United States Patent [19]

Hengelhaupt

[11] **3,904,016**

[45] **Sept. 9, 1975**

[54] **TYPEWRITER RIBBON ARRANGEMENT HAVING INTERCHANGEABLE RIBBON LOADABLE CARTRIDGES WITH ATTACHED MOVABLE RIBBON LIFTERS**

[75] Inventor: **Hans-Georg Hengelhaupt,** Nuernberg, Germany

[73] Assignee: **Triumph Werke Nurnberg A.G.,** Nuremberg, Germany

[22] Filed: **July 25, 1973**

[21] Appl. No.: **382,508**

[30] **Foreign Application Priority Data**

Aug. 9, 1972 Germany 2239116

[52] **U.S. Cl.** **197/151;** 197/157; 197/162

[51] **Int. Cl.²** **B41J 33/14**

[58] **Field of Search** ..... 197/151, 157, 158, 159, 197/160, 161, 162, 163, 164, 165, 168, 170, 153 A, 153 R

[56] **References Cited**

UNITED STATES PATENTS

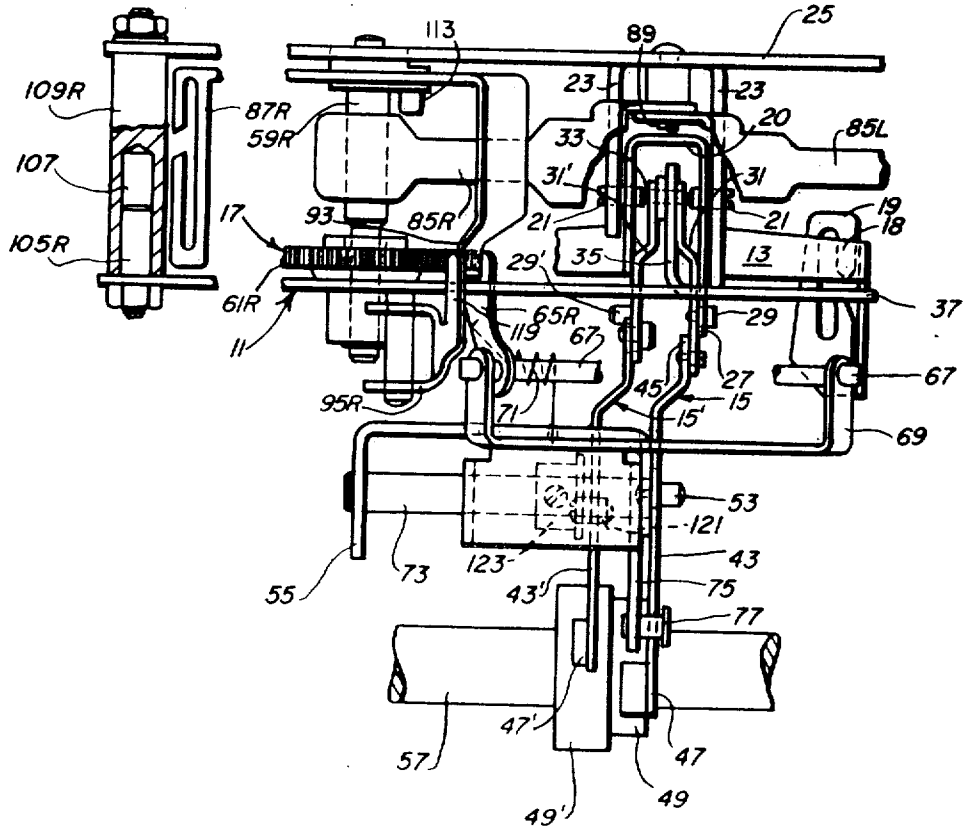
785,709	3/1905	Burridge	197/168
1,059,522	4/1913	Bordt	197/151 X
1,761,529	6/1930	Long	197/157 UX
2,902,136	9/1959	Whippo	197/165
3,171,530	3/1965	O'Daniel et al.	197/151
3,346,090	10/1967	Goff et al.	197/158
3,349,888	10/1967	Page	197/151 X
3,513,957	5/1970	Ricciardi et al.	197/151
3,604,549	9/1971	Caudill et al.	197/151
3,643,777	2/1972	Anderson et al.	197/151
3,643,778	2/1972	Anderson	197/151
3,643,779	2/1972	Anderson et al.	197/151
3,777,871	12/1973	Zeamer	197/170 X
3,799,315	3/1974	Stewart	197/170 X
3,804,227	4/1974	Cappotto et al.	197/151

