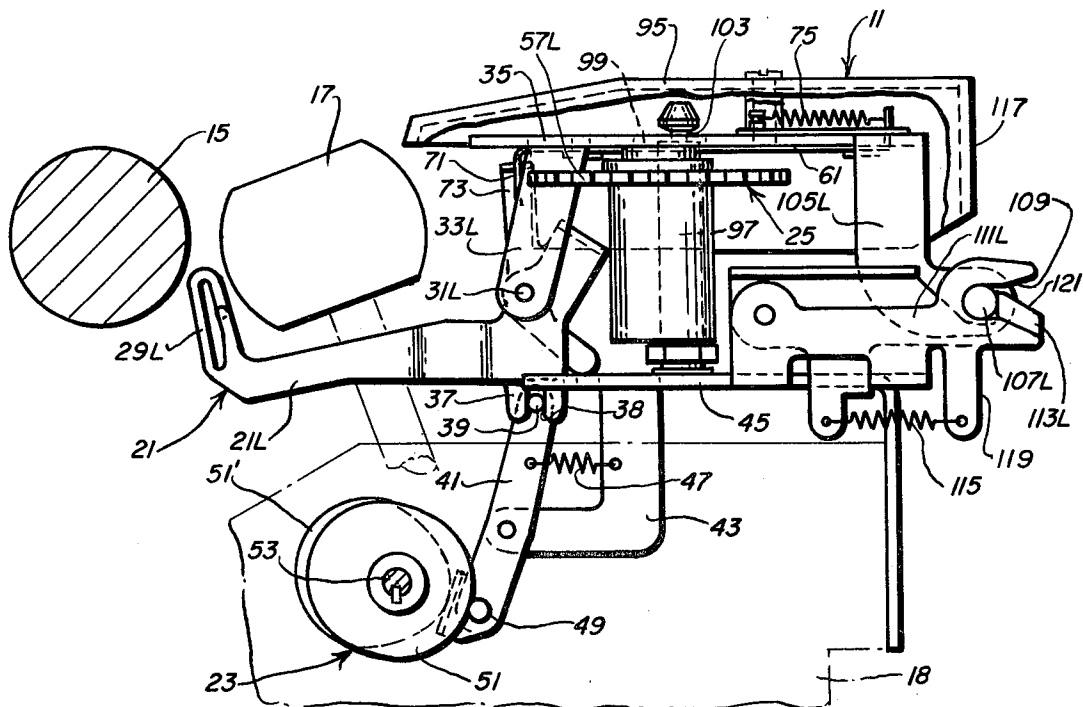
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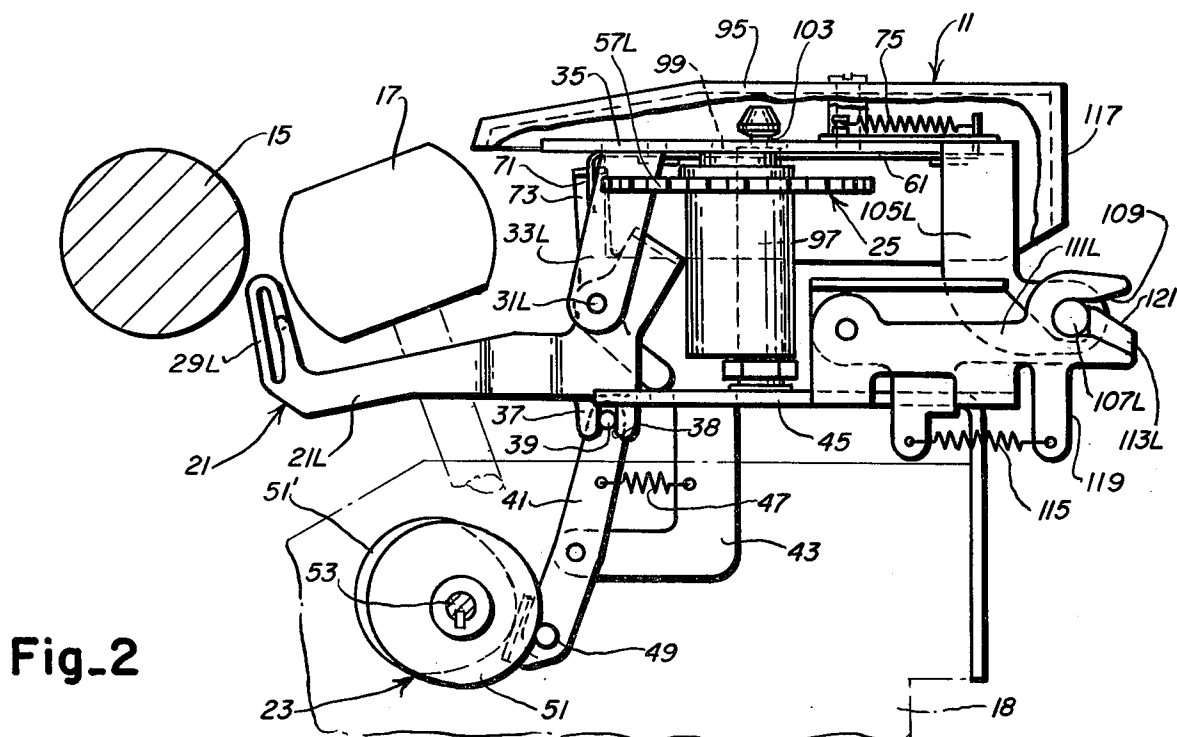
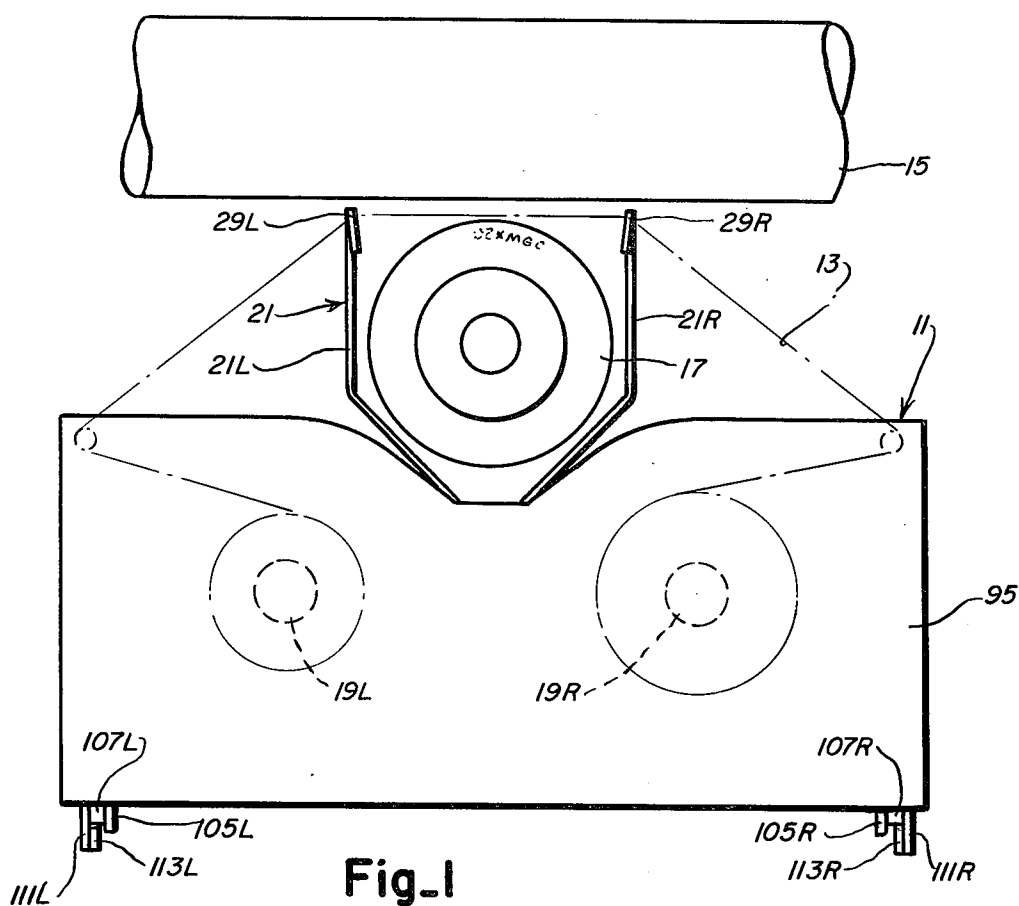
Primary Examiner—Ernest T. Wright, Jr.
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[57] ABSTRACT

