United States Patent [19]

Brignole

[11] **3,899,065**

[45] **Aug. 12, 1975**

[54] **RIBBON CASSETTES FOR SINGLE ELEMENT TYPEWRITERS**

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[22] Filed: **July 22, 1974**

[21] Appl. No.: **490,860**

[52] **U.S. Cl.** **197/151;** 197/162; 197/170

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

[58] **Field of Search** 197/151, 162, 170, 154, 197/156, 159

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Assistant Examiner—R. T. Rader
Attorney, Agent, or Firm—Joseph R. Spalla

[57] **ABSTRACT**

The invention is a ribbon cassette which rotatably mounts supply and take-up spools and includes vibrator arms which are couplable to ribbon elevating means mounted on a cartridge. The cartridge is removably mounted on a machine and includes ribbon feed means operable by the ribbon elevating means. The cartridges are movable from a load position to enable facile coupling of the cartridge to the elevating and feed means thereon and to an operating position, at which the elevating means in the cartridge is coupled in driving relation to an oscillatable drive means operative incident to each print action.

4 Claims, 8 Drawing Figures

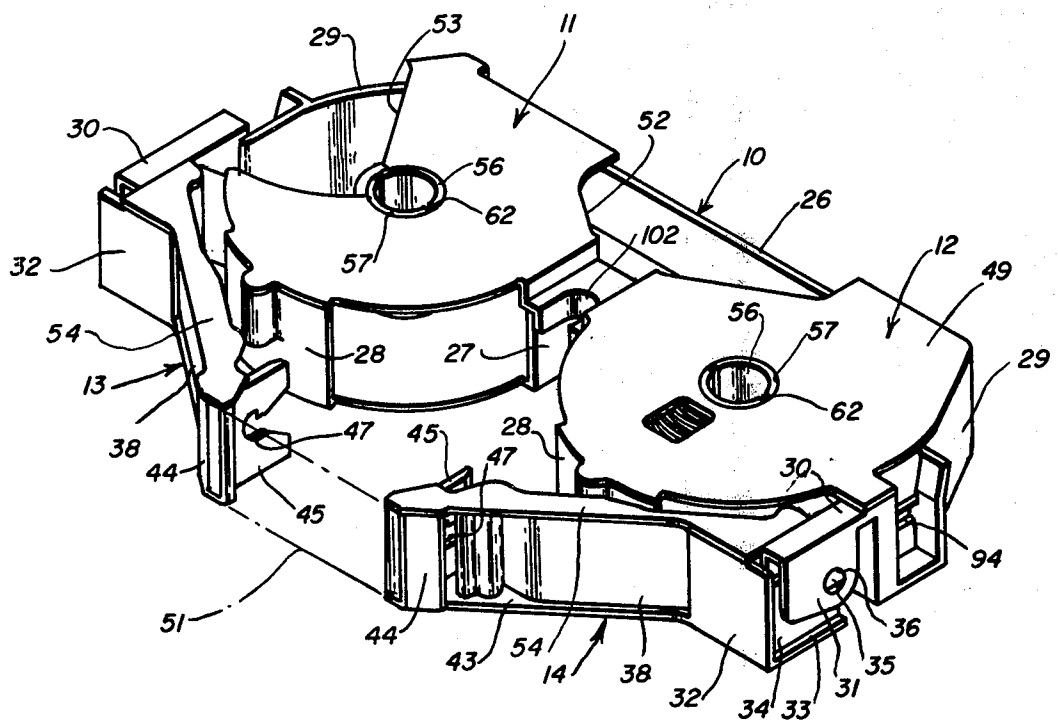
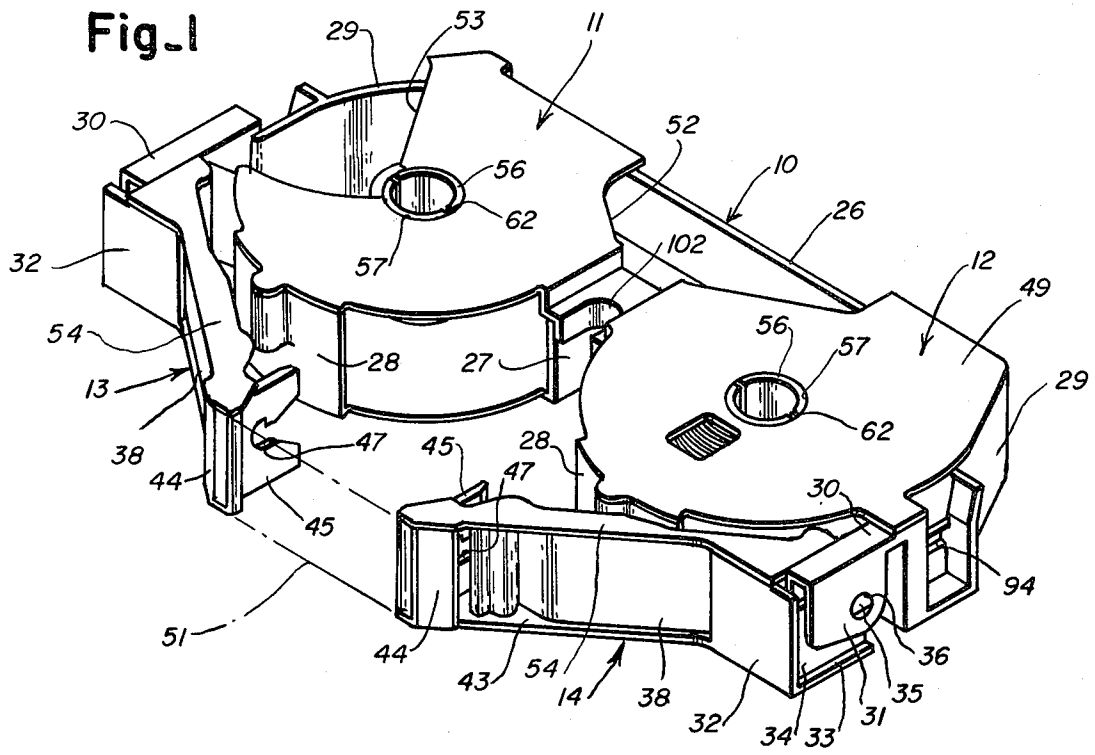