Primary Examiner—Ernest T. Wright, Jr.
Attorney, Agent, or Firm—Joseph R. Spalla

[57] **ABSTRACT**

A typewriter ribbon arrangement has upper and lower portions which are supported on a carriage for movement with a single element printer. The upper portion contains the supply of ribbon and is removably attachable to the lower portion which is fixedly mounted on the carriage and has separate drive mechanisms for use with an upper portion having a cloth ribbon or an upper portion having a carbon ribbon. Each upper portion carries a pivotally supported ribbon lifter so they may be interchangeably attached to the lower portion without further threading. The upper portion for a cloth ribbon has spool-supporting spindles which are drivingly coupled to an indexing ratchet wheel drive mounted in the lower portion, and the upper portion additionally carries a pair of drag levers for keeping the ribbon taut and a pair of tension arms for sensing the tautness of the ribbon to operate a ribbon reversing means mounted in the lower portion when a spool carried by a spindle becomes fully wound.

4 Claims, 3 Drawing Figures



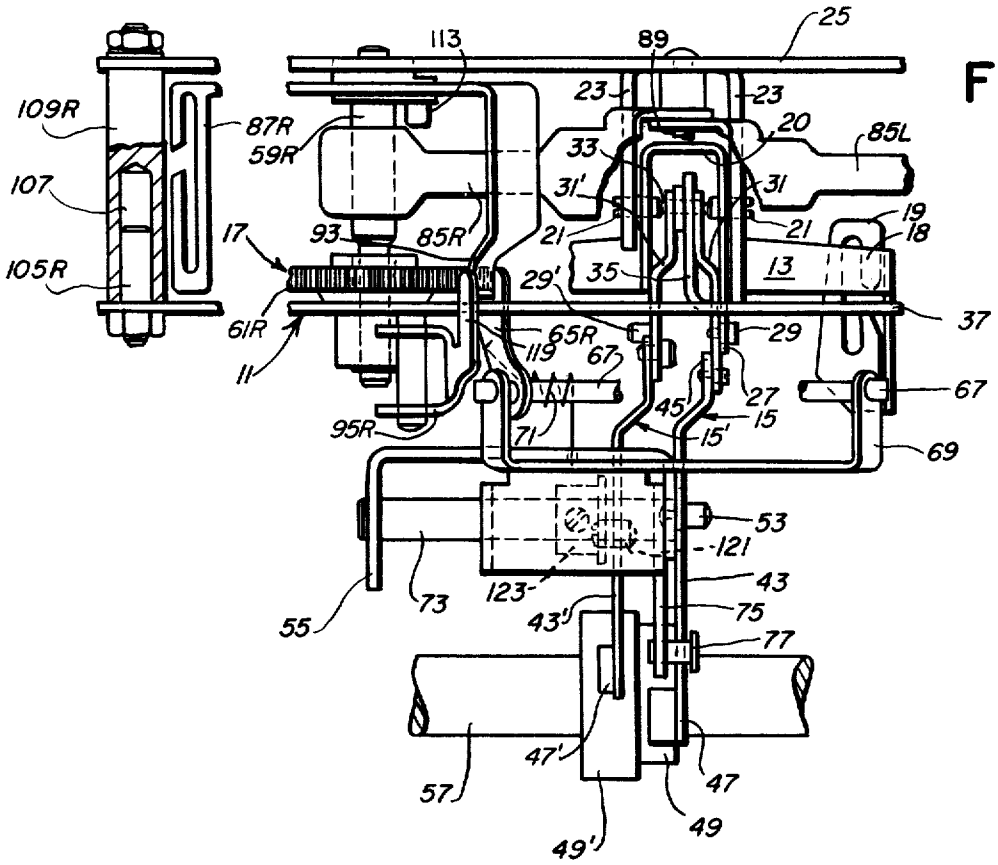

25
113
89
23
23
109R
87R
59R
20
85L
33
31'
31
107
19
18
17
93
85R
21
21
105R
13
29'
35
37
61R
65R
29
11
119
67
27
67
45
15
15'
95R
71
69
53
121
43
123
73
55
43'
75
77
47'
57
47
49
49'