A ribbon lifting and feeding arrangement for a single element typewriter is divided into upper and lower portions serving as a ribbon cartridge having a ribbon lifter pivotally carried thereon for being operatively associated with a drive mechanism of the lower portion for moving the ribbon lifter between a lowered rest position and an elevated printing position. The ribbon lifter has a pair of arms for movement on opposite sides of the single print element, and the upper portion is separable from the lower portion to facilitate replacement of the ribbon or the substitution of another upper portion having a different type of ribbon. To prevent damage to the type characters on the print element as the upper portion is being placed on the lower portion, the upper portion is pivotally coupled to the lower portion for guiding the arms of the ribbon lifter past the print element during movement between an operating position and a loading position, and the coupling between the upper portion and the lower portion is releasable to permit the substitution of another upper portion having a different type of ribbon.

5 Claims, 8 Drawing Figures





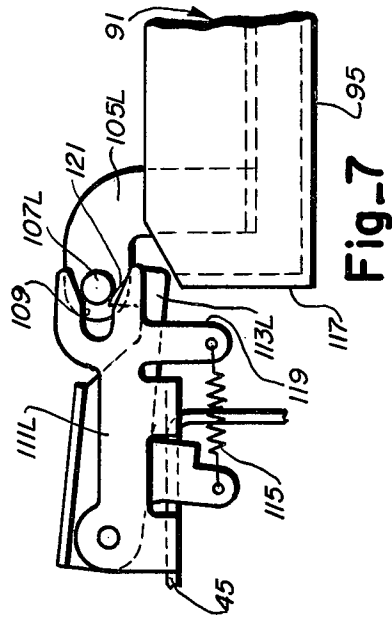


Fig. 7

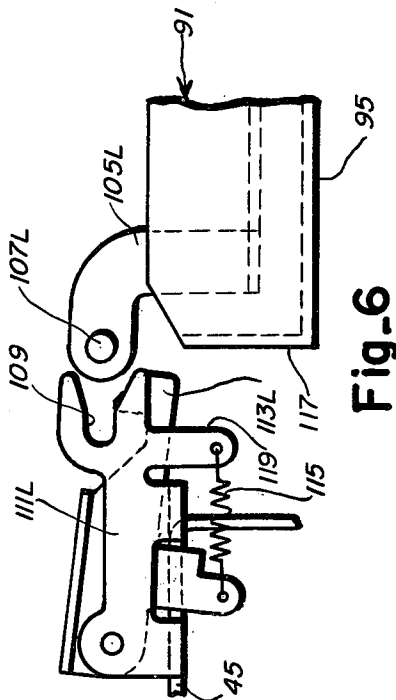


Fig. 6

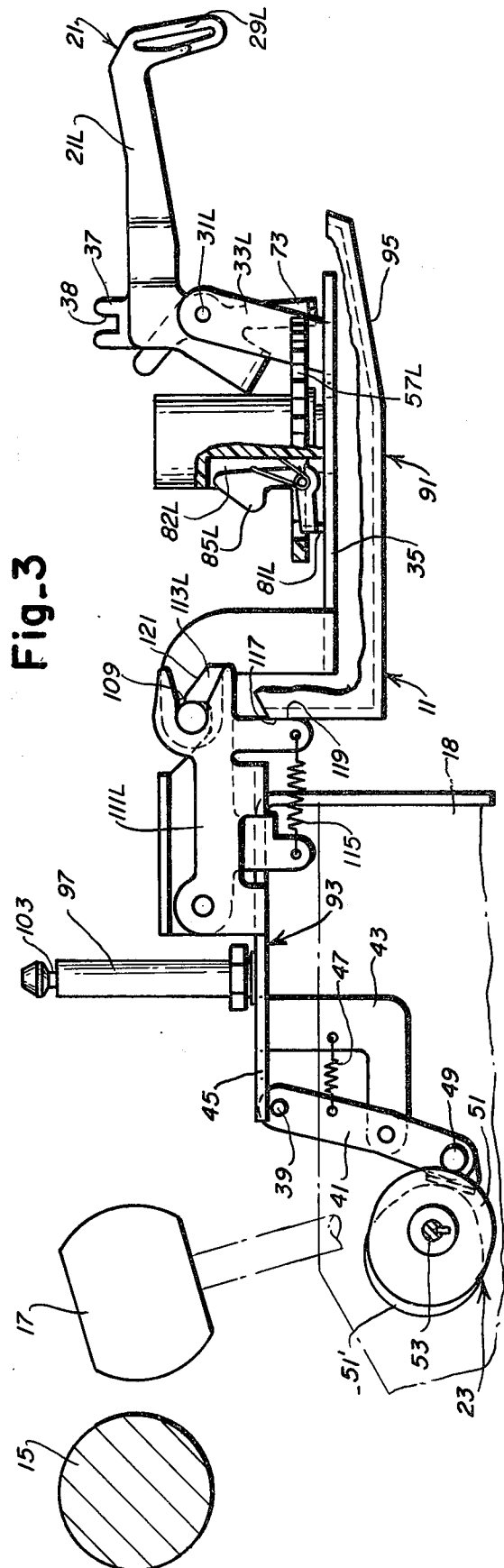


Fig. 3

Fig. 4

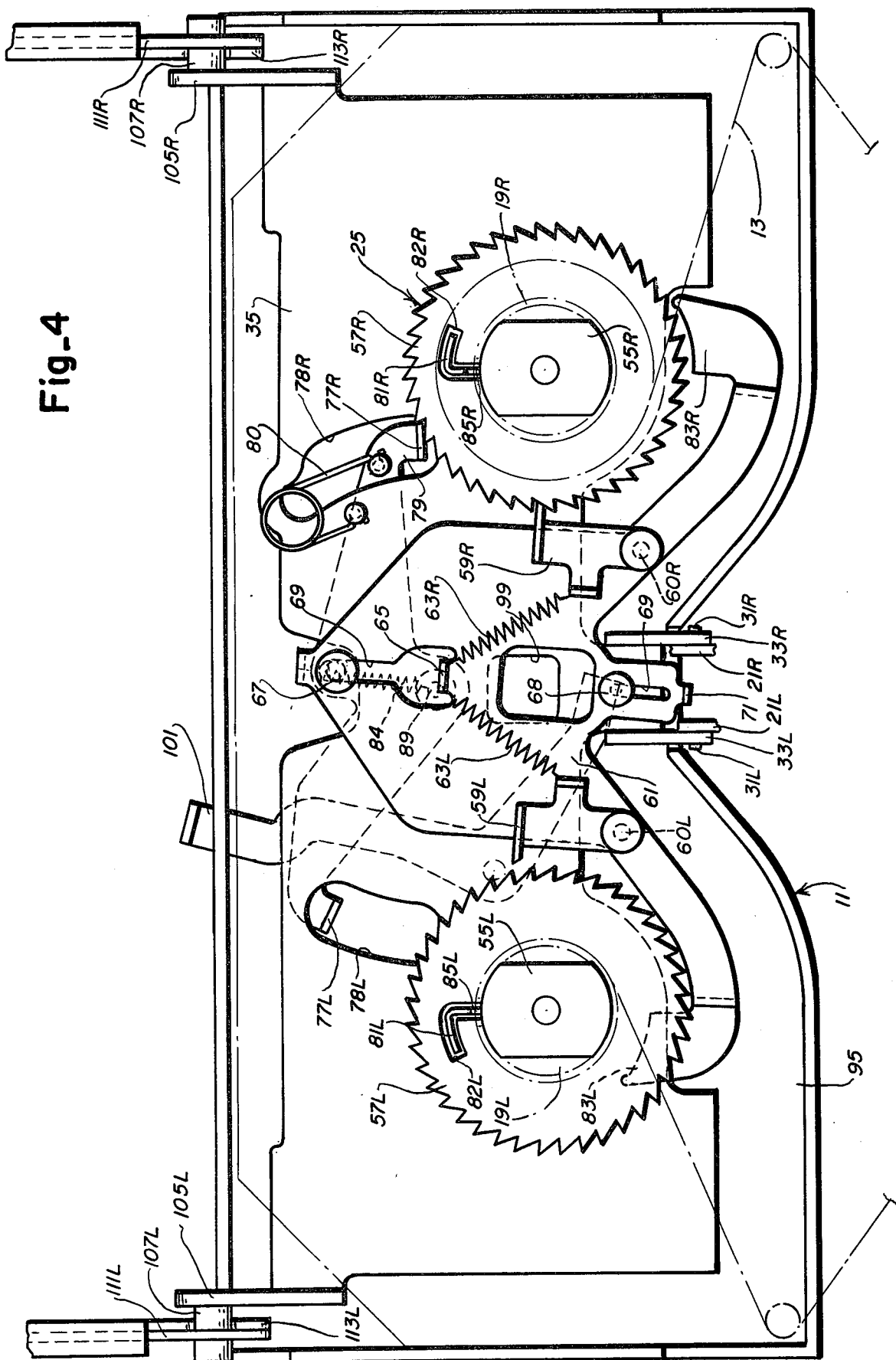


Fig. 5

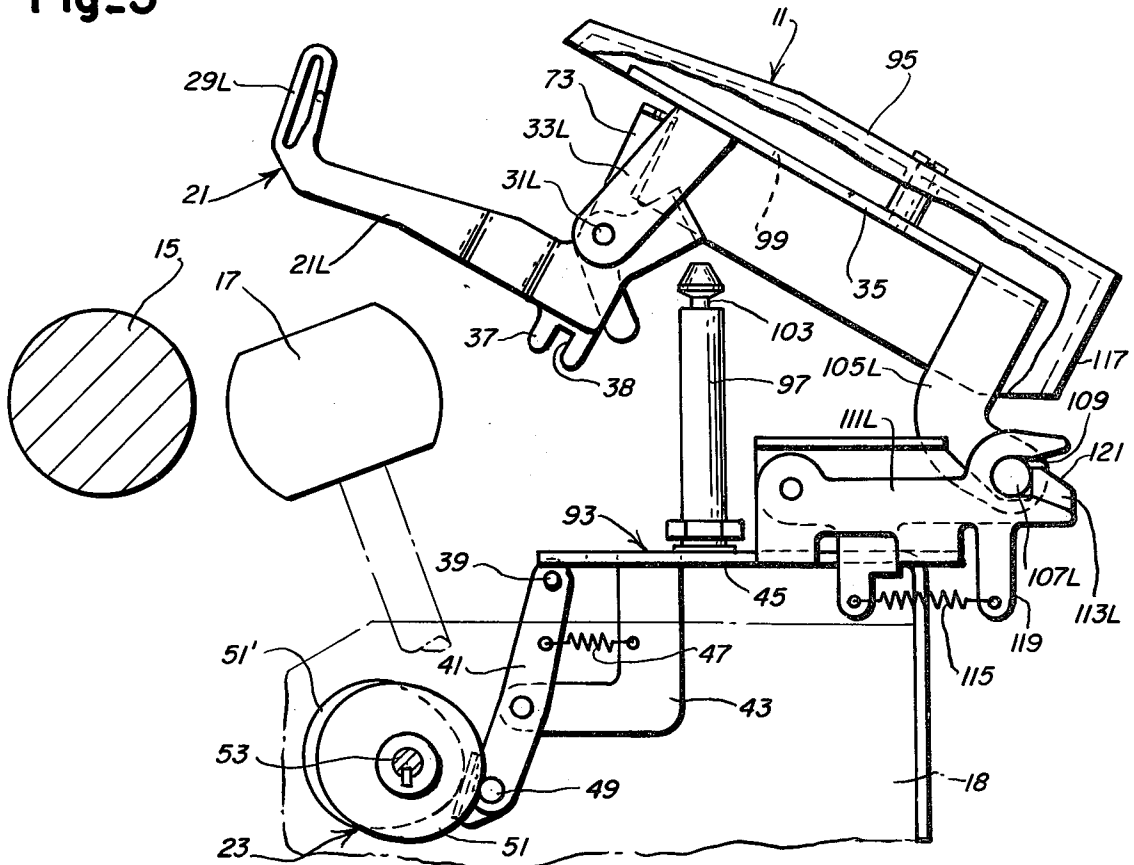
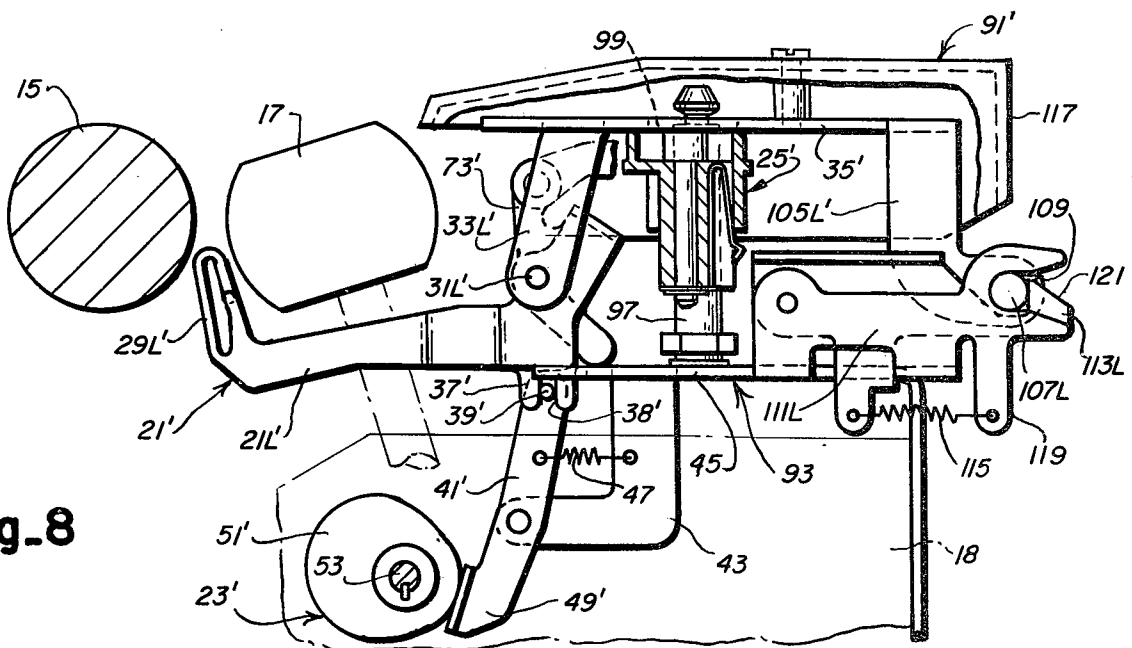


