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Cappotto et al.

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[54] TYPEWRITER RIBBON CARTRIDGE

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[21] Appl. No.: **250,013**

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

[51] **Int. Cl.** **B41j 33/14**

[58] **Field of Search** ..... 197/151, 153 R, 153 A, 197/157, 158, 159, 162, 168, 170; 101/336; 74/577 R, 577 S, 577 SF; 242/107.3, 107.4, 107.6, 107.7, 198, 200

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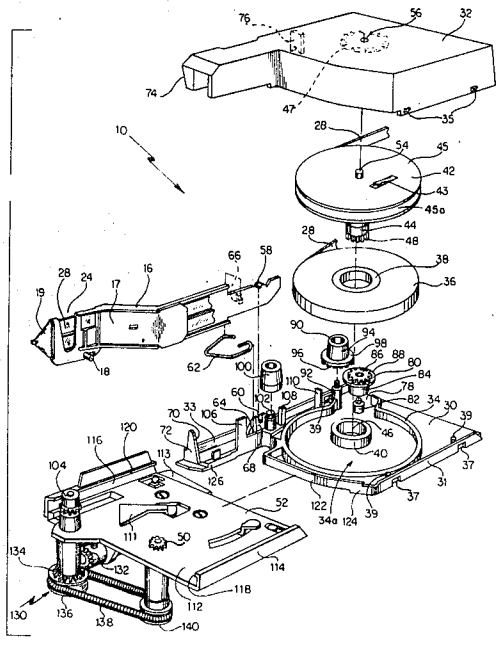
Primary Examiner—Ernest T. Wright, Jr.

Attorney, Agent, or Firm—Milton Wolson; Harvey Zeller; John Taylor

[57] ABSTRACT

A cartridge for housing a supply of ribbon for a typewriter or like machine is disclosed. The cartridge includes a housing having a base and a cover and an arm laterally extending from the housing for guiding the ribbon from the housing to a print point and back to the housing. The arm is mounted on an open fulcrum on the base for pivotal movement at an oblique angle to the base and is normally spring biased to a rest position. The base includes a circular storage compartment having a hollow concentric hub therein for storing a roll of ribbon freely rotatable around the hub. A takeup spool rests on top of the hub and has an integral axial shaft with a gear at its opposite end which passes through the hollow hub to engage a drive gear in the machine. A friction roller is provided for cooperation with a drive roller in the machine to pull the ribbon from the supply through the arm and feed it back into the housing where it is wound upon the takeup spool. An upstanding flange is provided on the base to adjust the plane of the ribbon after it leaves the arm prior to its engagement by the friction and drive rollers. A pair of geared rollers are provided for regulating the tautness of ribbon pulled from the supply roll. A first of the geared rollers is rotated by the ribbon entering upon the takeup spool. Rotation of this roller drives the second geared roller adjacent the supply roll. If the ribbon from the supply roll is taut it will be frictionally engaged by the second roller and driven thereby thus decreasing the tautness. If the ribbon is not taut then the second roller will merely rotate without sufficient frictional engagement with the ribbon to drive it. The takeup spool has a flexible detent finger formed in its upper flange which cooperates with a circular detent train on the inner surface of the cover to prevent unwinding of the ribbon on the takeup spool.