Fig_1

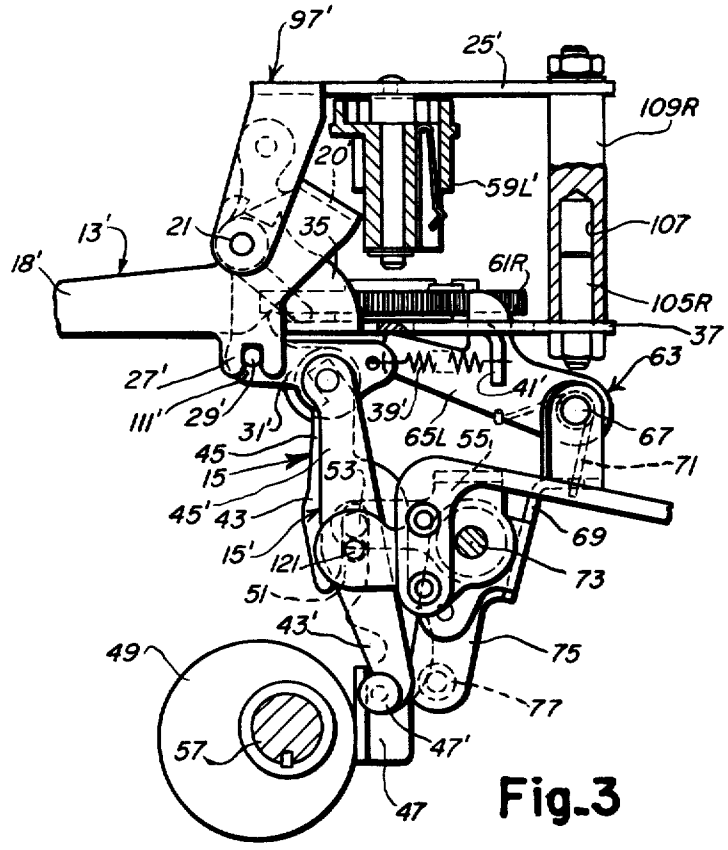
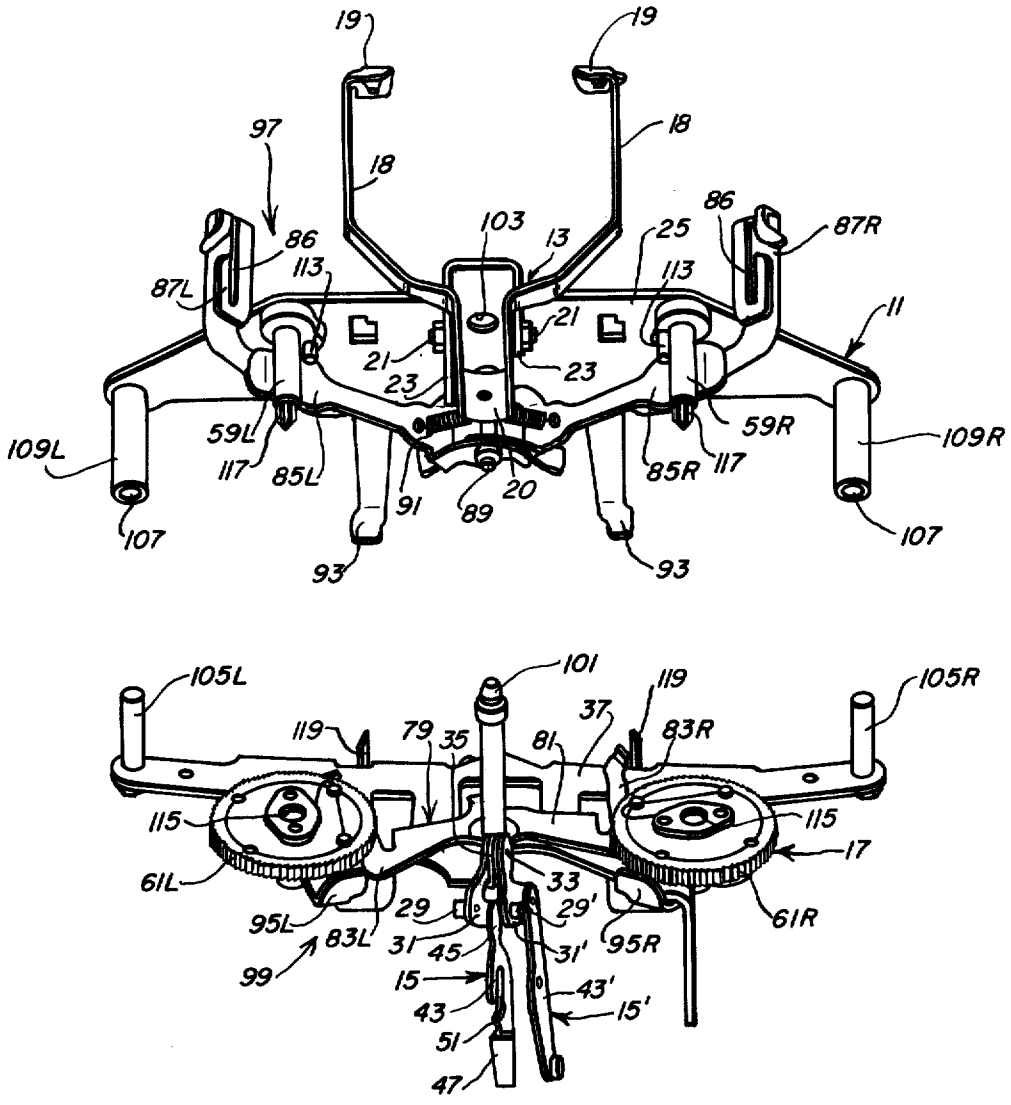