Fig. 8



TYPEWRITER RIBBON LOADING ARRANGEMENT TO FACILITATE REPLACEMENT OR SUBSTITUTION OF RIBBON

This invention relates to a ribbon arrangement for a single element typewriter, and more particularly to a ribbon lifting and feeding arrangement divided into upper and lower portions with the upper portion serving as a ribbon cartridge separable from the lower portion of the ribbon arrangement so as to facilitate the replacement of the ribbon in the cartridge or the substitution of another cartridge having a different type of ribbon requiring different ribbon lifting and feeding movements.

In a typewriter or similar business machine, printing is effected by operating a type key action to place a ribbon at a printing location adjacent a recording medium supported on a platen and then impacting a print element against the ribbon and the recording medium. In a typical single element typewriter, the print element is supported on a carriage for movement along the platen to print a line of type, and the ribbon is also supported on the carriage for movement with the print element. As is conventional, the ribbon is carried in a ribbon fork, and with each printing operation the ribbon is advanced through the ribbon fork which is moved from a rest position to a printing position to place the ribbon adjacent the recording medium prior to the impacting of the print element. Subsequently, the ribbon is returned to the rest position.

Oftentimes it is desirable to selectively use different types of ribbons in a typewriter, for example a cloth ribbon and a carbon ribbon. However, such ribbons are typically advanced through the ribbon fork with different ribbon feeding movements. A cloth ribbon is usually secured between a pair of spools and advanced through the ribbon fork by winding the ribbon onto one of the spools until it is full, whereupon the winding movement is reversed to rewind the ribbon onto the other spool, and the reversal of the winding movement continues until the ribbon becomes unserviceable and is replaced. Unlike a cloth ribbon, a carbon ribbon is non-reuseable and fed only once through the ribbon fork by unwinding the ribbon from a supply spool and onto a take-up spool for later disposal. However, to achieve greater utilization of a carbon ribbon, the ribbon may be advanced through the ribbon fork at a rate slower than a cloth ribbon, and the ribbon may be moved to successively different levels at the printing location to enable closely adjacent yet different portions of the ribbon to be impacted by the print element.

To facilitate the changing of ribbons in a typewriter, either to replace a used ribbon or to substitute a different type of ribbon, the ribbon mechanism may be arranged in separable upper and lower portions with the ribbon and associated spools being disposed in an upper portion which serves as a cartridge for attachment to the lower portion which is mounted on the carriage for movement with the print element and includes a drive arrangement for operating a ribbon feed mechanism and a ribbon lifter supported on the upper portion. However, the ribbon lifter typically includes a pair of arms arranged for movement closely adjacent opposite sides of the single print element and during attachment of the cartridge to the lower portion mounted on the carriage the arms of the ribbon lifter may strike and damage the print element.

Accordingly, an object of the invention is to provide a single element typewriter with a ribbon arrangement having a drive mechanism located in a lower portion which operably supports an upper portion serving as a ribbon cartridge having a ribbon lifter movable closely adjacent the single print element, wherein the ribbon cartridge is coupled to the lower portion for guided movement from an operating position on the lower portion to an inverted loading position facilitating replacement of the ribbon in the ribbon cartridge.

Another object is to provide a single element typewriter with a ribbon arrangement having different drive arrangements in a lower portion supporting an upper portion serving as a ribbon cartridge having a movable ribbon lifter selectively coupled to the different drive arrangements, wherein the ribbon cartridge is releasably coupled to the lower portion for guided movement between an operating position and a loading position for substitution of another ribbon cartridge.