4 Claims, 7 Drawing Figures



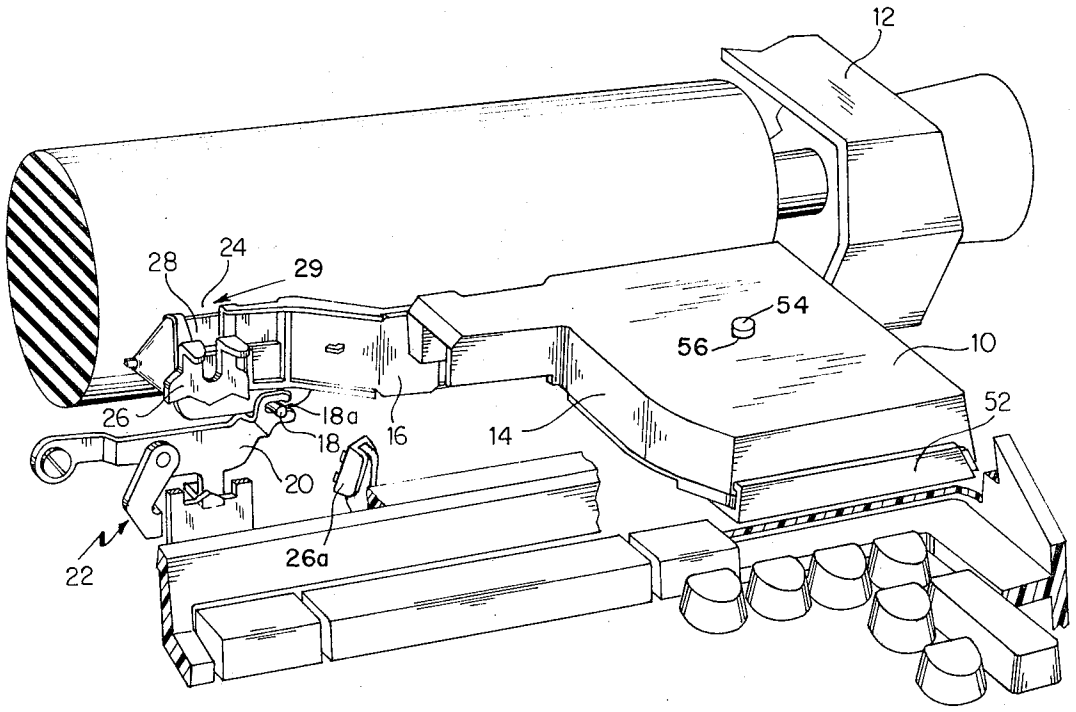
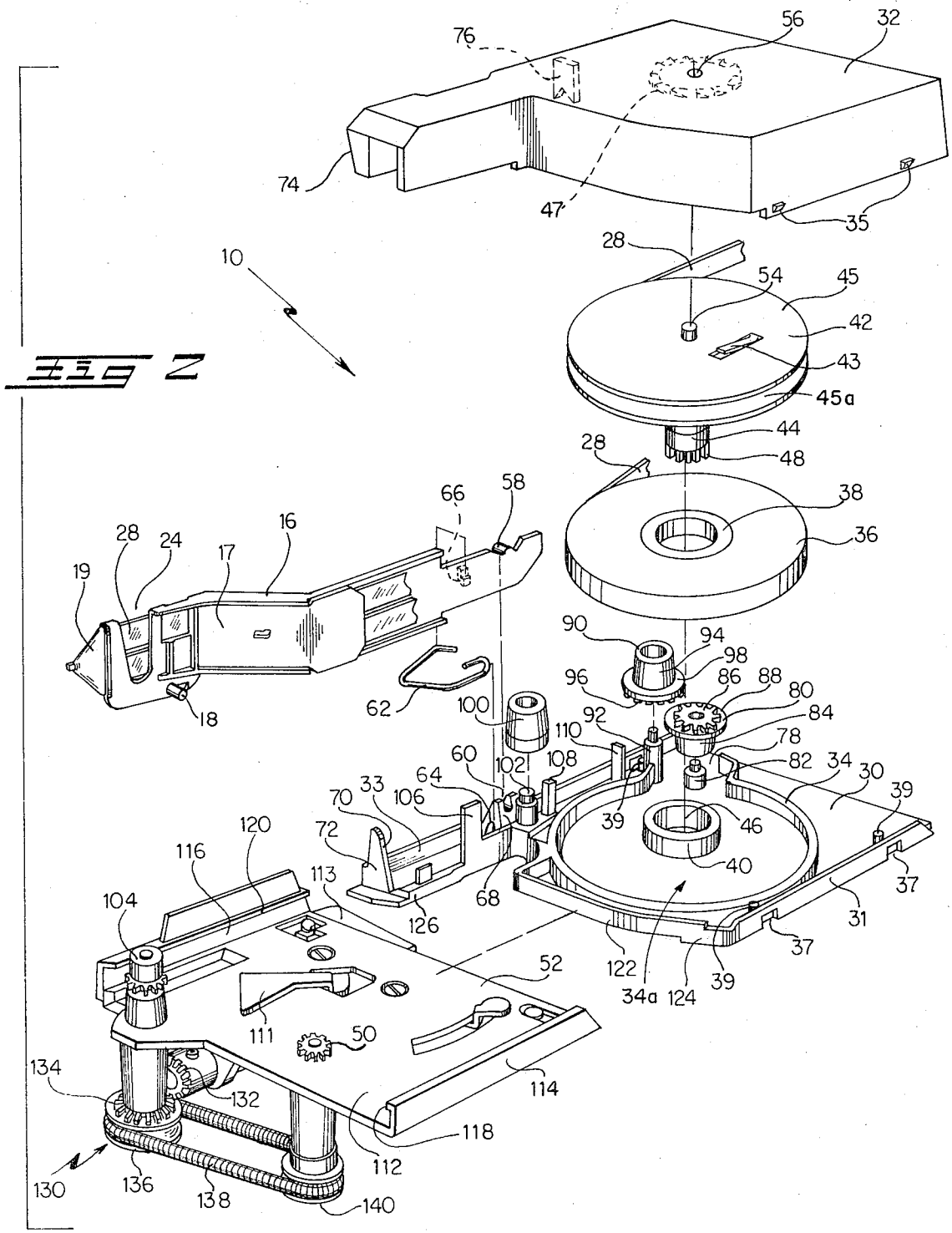