97'
25'
109R
20
59L'
107
13'
21
35
18'
61R
105R
37
63
27'
41'
111'
29'
31'
39'
65L
55
67
45
15
53
71
45'
43
69
15'
121
73
51
43'
75
49
77
57
47'
47

Fig_3

Fig_2


19
19
97
18
18
86
103
13
25
86
87R
87L
113
113
11
21
21
23
23
59L
59R
109L
109R
117
85L
85R
117
91
89
20
107
107
93
93
105L
105R
101
119
119
37
79
35
81
83R
115
115
17
61L
61R
33
29
29'
95L
83L
31
45
31'
95R
99
15
43'
43
15'
51
47

TYPEWRITER RIBBON ARRANGEMENT HAVING INTERCHANGEABLE RIBBON LOADABLE CARTRIDGES WITH ATTACHED MOVABLE RIBBON LIFTERS

This invention relates to a ribbon arrangement for a single element typewriter or other printing machine, and more particularly to a ribbon lifting and feeding arrangement for a typewriter utilizing different types of ribbons in removable ribbon cartridges.

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 impact a print element against the ribbon and 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 by an incremental length and the ribbon fork 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 elment. 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 onto one of the spools until it is full, whereupon the winding movement is reversed to wind the ribbon on the other spool, and the reversal of the winding movement continues until the ribbon is replaced by an operator. Unlike a cloth ribbon, a carbon ribbon is non-reusable and fed only once through the ribbon fork by winding the ribbon from a supply spool to 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, the ribbon mechanism is sometimes arranged in separable upper and lower parts with the ribbon and associated spools being disposed in the upper part which serves as a cartridge for attachment to the lower part which is mounted on the carriage for movement with the print element and includes the drive mechanism for moving the ribbon. Such an arrangement is shown, for example, in German Disclosure No. 1,611,468 corresponding to U.S. Pat. No. 3,513,957 wherein the ribbon spools are mounted in a cartridge which has a fixed ribbon guide and is open at the bottom to facilitate the changing of the ribbon. However, the ribbon is moved to and from the printing position only by raising and lowering the entire ribbon mechanism, and the movement of such a large mass is undesirable in the operation of a high speed printer.

