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Shattuck et al.

[11] **3,897,867**

[45] **Aug. 5, 1975**

[54] **RIBBON FEED MECHANISM FOR INK RIBBON CARTRIDGES**

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[52] **U.S. Cl.** **197/151**

[51] **Int. Cl.**[2] **B41J 33/14**

[58] **Field of Search** ..... 197/151, 153 R, 153 A, 197/157, 158, 159, 168, 170, 82

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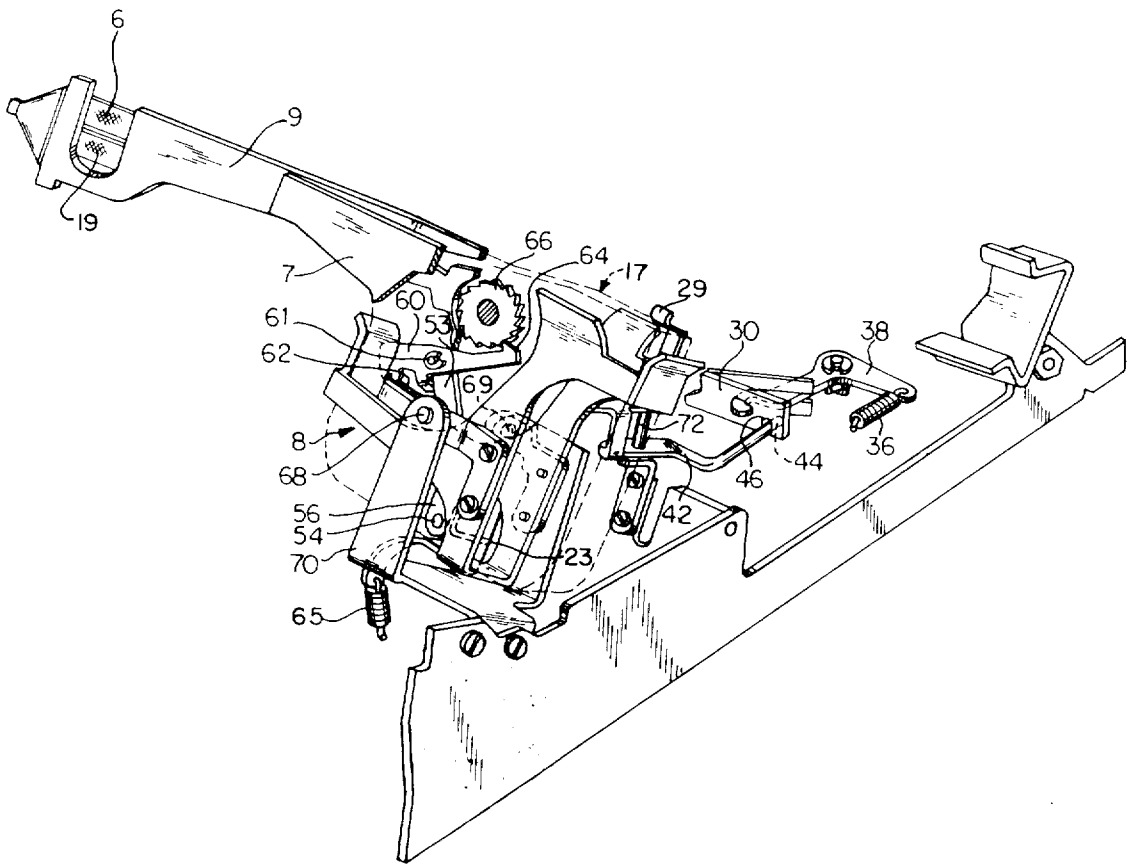
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Primary Examiner—J. Reed Fisher

[57] **ABSTRACT**

A cartridge ribbon feed mechanism for typewriters including an incrementally rotational star wheel escapement mechanism, the escapement mechanism being engaged by a frame mounted linkage coupled to a cartridge carrier supported linkage for actuating a cartridge mounted ratchet for advancing the ribbon. The cartridge carrier is pivotally mounted on the typewriter frame for oscillating the cartridge thereby shifting the ribbon to and from the typewriter print point independent of the ribbon advance.