Still other objects, features and advantages of the present invention will become apparent to those skilled in the art from a reading of the following detailed description of the invention, taken in conjunction with the accompanying drawing, wherein:

FIG. 1 is a top view of a ribbon arrangement for a single element typewriter constructed in accordance with the present invention and having separable upper and lower portions with the upper portion in an operating position;

FIG. 2 is a side elevational view of the ribbon arrangement illustrated in FIG. 1;

FIG. 3 is a side elevational view of the ribbon arrangement of FIG. 1 and illustrating the arrangement with the upper portion at a loading position;

FIG. 4 is a view of the upper portion of the ribbon arrangement shown in FIG. 3 and illustrating the ribbon feeding mechanism for advancing a cloth ribbon;

FIG. 5 is a side elevational view of the ribbon arrangement showing the upper portion being moved relative to the operating position;

FIG. 6 is a side view of the coupling between the upper portion and lower portion of the ribbon arrangement and illustrating the upper portion being removed from the lower portion;

FIG. 7 is a view similar to FIG. 6 illustrating the upper portion of the ribbon arrangement being coupled to the lower portion; and

FIG. 8 is a side elevational view of the ribbon arrangement of FIG. 1 and illustrating a different upper portion with a ribbon feeding arrangement for advancing a carbon ribbon.

Referring now in detail to the figures of the drawing, and more particularly to FIGS. 1-4, there is shown a typewriter ribbon arrangement, generally indicated 11, which is operated with each actuation of a type key action, not shown, for advancing a ribbon 13 and moving it to a printing location adjacent a platen 15 prior to the impacting of a print element 17 to enable a recording medium, not shown, which is supported on the platen 15 to be marked by the print element 17. As is conventional, the ribbon 13 may be secured at each end to a pair of spools 19L, 19R and an intermediate portion of the ribbon 13 may be carried in a ribbon lifting member, generally indicated 21, of the ribbon arrangement 11 which is mounted on a carriage 18 for movement along the platen 15 to print a line of type. The ribbon lifting member 21 is normally biased downwardly to a

rest position and the ribbon arrangement 11 includes drive means, generally indicated 23, which operates in response to the actuation of a type key action for moving the ribbon lifting member 21 to an elevated position to place the ribbon 13 at the printing location. In addition, the ribbon 13 is acted upon by a ribbon feed arrangement, generally indicated 25 in FIG. 4, for advancing the ribbon 13 through the ribbon lifting member 21 as will be explained below. The type key action and other parts of the typewriter are not shown since they form no part of the invention and may be desirably conventional. Moreover, portions of the ribbon arrangement 11 have been deleted from some of the figures in the drawing for clarity of illustration.

As shown, the ribbon lifting member 21 is in the form of a pair of arms 21L, 21R arranged on opposite sides of the single print element 17 with conventional ribbon forks 29L, 29R on the ends of the arms 21L and 21R adjacent the platen 15, and the arms 21L, 21R are supported for pivotal movement about a pair of screws 31L, 31R secured in axial alignment with each other, to a pair of downturned arms 33L, 33R of a bracket 35. To move the ribbon 13 from the lowered rest position to the elevated printing position, the ribbon lifting member 21 has a depending coupling arm 37 with a notch 38 which is acted upon by the drive means 23 which includes a pin 39 received in the notch 38 and carried by a drive lever 41 which is pivotally supported on a downturned arm 43 of a plate 45. The ribbon lifting member 21 is normally urged downwardly to the lowered rest position by suitable resilient biasing means in the form of a spring 47 stretched between the drive lever 41 and the downturned arm 43. To move the ribbon lifting member 21 to the elevated printing position, the other end of the drive lever 41 has a roller 49 engaging a surface of a cam 51, and the drive lever 41 is pivoted to raise the ribbon lifting member 21 by the rotational movement of the cam 51 which is keyed to a drive shaft 53 undergoing a single revolution with each actuation of a type key action.

Although not shown, the ribbon spools 19L, 19R for a cloth ribbon may be rotatably mounted in a cassette with the ribbon 13 passing through suitable external openings for movement through the ribbon forks 29L, 29R, and each of the ribbon spools 19L, 19R typically have an axial bore for receiving a pair of spaced-apart spindles 55L, 55R of the ribbon feed arrangement 25. As more particularly shown in FIG. 4, the spindles 55L, 55R are axially mounted on corresponding ratchet wheels 57L, 57R which are rotatably supported on the bracket 35, and the ribbon spools 19L, 19R may be secured by suitable means, not shown, for rotational movement with the ratchet wheels 57L, 57R. To advance the cloth ribbon 13 through the ribbon forks 29L, 29R by winding the ribbon 13 from one spool onto the other, the ribbon feed arrangement 25 includes a pair of indexing pawls 59L, 59R which undergo an oscillating movement with each printing operation for rotatably driving the ratchet wheels 57L, 57R in incremental movements. As shown, the indexing pawls 59L, 59R are pivotally mounted as at 60L, 60R on a control plate 61 and the indexing pawls 59L, 59R are biased toward the ratchet wheels 57L, 57R by springs 63L, 63R stretched between suitable portions of the indexing pawls 59L, 59R and a projection 65 on the control plate 61.