Fig_1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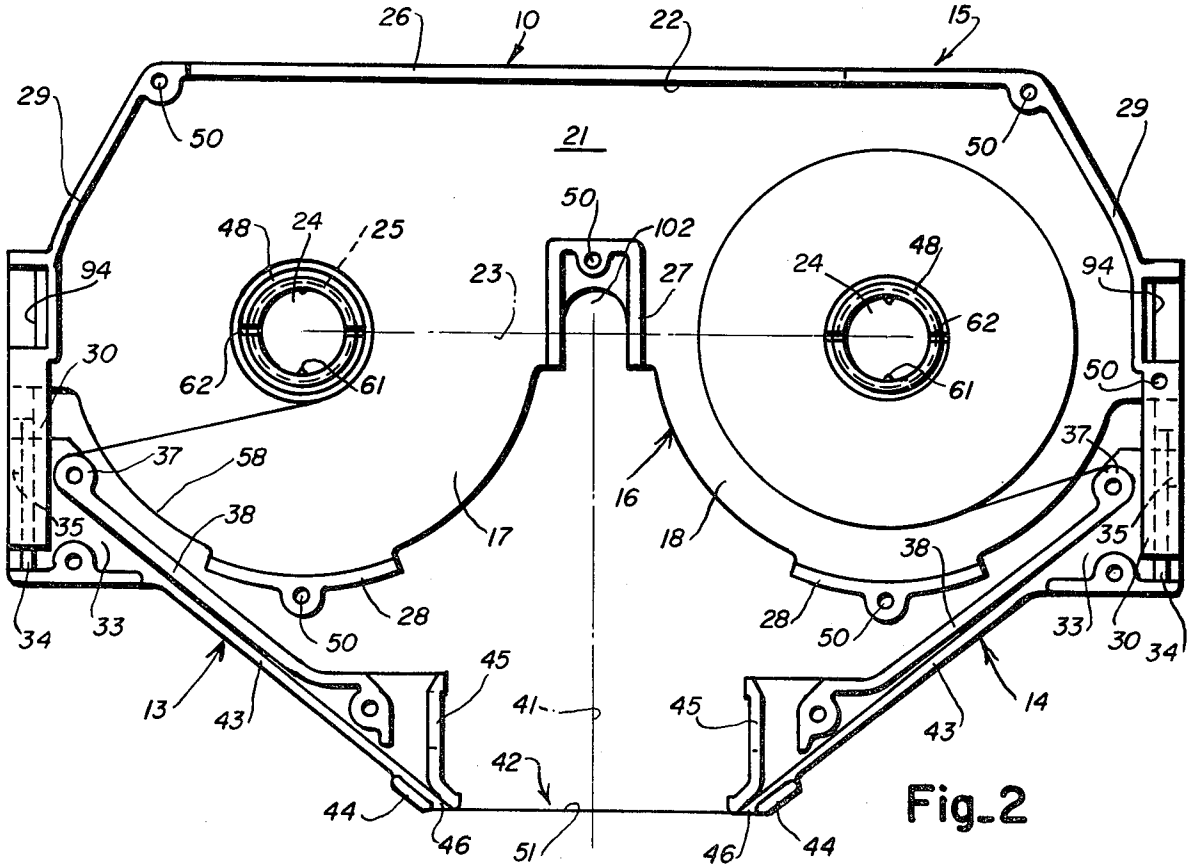
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Fig_2

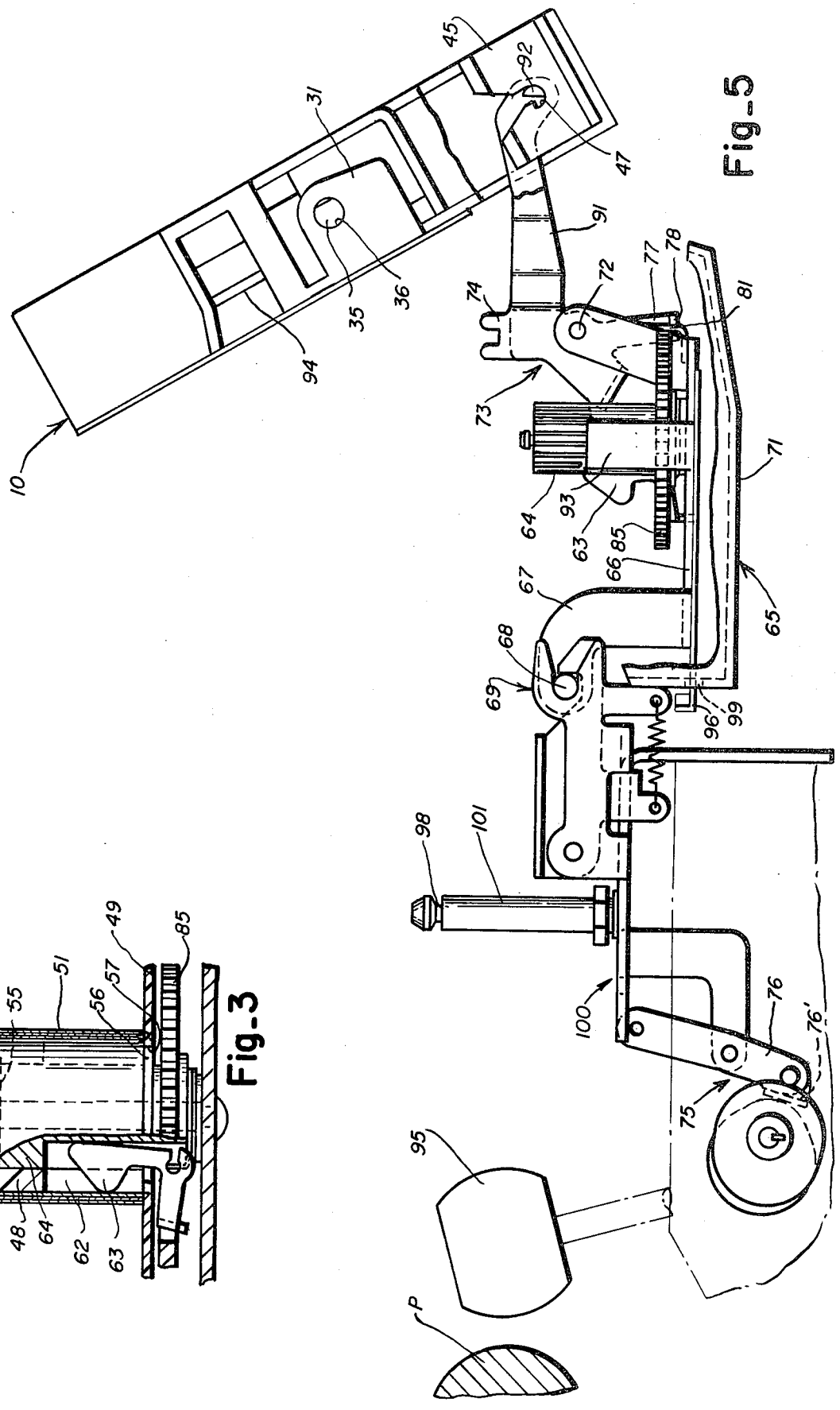
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Fig.5