11 Claims, 3 Drawing Figures



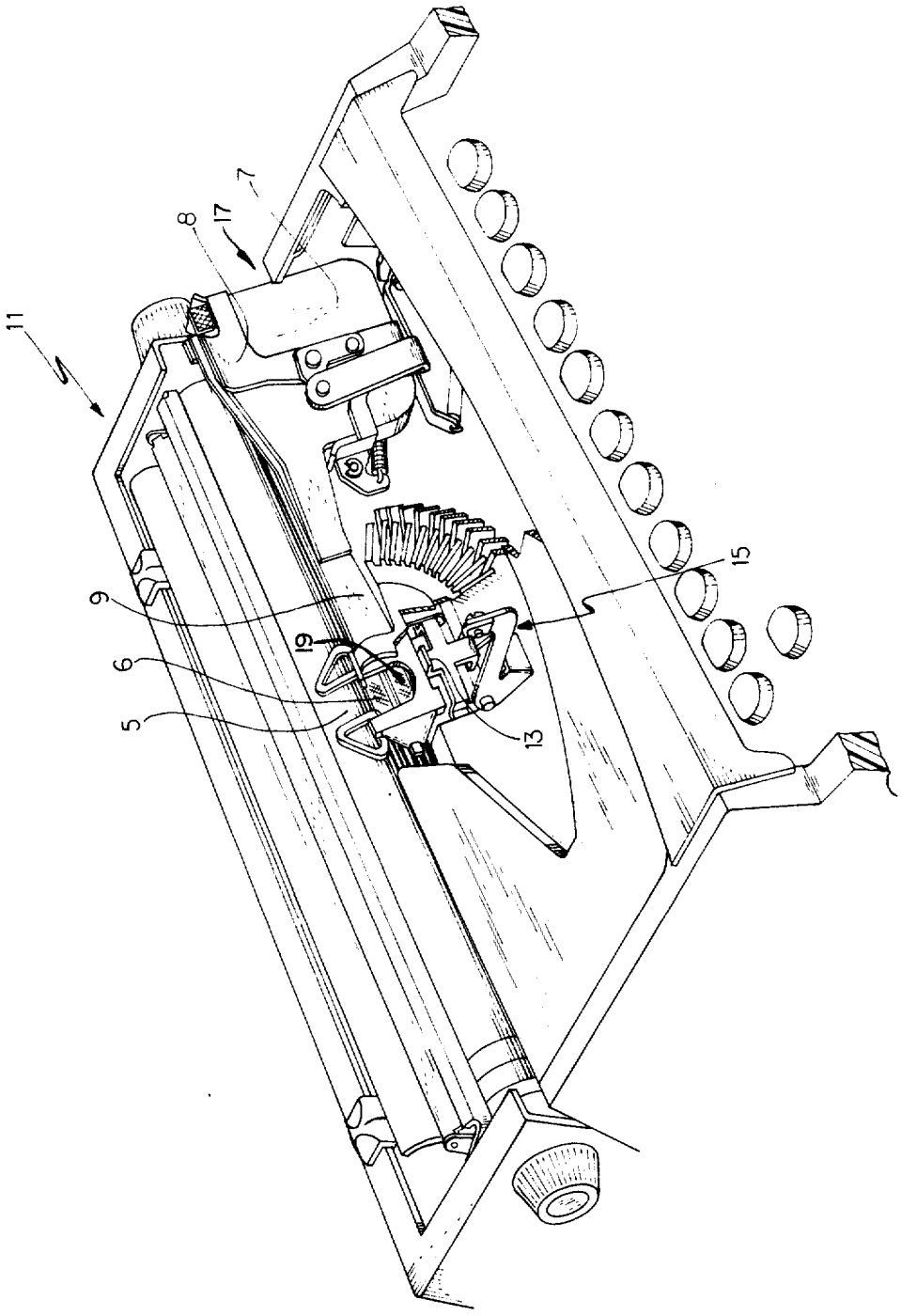


FIG 1

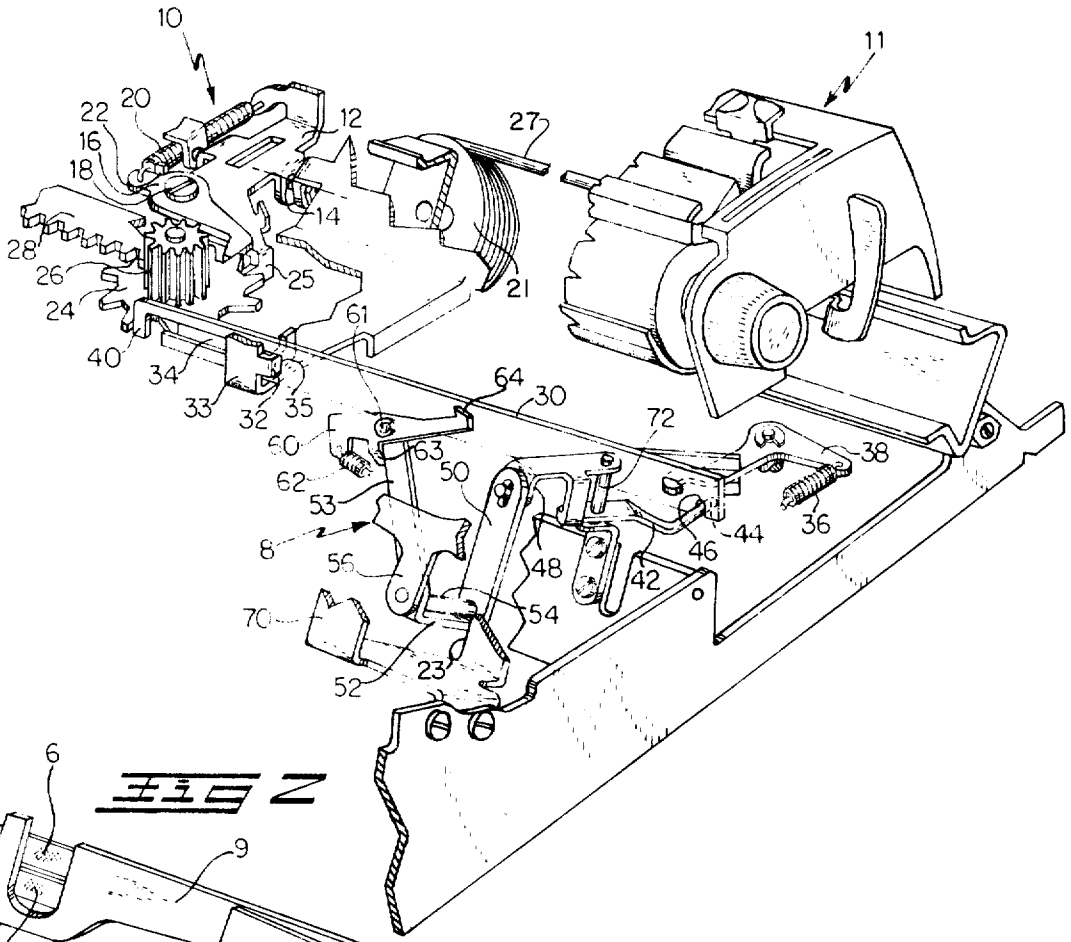

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Fig 2

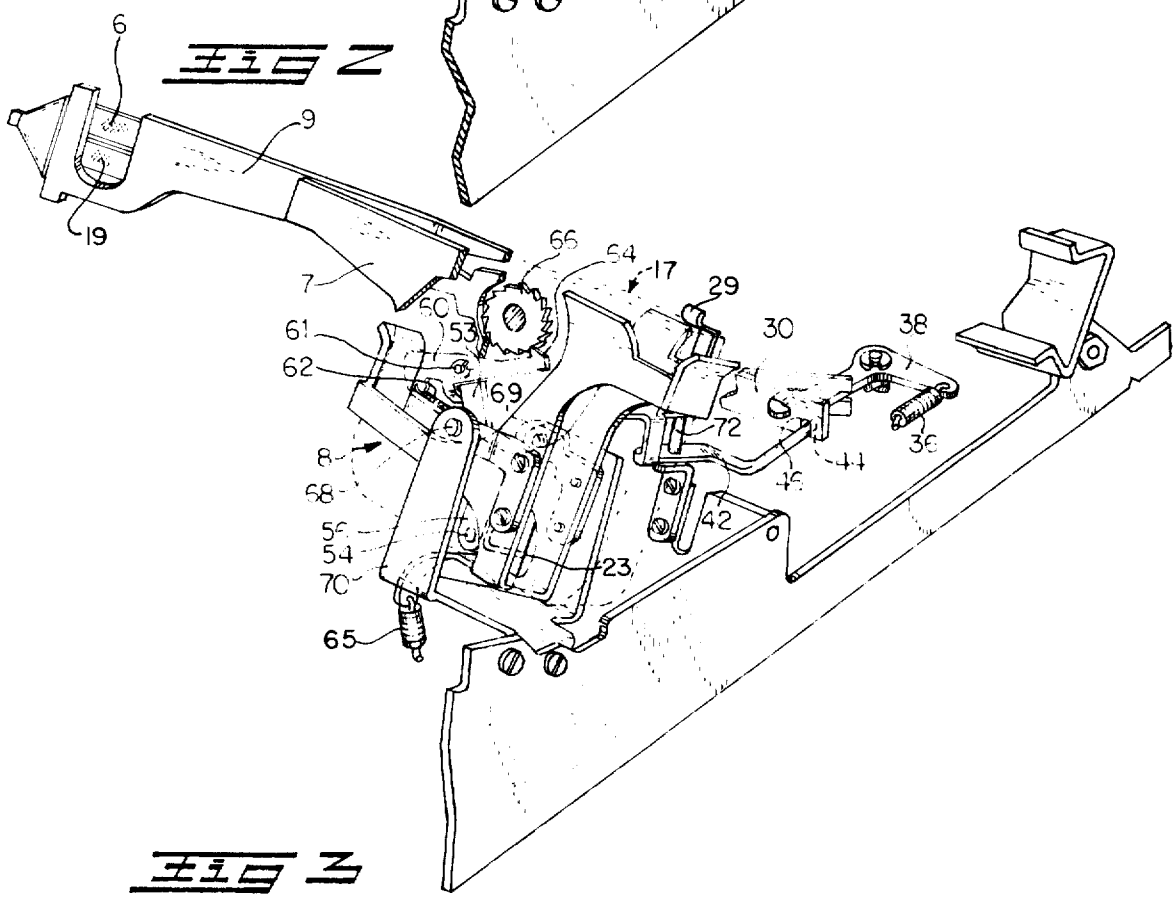

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Fig 3

RIBBON FEED MECHANISM FOR INK RIBBON CARTRIDGES

BACKGROUND OF THE INVENTION

The present invention relates to typewriters, and in particular to a ribbon feed mechanism for a ribbon cartridge supported on a pivotal carrier.

Present typewriter ribbon feed systems for ribbon cartridges supported on pivotal carriers are either massive, complex, or not compatible with a removable ribbon cartridge.

For example, U.S. Pat. No. 3,513,957 has a removable ribbon cartridge with its bottom open for receiving two flanged ribbon spools where they are retained on fixed shafts secured to the top of the cartridge. The ribbon cartridge is placed upon a pivotal carrier where openings in the spool flanges are engaged by a driving mechanism mounted on the carrier to feed ribbon from one spool to the other. The pivoting of the carrier and the feeding of the ribbon is accomplished by using dual cams supported on a common driven shaft.

Manual manipulation is necessary to remove the used spools of ribbon and replace them with unused spools of ribbon and thereafter thread the ribbon around the guide rollers. Consequently the problem of soiling ones hands during the handling of the ribbon during installation is still a problem.

Furthermore, the complexity of unitary ribbon feed and carrier pivoting mechanisms necessary to engage the spools to feed the ribbon and at the same time to pivot the carrier is both expensive and subject to malfunction. The expense is magnified by the necessity of a ribbon reversing mechanisms supported within the cartridge.