To enable an oscillatable movement to be imparted to the indexing pawls 59L, 59R, the control plate 61 is slidably supported on the bracket 35 by studs 67, 68 extending through slots 69 in the control plate 61, and the control plate 61 has a depending arm 71 operably connected to an arm 73 of the ribbon lifting member 21 so as to be slidable in response to the movement of the ribbon lifting member 21. The control plate 61 may be resiliently biased toward a rest position by a spring 75 stretched between suitable projections of the control plate 61 and the mounting bracket 35, and with each actuation of a type key action the drive means 23 raises the ribbon lifting member 21 and drives one of the indexing pawls 59L, 59R against the associated ratchet wheel 57L or 57R to advance the ribbon 13 through the ribbon forks 29L, 29R. To hold the driven ratchet wheel 57L, 57R in the rotatably indexed position, the ribbon feed arrangement 25 also includes a pair of lock pawls 77L, 77R formed on a plate 79 pivotally mounted as at 89 on the opposite side of the bracket 35 and extending through suitable openings 78L, 78R therein with one of the lock pawls 77L, 77R biased into operable engagement with the corresponding driven ratchet wheel 57L or 57R by a suitable overcenter biasing spring 80.

To wind the cloth ribbon 13 from one spool onto the other spool, the ribbon feed arrangement 25 includes a ribbon reversing means for controlling the direction of rotational movement of the ratchet wheels 57L, 57R. As more particularly shown in FIGS. 3 and 4, the ratchet wheels 57L, 57R carry pivotally supported lugs 81L, 81R respectively which are movable through corresponding openings 82L, 82R for being engaged by reversing arms 83L, 83R formed on the control plate 61 during an oscillatable indexing movement. The lugs 81L, 81R have associated pawls 85L, 85R extending adjacent the spindles 55L, 55R, and the lugs 81L, 81R are held from engagement with the reversing arms 83L, 83R when the pawls 85L, 85R are pressed against the spindles 55L, 55R by ribbon 13 wound onto the spools 19L, 19R. Accordingly, when the ribbon 13 is unwound from one of the spools 19L, 19R, the associated lug 81L or 81R will move into the path of the corresponding reversing arm 83L or 83R so as to effect pivoting of the control plate 61 about stud 68 with the next indexing movement, thereby swinging the corresponding indexing pawl 59L, 59R with the assistance of a conventional overcentering spring arrangement 84 into engagement with the other associated ratchet wheel 57L or 57R to wind the ribbon 13 onto the empty spool 19L, 19R. In addition, the pivoting movement of the control plate 61 swings the plate 79 by means of a pivotal connection 89 so as to bring the corresponding lock pawl 77L, 77R into engagement with the driven ratchet wheel 57L or 57R.

To facilitate the replacement of the cloth ribbon 13, the ribbon arrangement 11 described above is formed in separable upper and lower portions, generally indicated 91 and 93 respectively. As shown, the upper portion 91 for a cloth ribbon includes the bracket 35 carrying the ribbon lifting member 21 and the ribbon feed mechanism 25, while the lower portion 93 includes the plate 45 and the drive means 23. The ribbon spools 19L, 19R may be suitably secured to the spindles 55L, 55R of the upper portion 91 which has a cover 95 attached thereto and serves as a ribbon cartridge. Alternately, the ribbon cassette previously discussed may be

suitably secured to the cover 95 with the spindles 55L, 55R being received in the axial bores of the spools 19L, 19R.

As described above, the upper and lower portions 91, 93 of the ribbon arrangement 11 are operatively associated when the upper portion 91 is mounted on the lower portion 93 in an operating position, as shown in FIG. 2, with the notch 38 of the lifting member 21 receiving the pin 39 of the drive lever 41. In the operating position, the end of the downturned arm 33L rests against the lower bracket 45, and the upper and lower portions 91, 93 may be secured together by an upstanding pin 97 on the bracket 45 being received through a corresponding opening 99 in the upper bracket 35 which carries a suitable lever 101 which may be moved into engagement with an annular notch 103 formed in the pin 97.

However, to place the upper portion 91 on the lower portion 93 in the operating position, the arms 21L, 21R of the ribbon lifter 21 must pass on opposite sides of the single print element 17 and the notch 38 in the depending arm 37 of the ribbon lifter 21 must be moved so as to receive the pin 39 of the drive lever 41. Since the arms 21L, 21R as well as other parts of the ribbon arrangement 11 are closely associated with the print element 17, the type characters on the print element 17 may be struck and damaged as the upper portion 91 is placed on the lower portion 93.

In accordance with the present invention, damage to the type characters of the print element 17 is avoided by coupling the upper portion 91 to the lower portion 93 in a manner which enables the ribbon 13 to be replaced on the upper portion 91 at a convenient loading position yet guides the upper portion 91 during movement between the loading position, as shown in FIGS. 3 and 4, and the operating position, as shown in FIGS. 1 and 2, so that the print element 17 is received between the arms 21L, 21R of the ribbon lifter 21 as the notch 38 receives the pin 39 of the drive lever 41. As shown, the bracket 35 of the upper portion 91 has a pair of downturned arms 105L, 105R with axially aligned pins 107L, 107R respectively which are received in notches 109 formed in upturned arms 111L, 111R respectively of the lower bracket 45 so as to provide a pivoting movement between the loading position and the operating position, and the arms 105L, 105R and 111L, 111R of the upper and lower brackets 35, 45 respectively serve to align the upper and lower portions 91, 93 for guiding the arms 21L, 21R of the ribbon lifter 21 past the print element 17. The pins 107L, 107R are secured in the notches 109 by pivotally supported latch hooks 113L, 113R respectively which are biased to the latching position by springs 115 stretched between the arms 111L, 111R and the latch hooks 113L, 113R, and the upper portion 91 may be supported in an inverted loading position, as shown in FIG. 3, by suitable abutting surfaces 117, 119 of the upper and lower portions 91, 93 respectively which limit the pivotal movement of the upper portion 91 about the axis defined by the pins 107L, 107R. Although the abutting surface 117 is shown as part of the cover 95, it may also be in the form of a finger extending from the downturned arms 105L, 105R.