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62
63

Fig.3

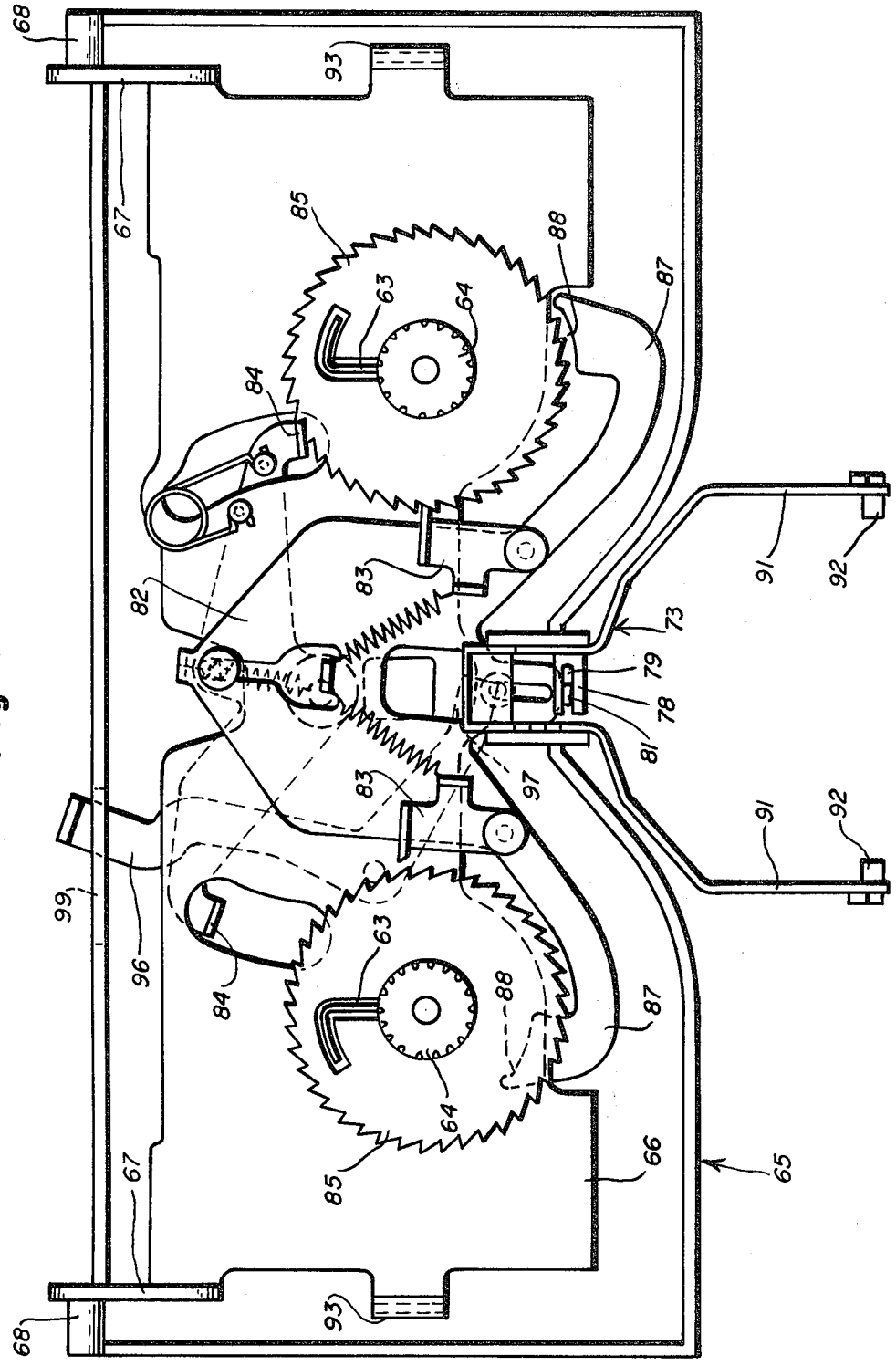
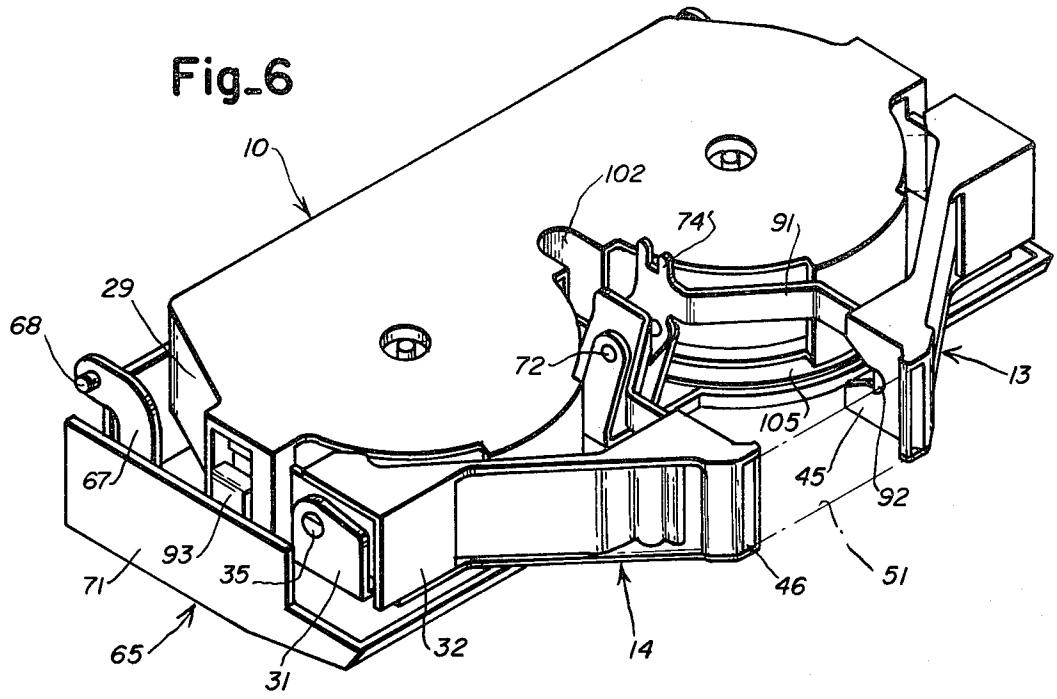