A further example is U.S. Pat. No. 1,059,522 for an adding machine, which has a pair of ribbon spools supported on a pivotal frame. The spools are driven by a first pair of bevel gears alternately engageable by a second pair of bevel gears mounted on a ratchet driven shaft, the ratchet mechanism being driven by the reciprocating movement of the frame. The massiveness of the pivotal frame precludes the rapid reciprocation necessary for use in a typewriter and consequently it is not conducive for such use.

For example, the structure of the pivotal frame in Pat. No. 1,059,522 is unwieldy. Therefore, if the frame were reciprocated rapidly, the inertia of the high mass frame would induce undesirable loads on the frame structure and components and may result in a short life expectancy.

SUMMARY OF THE INVENTION

Briefly described, this invention provides a simplified ribbon feed mechanism for cartridge ribbons that includes a typewriter starwheel escapement driving means coupled to a linkage mechanism that responds to the incremental actuation of the starwheel escapement driving means to incrementally drive a ratchet ribbon advancing means of a ribbon cartridge. The ribbon cartridge is supported on a pivotal carrier actuated by a ribbon lift mechanism where the ratchet on the cartridge is driven independently of the pivotal movement of the ribbon cartridge carrier to feed ribbon from the ribbon cartridge along a guide arm of the ribbon cartridge to the print point and back to the cartridge.

Accordingly, it is an object of the present invention to provide a reliable, inexpensive, unitary ribbon drive for a pivotally supported ribbon cartridge.

A further object of the present invention is to provide a pivotal supporting carrier for a ribbon cartridge where a ribbon drive means mounted on the pivotal carrier actuates a cartridge ribbon advancing means on the ribbon cartridge independent of the pivotal movement of the ribbon cartridge carrier.

A further object of the present invention is to provide a ribbon drive means mounted on a pivotal carrier that is powered by a starwheel escapement mechanism.

Other objects, features, and advantages of the invention will become more apparent from the following description, including appended claims, and the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view showing the typewriter with a ribbon cartridge positioned in a cartridge carrier.

FIG. 2 is a perspective view showing the typewriter ribbon feed mechanism of the present invention.

FIG. 3 is a perspective view showing the ribbon cartridge carrier and its relationship with the ribbon feed mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 showing a ribbon cartridge 7 supported in a ribbon cartridge carrier 8 with an arm 9 of ribbon cartridge 7 extending laterally to a typewriter print point 5 wherein a print point 6 of arm 9 is aligned with typewriter print point 5 and a portion of arm 9 rests on a link 13 of a typewriter lift mechanism 15.

FIG. 2 shows the ribbon feed mechanism comprised of a carriage driven escapement mechanism 10 which primarily controls the movement of a spring drum driven carriage 11. The carriage 11 is normally urged in a letter feed direction from right to left and is controlled in its movement to feed step by step by the escapement mechanism 10.

The escapement mechanism 10 includes a dog rocker 12 rockable about an axis 14 into a position in which a known spring urged dog 16 pivotal on the rocker 12 at a pivot 18 is held by a spring 20 against a stop 22 on the rocker 12 and is normally engaged by a tooth of a starwheel 24 to restrain the carriage 11 against letter feed advance.

Rocker 12 is operable to disengage pivoted dog 16 from the teeth of the starwheel 24 and interpose an integral rigid dog 25 carried by the rocker 12 into the path of travel of the teeth of the starwheel 24. A feed pinion 26 integral with the starwheel 24 is in mesh with a carriage feed rack 28. Therefore, the carriage 11, driven by the spring drum and cord 21 and 27 respectively, is fed by the typing actuations in a step by step letter spacing manner controlled by the just described escapement mechanism 10. Thus as carriage 11 is advanced, pinion 26 is rotated and in turn rotates starwheel 24.

A link 30 is slideably supported by a tab 32 of a frame member 33 and the tab 32 is guided by a longitudinal slot 34 of the link 30. Link 30 is biased leftward by spring 36 of frame mounted bellcrank 38 and is limited in its leftward movement by the tab 32 engaging an end

35 of the slot 34 at which time an end 40 of the link 30 is spaced adjacent to and in the path of a tooth of a starwheel 24 for engagement therewith.