Accordingly, with the upper portion 91 at the loading position as shown in FIGS. 3 and 4, the ribbon feeding arrangement 25 is inverted and a worn ribbon 13 may be easily removed and replaced with a fresh ribbon 13

as previously described. After replacing the ribbon 13, the upper portion 91 may be pivoted, as shown in FIG. 5, to the operating position as discussed above.

When it is desired to substitute a carbon ribbon 13 for the cloth ribbon 13, the upper portion 91 may be easily removed from the lower portion 93 by depressing the latching hooks 113L, 113R, as shown in FIG. 6, and removing the pins 107L, 107R from the notches 109 of the lower bracket 45. Carbon ribbon elements corresponding to fabric ribbon elements are distinguished by primed reference numerals. Thus a carbon ribbon upper portion 91', such as shown in FIG. 8 and having a carbon ribbon, may be coupled to the lower portion 93. As more particularly shown in FIG. 7, the latching hooks 113L, 113R each have a camming surface 121 for engagement by the pins 107L, 107R so as to be deflected as the pins 107L, 107R move into the notches 109 of the upturned arms 111L, 111R of the lower bracket, whereupon the latching hooks 113L, 113R are returned to latching engagement with the pins 107L, 107R by the springs 115.

The upper portion 91' for a carbon ribbon may be generally similar to the upper portion 91 for a cloth ribbon and accordingly similar reference numerals are used for indicating similar parts. A ribbon feed arrangement 25' in the upper portion 91' may be operated by the lifting movement of a ribbon lifter 21', and a drive means 23' including carbon ribbon drive cam 51 for lifting the ribbon to successively different levels at the printing location is shown in U.S. Pat. No. 3,782,521 to which reference may be made for further details.

The ribbon lifter 21' may have a depending coupling arm 37' with a notch 38' for receiving another coupling pin 39' carried by another drive lever 41' located in spaced-apart relation to the drive lever 41 previously described and may be supported in a similar manner. Accordingly, with the upper portion 91' coupled to the lower portion 93 as described above, the upper portion 91' may be pivoted from the loading position to the operating position with the arms 21L', 21R' of the ribbon lifter 21' being guided past the print element 17 to avoid damage to the type characters thereon.

What is claimed is:

1. In a business machine having a type element supported on a carriage for impacting against a platen in a printing operation, and a ribbon lifting and feeding arrangement for lifting a ribbon from a lowered rest position to a printing position adjacent the platen prior to the impacting of the type element and for advancing a length of the ribbon past the type element with each printing operation, the improvement comprising:
 - said ribbon lifting and feeding arrangement including an upper portion serving as a holder for the ribbon and a lower portion mounted fixedly on said carriage for supporting said upper portion in an operating position,
 - said upper portion having a ribbon lifter movably supported thereon for carrying a portion of the ribbon adjacent the type element for movement between the rest position and the printing position,
 - said lower portion having a ribbon lifting drive means operably associated with the ribbon lifter of said upper portion in the operating position for driving the ribbon lifter from the lowered rest position to the printing position, and
 - said upper portion being coupled to said lower portion for guided movement from the operating posi-

tion adjacent the type element to a generally inverted loading position facilitating the replacement of the ribbon with the ribbon lifter being guided past the type element on the carriage during movement between the operating position and the inverted loading position. 5

2. In a business machine according to claim 1, said upper portion being releasably coupled to said lower portion for enabling another upper portion having a ribbon lifter movably supported thereon to be coupled to said lower portion for guided movement between a loading position and an operating position with the ribbon lifter being guided past the type element. 10

3. In a business machine according to claim 1:
shaft means associated with one of said upper and lower portions of said ribbon lifting and feeding arrangement for defining an axis for pivotal movement of said upper portion between the loading position and the operating position, 15
said other portion of said ribbon lifting and feeding arrangement having means defining notches for receiving said shaft means and supporting said upper portion for pivotal movement about the axis defined by said shaft means between the loading position and the operating position, and 25

cooperating guide surfaces on said upper portion and said lower portion for axially locating said shaft means relative to said notches for guiding the ribbon lifter supported on said upper portion past the type element.

4. In a business machine according to claim 3, the combination further comprising:

latch means associated with said portion of said ribbon lifting and feeding arrangement having said notches for releasably securing said shaft means in said notches, and

said upper and lower portions having cooperating abutting surfaces for blocking pivotal movement of said upper portion about the axis defined by said shaft means with the upper portion disposed generally horizontally at the loading position.

5. In a business machine according to claim 4:

said latch means being resiliently biased to hold said shaft means in said notches, and

said latch means having a camming surface leading to a hook portion for engagement by said shaft means to effect a camming movement of said latch means relative to said notches until said shaft means moves past the hook portion.

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