Fig_4

Fig_6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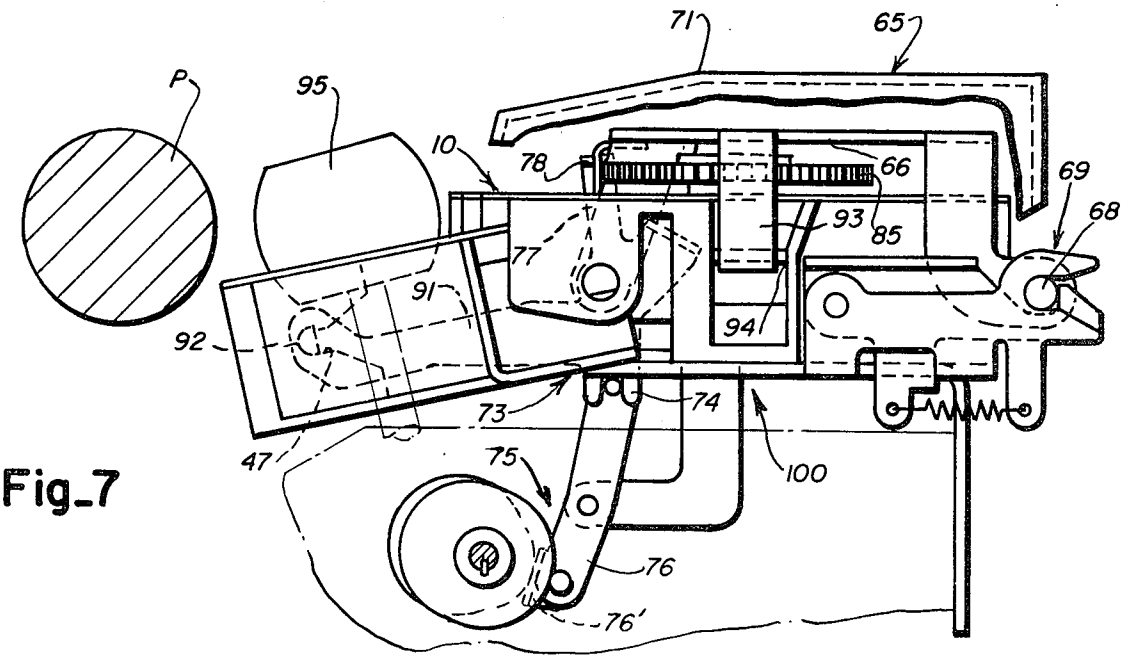
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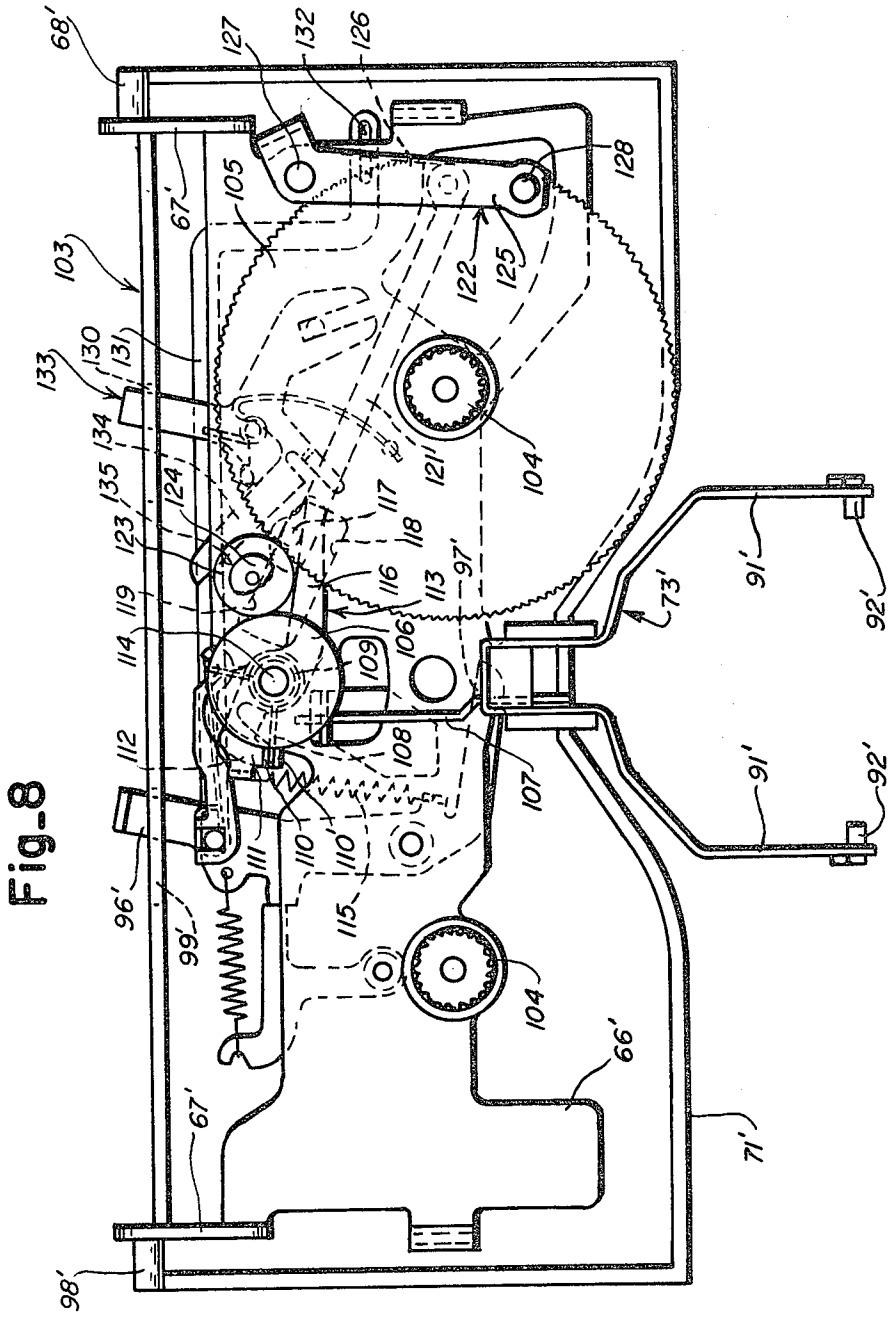
76'