A frame mounted pivotal bellcrank 42 is coupled to the link 30 by an end 44 of the bellcrank 42 slideably engaging a slot 46 of the link 30. An end 48 of the bellcrank 42 is slideably coupled to an upstanding arm 50 of a U-shaped member 52 so that any motion generated by the link 30 is transmitted by the bellcrank 42 to the member 52.

Member 52 in turn is pivotally supported on a pivot pin 54 that is fixed to a downward extending arm 56 of a pivotal carrier 8 as shown in FIG. 3. An upward extending arm 53 of the member 52 provides the support for a pivotal pawl 60.

The pawl 60 is biased counter clockwise about a pin 61 by a spring 62 to an effective position limited by a formed ear 63 abutting the arm 53 of the member 52. When the ribbon cartridge 7 is positioned in the carrier 8, a nose 64 of the pawl 60 engages a ratchet wheel 66 carried by an rotationally supported on the outside surface of the wall of the ribbon cartridge 7.

Carrier 8 is pivotally supported at pivots 68 and 69 by a frame mounted U-shaped bracket 70 and is of box like construction with its top open for insertion of the ribbon cartridge 7. Any pivotal movement of the carrier 8 is independent of any pivotal movement of the member 52 which, as mentioned before, is pivotally supported on the carrier 8. The carrier 8 is biased to a rest position against a suitable stop 23 by a spring 65.

In operation, the ribbon cartridge 7 is inserted into the carrier 8 and latched into position by a suitable means 29. The ribbon cartridge 7 is defined by a housing 17 for supporting and storing a ribbon 19 and laterally extending arm 9 therefrom for guiding ribbon 19 to a position near the typewriter print point 5 and back to the housing 17. As the ribbon cartridge 7 is positioned in the carrier 8, the ratchet wheel 66 of the ribbon cartridge 7 is engaged by the nose 64 of the pawl 60.

As a typing operation occurs, the escapement mechanism 10 is actuated whereupon the rocker 12 is rocked to disengage from the teeth of the starwheel 24. The starwheel tooth adjacent the link end 40 moves in an arc, abuts the link end 40, overcomes the biassing effect of the spring 36, and urges the link 30 linearly rightwards. This movement of link 30 urges the bellcrank 42 to pivot clockwise about a pivot 72 and, being coupled to the member 52, urges the member 52 to pivot counter clockwise about the pivot pin 54. Pawl 60, being pivotally attached to the arm 53 of the member 52, moves with the arm 53, and the pawl nose 64, being in biassed engagement with the ratchet wheel 66, actuates the ratchet wheel 66 to incrementally rotate.

The linear path of the link 30, when abutted by each rotating starwheel tooth, and the arcuate path of the starwheel tooth as the starwheel 24 rotates, cause the starwheel tooth to progressively disengage from its abutment with the link end 40 whereupon the link 30 is urged by the bellcrank 38 to its rest position.

As the link 30 is returning to rest position, the link 30 urges the bellcrank 42 to pivot counter clockwise, the member 52 to pivot clockwise, and the pawl 60 to return to its initial relationship with the ratchet wheel 66.

As the starwheel 24 engages and disengages from the link 30, the link 30 oscillates and thru the bellcrank 42 and the member 52, the pawl 60 is urged to oscillate and actuate the ratchet wheel 66 to incrementally advance the ribbon 19.

The foregoing action occurs independently of the pivotal action of the ribbon cartridge 7 which has the forward end or its arm 9 in engagement with link 13 of typewriter lift mechanism 15. The lift mechanism 15 raises and lowers arm 9 to align the cartridge print point 6 with that of the typewriter print point 5 and in turn causes pivotal movement of carrier 8.