Accordingly, an object of the invention is to provide a ribbon arrangement for a typewriter wherein different types of ribbons may be placed in correspondingly different cartridges which are interchangeably attachable to a drive arrangement in the typewriter without necessitating further threading of the ribbon nor the movement of the entire ribbon arrangement with each printing operation.

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 partial rear elevational view of a ribbon arrangement constructed in accordance with the present invention wherein an upper portion for a cloth ribbon is selectively coupled to a drive mechanism of the lower portion;

FIG. 2 is an exploded perspective view of the ribbon arrangement of FIG. 1 and illustrating the upper portion for a cloth ribbon separated from the corresponding drive mechanism of the lower portion; and

FIG. 3 is a partial side view of the ribbon arrangement of FIG. 1 and illustrating an upper portion for a carbon ribbon which is selectively coupled to a corresponding drive mechanism of the lower portion.

Referring now in detail to the figures in the drawing, and more particularly to FIGS. 1 and 2, 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 and moving it to a printing location adjacent a platen, not shown, prior to the impacting of a print element, not shown, to enable a recording medium, not shown, which is supported on the platen to be marked by the print element. As is conventional, the ribbon may be secured at each end to a pair of spools, not shown, and an intermediate portion of the ribbon may be carried in a ribbon lifting member generally indicated **13** of the ribbon arrangement **11** which is mounted on a carriage, not shown, with the print element for movement along the platen to print a line of type. The ribbon lifting member **13** is normally biased downwardly to a rest position and the ribbon arrangement **11** includes drive means, generally indicated **15**, which operate in response to the actuation of a type key action for moving the ribbon lifting member **13** to an elevated position to place the ribbon at the printing location. In addition, the ribbon is acted upon by a ribbon feed arrangement, generally indicated **17**, for advancing the ribbon through the ribbon lifting member **13** as will be explained below. The platen, the print element, and the type action as well as other parts of the typewriter are not shown since they form no part of the invention and may be desirably conventional.

As shown in FIG. **2**, the ribbon lifting member **13** is in the form of a pair of spaced apart arms **18** joined at one end by a cross bar **20** and each formed at the other end with a conventional ribbon guide **19**. The ribbon lifting member **13** is pivotally supported near the joined end about a pair of screws **21** secured, in axial alignment with each other, to a pair of downturned arms **23** of a bracket or cartridge member **25**. To move a cartridge mounted ribbon from the lowered rest position to the elevated printing position, the ribbon lifting member **13** associated with a cloth ribbon cartridge has a depending arm **27** (FIG. **1**) which is acted upon by a pin **29** carried by a drive lever **31** which is pivotally supported about a bolt **33** secured in an upturned projection **35** of a plate **37**. The lifting member **13** may be

urged downwardly to the lowered rest position by suitable resilient biasing means, not shown, which may desirably act against the drive lever **31** in a manner similar to that shown in FIG. **3** which will be discussed below. To move the lifting member **13** to the elevated printing position, the drive lever **31** is pivoted forwardly by a camming lever **43** having one end **45** connected to the drive lever **31** and the other end **47** engaging a surface of a cam **49**. The camming lever **43** has a slot **51** receiving a bolt **53** carried by a bracket **55** comprising the movable carriage, as will be discussed below in further detail, and the camming lever **43** is pivoted about the bolt **53** by the rotational movement of the cam **49** which is keyed to for axial movement relative to a drive shaft **57** undergoing a single revolution with each actuation of a type key action.