Fig_7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97'
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73'
91'
92'
112
108
107
91'
92'
96'
111
110
110'
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115
104
66'
67'
71'
98'

Fig_8

RIBBON CASSETTES FOR SINGLE ELEMENT TYPEWRITERS

This invention relates to ribbon cassettes for single element typewriters; more particularly, it relates to ribbon spool containing cassettes having pivotally mounted thereon vibrator arms, and specifically, to ribbon cassettes having vibrator arms, which are easily couplable to ribbon elevating and feed means provided in cassette receiving cartridges.

Ribbon cassettes provided with supply and take-up spools are known in the art. The mounting of these prior art cassettes, either for replacement of spent ribbons or exchange of one ribbon cassette containing one type of ribbon with another cassette containing another type of ribbon, has required an undesirable degree of manipulation and an undue complexity of mechanism to properly locate a ribbon cassette in operative coupled relationship with ribbon elevating and feed mechanisms in a machine.

In accordance with the present invention, a ribbon cassette is provided with vibrator arms pivotally coupled thereto and across which ribbon extends between supply and take-up spools in the cassette. The vibrator arm extremities are formed to be coupled to ribbon elevating means supported on a cassette receiving cartridge, which also contains ribbon feed mechanism operated by the ribbon elevating means. The cartridge containing the ribbon elevating and feed means is designed to be removably mounted to the machine and a mounted cartridge is pivotal from an open load position to facilitate coupling of the vibrator arms to the elevating means and the reception of the cassette in the cartridge after which the loaded cartridge is moved to an operating position whereat the elevating means is connected to drive mechanism in the machine.

An object of the invention is to provide a ribbon cassette having pivotally mounted vibrator arms to facilitate coupling to ribbon elevating means.

Another object of the invention is in the provision of a ribbon cassette having pivotally mounted vibrator arms, which is designed for reception into a ribbon cartridge for coupling to ribbon feed mechanism therein.

Other objects and many of the attendant advantages of this invention will become better understood by reference to the following detailed description when considered in connection with the accompanying drawing in which like reference numerals designate like parts and primed reference numerals designate equivalent parts throughout the figures thereof and wherein

FIG. 1 is a perspective view of a ribbon cassette in accordance with the invention as it would appear when loaded in an operatively positioned cartridge;

FIG. 2 is an elevational view of the cassette as viewed in FIG. 1 with the top section removed showing details of construction;

FIG. 3 is a cross-sectional view of a mounted ribbon spool;

FIG. 4 is an elevational view of a cassette receiving, fabric ribbon feeding cartridge shown in an inverted or open load position, for reception of a fabric ribbon cassette;

FIG. 5 is a side elevational view of a cassette loaded cartridge mounted on a single element typewriter and shown in inverted load position with the vibrator arms of a cassette being coupled to ribbon elevating means on the cartridge;

FIG. 6 is a perspective view of a cassette fully loaded in a cartridge in open load position;

FIG. 7 is a side elevational view of an operatively positioned cassette loaded cartridge; and

FIG. 8 is an elevational view of a cassette receiving, carbon ribbon feeding cartridge shown in an inverted or open load position for reception of a carbon ribbon cassette.