Fig 1

Fig 2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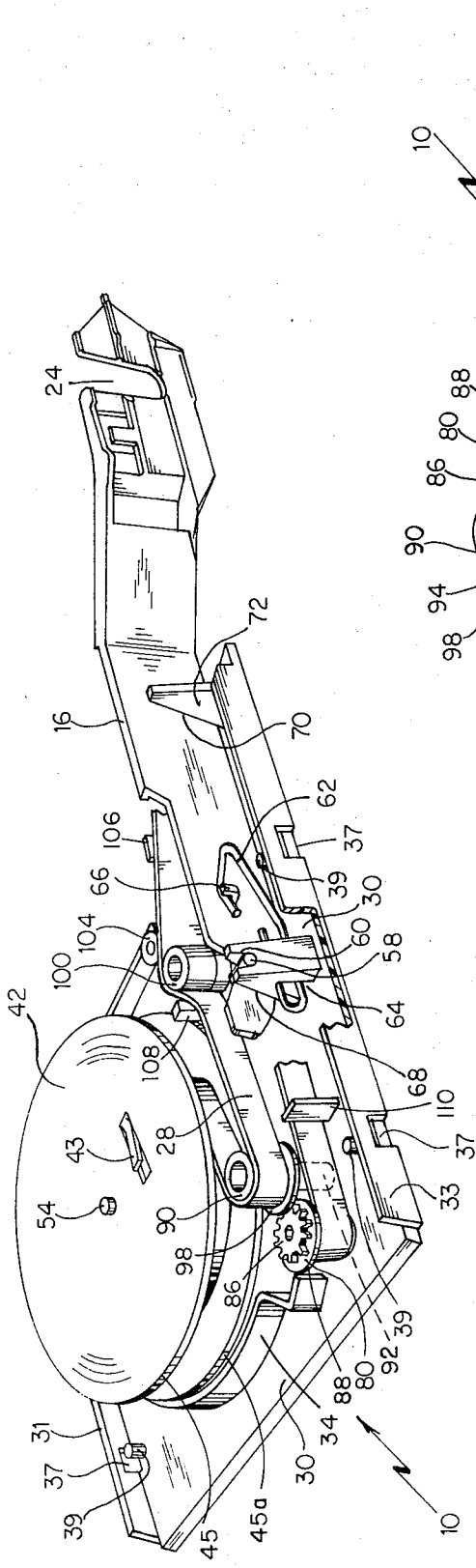