Although not shown, each of the ribbon spools for a cloth ribbon typically have an axial bore and a pair of spaced flanges for guiding the ribbon as it is being wound or unwound, and the pair of spools may be mounted in the ribbon arrangement **11** between the upper bracket or cartridge member **25** and the lower plate **37** with a pair of spaced-apart spindles **59L**, **59R** respectively being received through the axial bores of the spools for rotational movement therewith. To advance the cloth ribbon through the ribbon guide **19** by winding it from one spool to the other, the ribbon arrangement **11** includes a pair of corresponding ratchet wheels **61L**, **61R** which are supported on the plate **37** for rotation with the ribbon spools and are rotatably driven in incremental movements by indexing means, generally indicated **63** in FIG. **3**, which undergo an oscillating movement. As shown, the indexing means **63** include a pair of indexing pawls **65L**, **65R** which are pivotally supported on a rod **67** carried by a bracket **69** and resiliently urged toward engagement with the corresponding ratchet wheels **61L**, **61R** respectively by a pair of spring means **71** coiled about the rod **67** and connected to the indexing pawls **65L**, **65R** and the bracket **69**. To enable an oscillatable movement to be imparted to the indexing pawls **65L**, **65R**, the bracket **69** is pivotally supported on a rod **73** carried by the bracket **55** comprising the carriage, and the bracket **69** has a depending leg **75** which is operatively connected to the cam lever **43** by a bolt **77** so as to pivot the bracket **69** in response to the movement of the cam lever **43**. Accordingly, with each actuation of a type key action, the rotational movement of the cam **49** serves to pivot the bracket **69** and drive the indexing pawls **65L**, **65R** against the ratchet wheels **61L**, **61R** to advance the ribbon through the ribbon guide **19**.

To wind the cloth ribbon from one spool to another spool, the ribbon arrangement **11** includes ribbon reversing means, generally indicated **79** in FIG. **2**, for controlling the rotational movement of the ratchet wheels **61L**, **61R** by acting on the spring-biased indexing pawls **65L**, **65R** in a manner similar to that described in copending U.S. application of Herbert Decker Ser. No. 359,130, filed May 10, 1973, for Ribbon Feeding and Reversing Mechanism to which reference may be made for further details. The ribbon reversing means **79** includes a control member **81** pivotally supported on the base plate **37** and having a pair of arms **83L**, **83R** for positioning and guiding the indexing pawls **65L**, **65R** respectively for engagement with the corresponding ratchet wheels **61L** and **61R**. When the control member **81** is pivoted to the position shown in FIG. **2**, the indexing pawl **65L** engages the ratchet wheel **61L** to wind the ribbon on the associated spool, while the arm **83R** guides and holds the indexing pawl **65R** withdrawn from the ratchet wheel **61R**.

As the ribbon is being wound onto the ribbon spool associated with the ratchet wheel **61L**, the ribbon is kept taut by a pair of drag levers **85L**, **85R** (FIGS. **1** and **2**) which are urged against the ribbon wound on the spools and the ribbon is threaded through suitable guide slots **86** in a pair of tension arms **87L**, **87R** for sensing the tension in the ribbon and which are operable, in a manner to be explained below, to effect a reversal of the winding of the ribbon. As shown, the drag levers **85L**, **85R** are pivotally supported about a common post **89** and urged against the ribbon spools by a spring **91** stretched between the drag levers **85L**, **85R** and around the post **89**. In accordance with the instant invention as distinguished from the reversing mechanism described in said copending application of Herbert Decker Ser. No. 359,130 wherein the tension arms are pivotally mounted on the lower portion and which act directly on the pawls, the tension arms **87L**, **87R** herein are pivotally supported on the bracket or cartridge member **25** at a suitable location outwardly of the spool spindles **59R** and **59L** and have depending tabs **93** for engaging corresponding ribbon reversing levers **95L**, **95R** which are pivotally supported at suitable locations beneath the base plate **37** for engaging the indexing pawls **65L**, **65R** respectively so as to move them to a position to operate and shift the control member **81** in the manner disclosed in said Herbert Decker application Ser. No. 359,130.

Thus, when the ribbon becomes fully wound on the ribbon spool associated with the ratchet wheel **61L**, the tension sensing arm **87R** pivots the reversing lever **95R** which moves the indexing pawl **65R** to act against the control member **81**, thereby pivoting the control member **81** to an alternate position. Upon movement of the control member **81** to the alternate position, the indexing pawl **65L** is removed from engagement with the ratchet wheel **61L** while the indexing pawl **65R** engages the ratchet wheel **61R** to reverse the winding of the ribbon onto the associated ribbon spool. Likewise, when the ribbon again becomes fully wound, the other tension arm **87L** will effect a similar ribbon reversal for winding the ribbon back onto the other ribbon spool in the manner previously described.