Referring now to the drawing wherein like reference numerals designate like or corresponding elements throughout the views and primed reference numerals designate equivalent elements through the views, there is shown in FIG. 1, a ribbon cassette generally designated by reference numeral **10** for rotatably accommodating spooled carbon, solvent or fabric ribbon comprising spaced left and right ribbon spool holders generally designated by reference numerals **11** and **12** and vibrator guide arms generally designated by reference numerals **13** and **14** pivoted to the opposite sides of spool holders **11, 12.**

With reference to FIG. 2, the ribbon cassette **10** comprises a molded lower section generally designated by reference numeral **15** having a flat lower wall **16** taking the form of left and right circular sections **17, 18** spaced apart by an integral T-shaped web section **21,** which has an edge **22** parallel to a line **23** through the centers of both circular sections **17, 18** and which web section **21** extends between circular sections **17, 18** substantially to the line **23.** Each circular section **17, 18** has a central opening **24** to accommodate a spindle **64** (FIGS. 3 and 4) about which is a low annular upstanding ring **25.** The lower section **15** is also defined by a straight upright rear wall **26** extending along the edge **22,** by upright sections **27** tangent to the circular sections **17, 18** and extending from the web section **21** between circular sections **17, 18,** by upwardly extending arcuate front sections **28** opposite the rear wall **26,** and by upwardly extending side sections **29** which extend from the rear wall **26** around opposite ends of each of the circular sections **17, 18** to the line of centers **23** and then outwardly tangentially of the circular sections **17,** 18 at right angles to the line **23.**

As shown in the FIG. **1,** the ends **30** of each of the side sections **29** form a downwardly directed clevis **31** adapted to receive and pivotally support the left and right vibrator guide arms **13** and **14** for movement in a single plane.

As viewed in FIGS. **1** and **2,** each of the vibrator guide arms **13** and **14** comprises a right angled corner section formed by a front wall **32** and bottom wall **33.** Extending rearwardly from the front wall **32** and upwardly from the bottom wall **33** is a blade **34** adapted to be received by a clevis **31.** The blades **34** are provided with bevelled pins **35** which are adapted to enter holes **36** in each clevis **31** when the blade **34** is forced therein, thus to rotatably support the vibrator guide arms **13** and **14** for movement in the plane of the blades **34.** As viewed in FIG. **2,** a post **37** located inwardly of each vibrator guide arm blade **34** extends upwardly from the bottom wall **33** of the corner section of the vibrator guide arms **13** and **14** and serves as a ribbon guide. Each post **37** is integrally formed with one end of a ribbon guide rib or section **38** which extends at an angle on the order of 45° toward but short of a line **41** extending at right angles to the center line **23** from between the circular sections **17, 18** thereby forming between the ends a ribbon gap **42** across which ribbon **51**

extends. The ribbon guide sections 38 of the vibrator guide arms 13, 14 are formed with lower ribbon guide flanges or edges 43. Extending upwardly from the lower ribbon guide flange 43 at the end of the vibrator guide arms 13, 14 are spaced upstanding guides 44 and 45 forming an exit slot 46 through which ribbon 51 extends across the gap. The guides 45 forming the ribbon exit slots 46 extend rearwardly or toward the intermediate web section 21 at right angles to the gap 42 and are provided with notched slots 47 (FIG. 1) adapted to engagingly embrace semi cylindrical coupling pins 92 (FIGS. 4, 5, 7 and 8) on ribbon elevating means 91 (FIG. 4.) pivotally mounted on a machine support cartridge 65 (FIG. 5) to be described hereinafter for receiving a cassette 10.

With reference to FIG. 3, ribbon spools 48 are adapted to be rotatably supported between the lower wall 16 of the lower section 15 and an upper closure wall 49 which is secured to the lower section 15 by depending pins (not shown) extending into holes 50 (FIG. 2) provided in the upright rear wall 26 and arcuate wall 28 of the lower section 15 after ribbon 51 on the spools 48 has been threaded.

As shown in FIG. 1, the upper closure wall 49 as shown in FIG. 1 has cutouts 52 and 53 for reasons which will be hereinafter apparent. Also, top guide or flanged portions 54 are similarly secured to the top of the guide sections 38 of the vibrator guide arms 13 and 14 after threading ribbon 51.

With further reference to FIG. 3, the cylindrical ribbon spools 48 are each provided with a recess 55 in the lower ends to receive and be rotatably supported about the annular ring 25 on the lower wall 16 and each has a reduced outer diameter upper end 56 receivable within a central opening 57 in the upper closure wall 49 to rotatably locate the ribbon spools 48 in spaced relationship in the left and right holders 11 and 12. Ribbon 51 having its ends suitably secured to the spools 48 is wound on the spool 48 in the left holder 11 and extends through an opening 58 between the arcuate front wall 28 and side wall 29, around post 37, and through the guide section 38 of the left vibrator guide arm 13 through the exit slot 46 at the end of the left vibrator guide arm 13, thence across the gap 42 through the slot 46 and ribbon guide section 38 in the right vibrator guide arm 14, around the post 37 and onto the other rotatably supported spool 48. Suitably formed internal ribs 61 in the spools 48 are provided to locate and key the spools 48 to spindles 64 (FIGS. 4 and 5) in ribbon cassette 10 as is conventional.

Spools 48 supported in a fabric ribbon cassette 10 are provided with oppositely located slots 62 to accommodate an L-shaped reversing lever 63 pivotally mounted at the base of fabric ribbon spool 48 supporting spindles 64 and operative when ribbon 51 is unwound from a spool 48 to pivot out and down to cause fabric ribbon 51 reversals as will hereinafter appear.