While the foregoing description has shown and described the fundamental novel features as applied to a preferred embodiment, it will be understood by those skilled in the art that modifications embodied in various forms may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A ribbon feed mechanism for a ribbon cartridge in a typewriter having a frame, a ribbon lift mechanism and a print point, the ribbon cartridge having a single arm for guiding a ribbon from the ribbon cartridge to a position near the print point and thereafter guiding the ribbon back along said arm to the ribbon cartridge and having a ribbon advancing means including a ratchet, the ribbon feed mechanism comprising:

a ribbon cartridge carrier pivotally supported on the frame for supporting the ribbon cartridge, the ribbon cartridge arm engaging the ribbon lift mechanism causing the ribbon cartridge arm to pivot the ribbon cartridge and the ribbon cartridge carrier to shift the ribbon between the position near the print point and the print point;

a first driving means supported on said ribbon cartridge carrier for engaging and actuating the ratchet of the ribbon advancing means; and

a second driving means supported on the frame coupled to said first driving means for transmitting motion to said first driving means for actuating the ratchet driven ribbon advancing means independent of the pivotal movement of the ribbon cartridge carrier.

2. A ribbon feed mechanism as defined in claim 1 wherein said first drive means includes means pivotal relative to said ribbon cartridge carrier for actuating the ratchet of the ribbon advancing means independent of the pivotal movement of the ribbon cartridge carrier.

3. A ribbon feed mechanism as defined in claim 2 wherein said means pivotal relative to said ribbon cartridge carrier includes a pivotal pawl for engaging and actuating the ratchet of the ribbon advancing means.

4. A ribbon feed mechanism as defined in claim 1 wherein said second driving means includes an incrementally rotatable carrier spacing escapement starwheel for transmitting incremental motion to said first driving means.

5. A ribbon feed mechanism as defined in claim 4 wherein said starwheel includes spaced teeth and a link actuated by said starwheel teeth for transmitting incremental motion to said first driving means.

6. A ribbon feed mechanism as defined in claim 5 wherein said second driving means further includes a spring biased bellcrank connected to said link distant from said starwheel for biasing said link toward said starwheel spaced teeth for successive actuation by said spaced teeth.

7. A ribbon feed mechanism for a vertically insertable and removable ribbon cartridge in a typewriter having a frame, a ribbon lift mechanism, and a print

point, the ribbon cartridge having an arm for guiding a ribbon from the ribbon cartridge to a position near the print point and thereafter guiding the ribbon back to the ribbon cartridge and having a ribbon advancing means and a ribbon driving means, the ribbon feed mechanism comprising:

a ribbon cartridge carrier pivotally supported on the frame for supporting the ribbon cartridge such that the ribbon cartridge arm extends laterally from the ribbon cartridge and engages the ribbon lift mechanism causing the ribbon cartridge arm to pivot the ribbon cartridge and the ribbon cartridge carrier to shift the ribbon between the position near the print point and the print point;

the ribbon advancing means including a ratchet rotatably supported on an outside surface of a wall of the ribbon cartridge with a plurality of driving surfaces of said ratchet perpendicular to said outside surface of said ribbon cartridge wall and the ribbon driving means including a pawl pivotally supported on said ribbon cartridge carrier, said pawl having a pawl nose in alignment with the driving surfaces of said ratchet for engaging and actuating said ratchet for advancing the ribbon; and

a second driving means supported on the frame coupled to said ribbon driving means for transmitting motion to said ribbon driving means for actuating the ratchet driven ribbon advancing means independent of the pivotal movement of the ribbon cartridge carrier.

8. A ribbon feed mechanism as defined in claim **7** wherein said pawl is biased into engagement with said ratchet by a spring for urging said pawl into continuous engagement with said ratchet during oscillation of said ribbon cartridge carrier.

9. A ribbon feed mechanism as defined in claim **7** wherein said second driving means includes an incrementally rotatable carriage spacing escapement starwheel for transmitting incremental motion to said ribbon driving means.

10. A ribbon feed mechanism as defined in claim **9** wherein said starwheel includes spaced teeth and a link actuated by said starwheel, spaced teeth for transmitting incremental motion to said ribbon driving means.

11. A ribbon feed mechanism as defined in claim **10** wherein said second driving means further includes a spring biased bellcrank connected to said link distant from said starwheel for biasing said link toward said starwheel spaced teeth for successive actuation by said spaced teeth.

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