In accordance with the present invention, the above-described ribbon arrangement **11** is formed in separable upper and lower portions, generally indicated **97** and **99** respectively, as more particularly shown in FIG. **2**, to facilitate the replacement of cloth ribbon spools at a location remote from the typewriter or to substitute another upper portion or ribbon loaded cartridge, generally indicated **97'** in FIG. **3**, in which carbon ribbon spools are spindle mounted with ribbon threaded through lifting member **13'**. As shown, the upper portion or cartridge **97** for loading cloth ribbon includes the bracket or cartridge member **25** carrying the ribbon lifting member **13**, the tension sensing arms **87L**, **87R**, and spindles **59L**, **59R**, and the drag levers **85L**, **85R** which are received between the flanges of the ribbon spools to hold them on the spindles **59L**, **59R** when the upper portion **97** is removed from the lower or base portion **99** which carries the other parts of the above-described ribbon arrangement **11**. As will be explained below, the parts of the ribbon arrangement **11** carried

by the bracket or cartridge member **25** are adapted for operative engagement with the parts mounted on the base plate **37** comprising the lower carriage mounted portion **99** when the upper portion **97** is placed on the lower portion **99**, and the upper portion **97** of FIGS. **1** and **2** may be used interchangeably with the upper portion **97'** of FIG. **3** without requiring further threading of the ribbons.

As shown, when the upper portion or cloth ribbon cartridge **97** is placed on the lower portion **99**, an upstanding pin **101** which is centrally located on the base plate **37** is received through a corresponding opening **103** in the upper bracket or cartridge member **25**, and a pair of upstanding bolts **105L**, **105R** mounted at the opposite ends of the base plate **37** are received in the axial bores **107** of a pair of corresponding bushings **109L**, **109R** which are secured to the upper bracket or cartridge member **25**. The receipt of the pin **101** and bolts **105L**, **105R** by the corresponding opening **103** and bushings **109L**, **109R** serve to align the parts of the upper and lower portions **97**, **99** to facilitate their coupling with each other as well as to properly space the upper bracket or cartridge member **25** from the lower base plate **37**. When the upper bracket or cartridge member **25** is properly positioned on the base plate **37**, the pair of ribbon lifter pivot screws **21** may be tightened against the pivot bolt **33** secured in the upstanding projection **35** of the base plate **37**.

As the upper portion or cartridge **97** is placed on the lower portion **99**, the ribbon lifting member **13** associated with a cloth ribbon cartridge **97** is coupled to the ribbon lifting drive means **15** by the pin **29** of the drive lever **31** being received in a notch corresponding to notch **111'** in the ribbon lifting member **13'** associated with a carbon ribbon cartridge **97'** formed in the depending coupling arm **27** in a manner similar to that shown in FIG. **3**. The spindles **59L**, **59R** are rotatably supported on the bracket or cartridge member **25** with an offset pin **113** for rotating the spools therewith, and the corresponding ratchet wheels **61L**, **61R** have central sockets **115** for receiving the end portions **117** of the spindles **59L**, **59R** to impart a rotational movement thereto. Finally, the depending tabs **93** of the tension arms **87L**, **87R** engage corresponding upwardly extending tabs **119** of the ribbon reversing levers **95L**, **95R**.

When it is desired to substitute carbon ribbon for the cloth ribbon, the upper portion **97** may be easily removed from the lower portion **99** and the upper portion **97'** of FIG. **3** may be placed on the lower portion **99**. The upper portion **97'** for the carbon ribbon is generally similar to the upper portion **97** for the cloth ribbon, and accordingly similar reference numerals have been placed on similar parts. Moreover, the upper portion **97'** is attached to the lower portion **99** in the same manner as previously described for the upper portion **97**.