Referring now to FIG. 4, there is shown a cartridge 65 in an inverted load position supporting fabric ribbon feed and ribbon elevating mechanism 73. The fabric ribbon cartridge 65 comprises a feed and elevating mechanism support plate 66 having upwardly directed arms 67 supporting pintles 68 to pivotally secure the cartridge 65 to a machine carriage frame 100 (FIGS. 5 and 7) supported releasable latching means generally designated by reference numeral 69 (FIGS. 5 and 7). A cover 71 (FIGS. 5 and 7) is suitably secured to guard the ribbon feed mechanism and ribbon elevating mechanism 73 when in operative position as shown in FIG. 7. The support plate 66 pivotally supports as at 72 ribbon elevating mechanism generally designated by reference numeral 73 and best seen in FIGS. 5 and 6, having a forked arm 74 which when the cartridge 65 is operatively positioned as shown in FIG. 7 couples to cam driven drive mechanism generally designated by reference numeral 75 supported on machine carriage frame 100, which oscillates fabric and carbon drive arms 76, 76' incident to each type action. Another arm 77 of the ribbon elevating mechanism 73 is provided at its bent out end 78 with a slot 79 into which extends an arm 81 of an index plate 82 supporting feed pawls 83 and no-back pawls 84. The index plate 82 is pivotally and slidably supported on the support plate 66. The index plate 82 has two stable positions in which the paired feed pawls 83 and no-back pawls 84 are operatively positioned with one or the other of associated feed ratchets 85. As shown, the support plate 66 rotatably supports the feed ratchets 85 from which extend integral spindles 64 on which are pivotally supported the reversing levers 63 which, when ribbon 51 is wound on a spool 48, are held in inactive position out of the path of reversing arms 87 forming part of the index plate 82. When a reversing lever 63 is allowed to drop in the path of the end 88 of a reversing arm 87, continued rotation of spool 48 causes the lever 63 to act on the reversing arm 87 and shift the index plate 82 to its other stable position.

The ribbon elevating mechanism 73 also includes ribbon vibrator elevating arms 91, the ends of which are provided with laterally extending semi circular pins 92 adapted to be received with the slots 47 of the vibrator guide arms 13 and 14 on the cassette 10 when the cassette 10 is held in the position as shown in FIG. 5 and drawn upwardly. After coupling the vibrator guide arms 13 and 14 of the cassette 10 to the elevating arms 91, the cassette 10 is pivoted about the pins 92 on the elevating arms 91 for reception of the spindles 64 of the cartridge 65 into the spools 48 to the position shown in FIG. 6 and is held positioned in the cartridge 65 by spring clips 93 upstanding from the support plate 66 which cooperate with detent formations 94 on the outer side walls 29 of the cassette 10. In so loading a cassette 10, the pins 92 on the elevating arms 91 are trapped in the notched slots 47 on the vibrator guide arms 13, 14 as shown in FIGS. 6 and 7.

After so loading a fabric ribbon cassette 10 in the cartridge 65, the entire cartridge 65 is pivoted about a latched pivot connection 68, 180° to the operating position shown in FIG. 7 whereat the ribbon elevating mechanism 73 is automatically coupled to the ribbon drive mechanism 75 on the machine carriage frame generally designated by reference numeral 100 in FIGS. 5 and with the opening defined between the ribbon spanning the gap 42, the spaced elevating arms 91 and the circular sections 17, 18 of the cassette 10 embracing a single element typehead 95 with the ribbon 51 positionable between the typehead 95 and a platen P.

When the loaded cartridge 65 is operatively positioned, a locking lever 96 accommodated by a recess 99 in the upper edge of the rear wall of the cartridge 65 and pivoted on the support plate 66 can be shifted so that the end 97 of the locking lever 96 engages a groove 98 in the upper end of a post 101 extending up-

wardly from the carriage frame **100**. When the cartridge **65** is so operatively positioned and locked, the post **101** is accommodated by the semi circular grooves **102** formed in upper closure wall **49** and lower wall **16** of bottom section **15** (FIGS. 1 and 2) of the cassette **10**, which are shaped to embrace the upstanding sections **27** of the molded lower section **15** and strengthen the cassette **10**.

A carbon and solvent ribbon cartridge **103** shown in FIG. **8** in open load position also has a support plate **66'** and attached cover **71'**. The plate **66'** also rotatably supports a pair of spindles **104** one of which, serving as the take up spindle, is integral with an edge serrated disc **105**. The support plate **66'** also supports a drive roll **106** therebetween but offset from the line between spindle centers. In the carbon-solvent ribbon cartridge **103**, the ribbon elevating mechanism **73'** is provided with an arm **107** directed toward the drive roll **106** and is adapted to engage an end **108** of a clutch spring **109** positioned in its path. The spring end **108** is trapped between lugs **110** and **110'** associated respectively with a single armed lever **111** and one arm **112** of a lever generally designated **113**, both of which are pivotally supported on the drive roll shaft **114**. The lever **111** is biased counterclockwise as viewed in the figure by a spring **115**, urging the spring end **108** and arm **112** counterclockwise thereby urging the opposite arm **116** of the lever **113** against a boss **117** extending upwardly through a slot **118** in the support plate **66'** and guided by the edge **119** of the slot **118**. The boss **117** is supported on the end of a link **121** pivotally connected at its opposite end to a take-up spool diameter sensing mechanism generally designated **122**.

The clutch spring **109** is wound around the drive roll shaft **114** and when the spring end **108** and connected lever **113** are rocked clockwise by the drive arm **107**, the clutch spring wraps and rotates the drive roll shaft **114**, thus converting the motion of the arm **107** to rotary indexing movement of the drive roll **106**. The indexing movement of the drive roll **106** is transmitted to an intermediate roll **123** which is mounted for rotation on an arm **124** pivotally supported on the drive roll shaft **114** and spring biased to hold the intermediate roll **123** in driving engagement with the drive roll **106** and disc **105** thereby to take up used carbon or solvent ribbon **51**. The cutout **52** (FIG. 1) in the upper closure wall **49** of the cassette **10** is designed to accommodate the drive and intermediate rolls **106** and **123**.

The take-up spool diameter sensing mechanism **122** shown in full diameter position in FIG. **8** to accommodate a solvent or carbon ribbon cassette **103** with new or partially used ribbon **51** comprises connected upper and lower arms **125** and **126** pivoted as at **127** to and embracing the support plate **66'** and spring biased toward the take up spindle **104**. The upper arm **125** has a sensing pin **128** which extends through the cutout **53** provided in the upper closure wall of the cassette **10** to allow movement of the diameter sensing pin **128**, and bears against the coil of ribbon **51** wound on the take-up spool **48**. The link **121** is connected to the lower arm **126** of the diameter sensing mechanism and the boss **117** on the end opposite its point of connection and guided by the edge **119** of the slot **118** serves to position the clutch lever **113** to vary the distance between clutch spring end **108** and the drive arm **107** as ribbon diameter increases thereby to vary the incremental angular indexing of the take-up disc **105**.

Should it be desired to change a loaded fabric ribbon cartridge **65** for a loaded carbon or solvent ribbon cartridge **103** or vice versa, the locking lever **96** is operated to release the cartridge for movement about its pintles **68** to open load position and thereafter be removed by releasing the latch mechanism **69**.

As shown in FIG. **8**, the locking lever **96'** associated with a carbon-solvent ribbon cartridge **103** is connected by a link **131** to the arm **126** of the diameter sensing mechanism **122** by a one way pin-and-slot connection **132** provided to move the diameter sensing mechanism **122** to a full diameter position yet allow inward movement of the diameter sensor arms **125** and **126** after the locking lever **96'** is moved from the release position shown to a locking position. Thus, should a typing application require the use of solvent ribbon instead of a carbon ribbon, the carbon ribbon cassette **10** is easily removed from cartridge **103** and a solvent ribbon cassette **10** inserted. This interchangeability is permitted without interference by the diameter sensing mechanism **122** which is moved to its radially outward full diameter position when a cartridge **65** is released from its locking post **101** by the locking lever **96**. In the open load position of a cartridge **103**, after loading a solvent or carbon ribbon cassette **10**, the exposed disc **105** may be manually turned to take up any slack in the ribbon **51**.

A solvent ribbon control lever generally designated **133**, also accommodated by the recessed upper edge of the rear cassette wall **26**, is pivotally supported on the support plate **66'** and when moved counterclockwise as viewed in FIG. **8** acts through an arm **134** thereof to move the boss **117** away from edge **119**, as well as the clutch lever **113**, and to establish the edge **135** of arm **134** as the control surface for adjustment of the clutch lever **113** in accordance with the diameter of wound ribbon **51**. The effect is to reduce the increment of feed to permit print overlap on the solvent ribbon.

Further details of the cartridge latching means **69** and cartridge supported fabric and carbon ribbon feed mechanisms which per se form no part of the invention may be had with reference to copending applications Ser. No. 436,902, by Morelli filed Jan. 28, 1974, and Ser. No. 484,621 by Hengelhaust, filed July 1, 1974.

The invention claimed is:

1. A ribbon cassette comprising

a container having upper and lower walls, and discontinuous side walls forming ribbon openings,

wound ribbon spools,

means in said upper and lower walls for rotatably supporting said ribbon spools in spaced apart relationship,

vibrator arms,

means pivotally securing said vibrator arms to said side walls,

said vibrator arms extending outwardly from said pivotal securing means and toward one another defining a ribbon gap between said vibrator arms,

ribbon extending from one spool to the other spool and across the gap between said vibrator arms, and

means on the vibrator arms for coupling said vibrator arms to ribbon elevating means.

2. A ribbon cassette as recited in claim **1**, said means for pivotally securing said vibrator arms comprising a clevis formed on each of said side walls, and a blade on each of said vibrator arms receivable within each clevis to limit pivoting motion to the plane of said blades, a

hole formed in each clevis and a pin on each of said blades for reception in the hole of each clevis.

3. A ribbon cassette as recited in claim 2, said vibrator arms including a ribbon guide post adjacent said ribbon openings, a ribbon guide section having upper and lower flanges, and spaced ribbon guides extending between said flanges at the end of said ribbon guide sections, one of said spaced ribbon guides having a coupling slot.

4. In combination, a single element typewriter carriage frame, a ribbon cartridge containing and supporting ribbon elevating means and ribbon feed means pivotally detachably coupled to said carriage frame for movement between an operative position and an open load position,

dirve means on said carriage frame, said cartridge supported ribbon elevating means being couplable to said drive means when said cartridge is moved to operative position to be driven thereby and to drive said ribbon feed means, said ribbon feed means including spindles, and said ribbon elevating means including a pair of spaced arms,

a ribbon cassette comprising a pair of spool holders, spaced vibrator arms pivotally secured to said ribbon cassette and being separated to form a gap,

ribbon spools pivotally supported in said spool holders having ribbon wound thereon and extending from one spool to the other across the gap formed by said spaced vibrator arms, said ribbon spools having means adapted to receive said spindles,

means on said spaced vibrator arms and said pair of spaced arms of said ribbon elevating means for coupling said spaced vibrator arms and said spaced arms of said ribbon elevating means together when said ribbon cartridge is in an open load position, said ribbon cassette thereafter being rotated about said coupling means to engage said spools and spindles,

and means to secure said ribbon cassette to said ribbon cartridge whereby said ribbon cassette loaded ribbon cartridge may be pivoted to operative position.

* * * * *