As shown, when the upper portion **97'** is placed on the lower portion **99**, the ribbon lifting member **13'** is coupled to another ribbon lifting drive means generally indicated **15'** providing movements appropriate for a carbon ribbon as previously discussed. The ribbon lifting member **13'** has a downwardly depending coupling arm **27'** with a notch **111'** receiving a coupling pin **29'** carried by another drive lever **31'** located in spaced-apart relation to the drive lever **31**. Similarly, the drive lever **31'** is pivotally supported about the bolt **33**, and the lifting member **13'** is normally biased to a lowered rest position by a suitable resilient biasing means in the form of a spring **39'** stretched between the drive lever **31'** and a suitable downturned projection **41'** of the base plate **37**. To move the lifting member **13'** to the elevated printing position, the drive lever **31'** is pivoted forwardly by another camming lever **43'** having one end **45'** connected to the drive lever **31'** and the other end **47'** engaging a surface of another cam **49'** keyed to the drive shaft **57**. The camming lever **43'** is pivoted about a bolt **121** mounted in a bushing **123** which is suitably secured to the rod **73**, and with each actuation of a type key action the camming lever **43'** is pivoted by the rotational movement of the cam **49'**.

The advancement of the carbon ribbon in the ribbon lifting member **13'** is effected by a drive mechanism supported in cartridge **97'** and operating in response to the movement of the lifting member **13'** as described in copending U.S. application of Hans-Georg Hengelhaupt Ser. No. 350,522 filed Apr. 12, 1973 now U.S. Pat. No. 3,834,511 to which reference may be made for further details. Accordingly, spindle **59L'** and another, not shown, for receiving the supply and take-up spools for the carbon ribbon are rotatably supported on the upper bracket **25'** but are not operatively associated with the rotatable ratchet wheels **61L**, **61R** nor the ribbon reversing means **79**.

What is claimed is:

1. A ribbon lifting and feed arrangement comprising

a base portion for interchangeably mounting a first ribbon loadable cartridge and a second ribbon loadable cartridge,

each of said first and second cartridges having a pair of rotatable spindles for supporting supply and take-up ribbon spools and having a ribbon lifter pivotally supported thereon for lifting a length of ribbon threaded therethrough,

first and second ribbon lifter drive means for pivoting said ribbon lifters pivotally mounted on said first and second cartridges respectively when one or the other cartridge is mounted on said base portion,

said first and second ribbon lifter drive means including corresponding first and second drive levers pivotally supported on said base portion in spaced-apart relation to each other for imparting different driving movements to the ribbon lifters of said first and second cartridges,

said ribbon lifters of said first and second cartridges each having a coupling arm positioned for cooperative engagement with the corresponding first and second drive levers of said first and second ribbon lifter drive means,

said first and second drive levers each carrying a coupling pin for engagement with the coupling arm of the corresponding ribbon lifters of said first and second cartridges, and

said coupling arms of the ribbon lifters of said first and second cartridges each having a slot formed therein for receiving the coupling pin of said corresponding first and second drive levers upon attachment to said base portion.

2. An arrangement according to claim **1**, the combination further comprising:

said base portion including a pair of ratchet wheels supported for rotational movement and indexing means driven in an oscillatable movement with each printing operation for rotatably indexing said pair of ratchet wheels, and

said pair of ratchet wheels having central axial openings formed therein for receiving the end portions of said pair of rotatable spindles in said first cartridge upon attachment of said first cartridge to said base portion for imparting incremental rotational movement to ribbon spools carried by said pair of rotatable spindles.

3. An arrangement according to claim 2:

control means on said base portion for enabling said indexing means to rotatably index one of said pair of ratchet wheels for winding ribbon in one direction,

said base portion further including ribbon reversing means for acting on said control means for enabling said indexing means to rotatably index the other of said pair of ratchet wheels for winding ribbon in an opposite direction, and

said first cartridge further including sensing means for sensing ribbon tension and being operable in response to increasing ribbon tension for operating said ribbon reversing means to alternate the indexing of said pair of ratchet wheels to wind the ribbon in an opposite direction.

4. An arrangement as recited in claim 1, said cartridges and said base portion having complimentary means for positioning and securing said cartridges on said base portion.

* * * * *