FIG 3

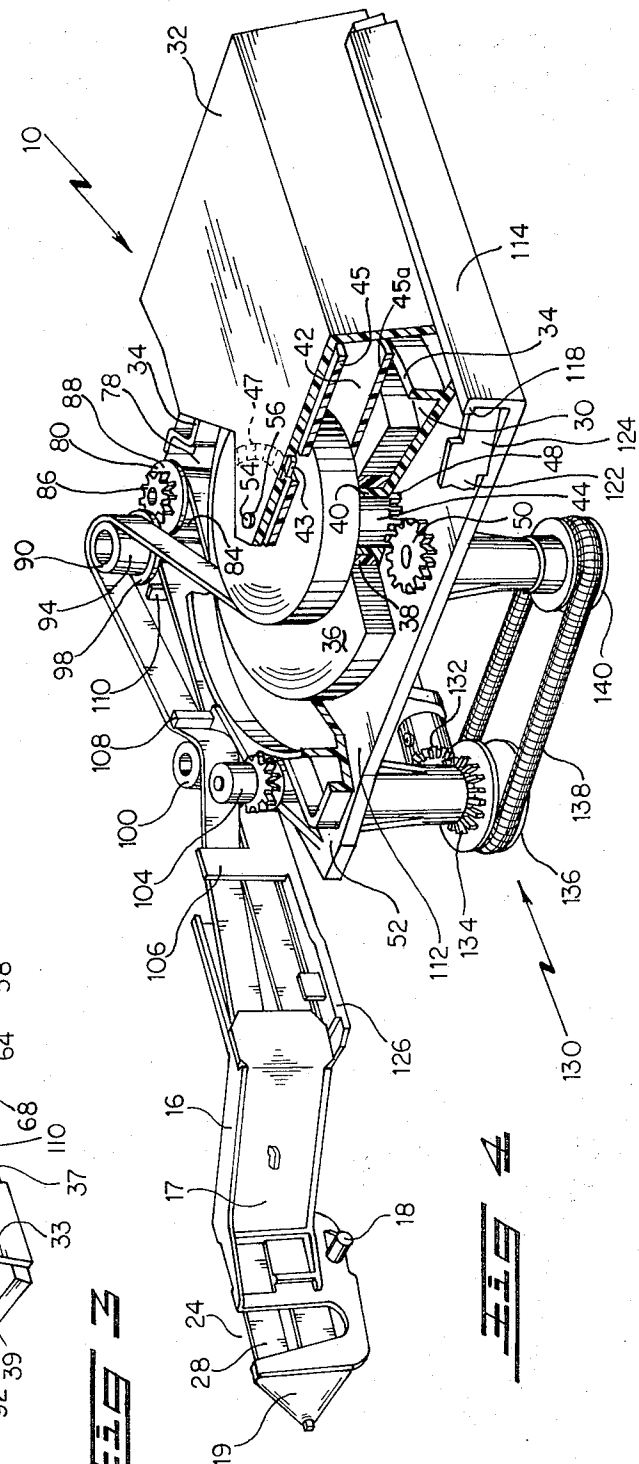

FIG 4

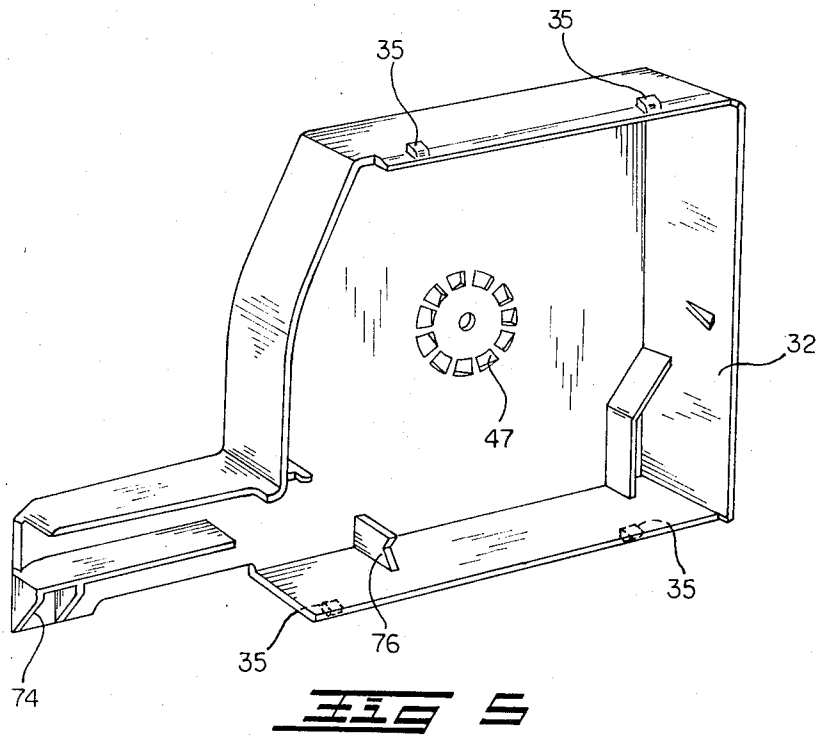

Fig 5

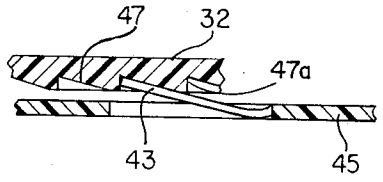

Fig 6

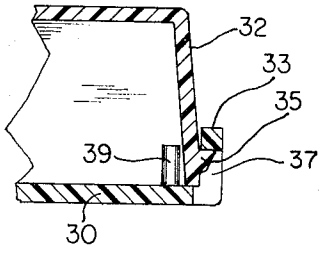

Fig 7

TYPEWRITER RIBBON CARTRIDGE

BACKGROUND OF THE INVENTION

The present invention relates to typewriter ribbon cartridges and particularly to typewriter ribbon cartridges of the type adapted to be inserted into the typewriter without the need of threading the ribbon through a ribbon lift mechanism in the typewriter. More specifically, the present invention relates to and is an improvement of the typewriter ribbon cartridges disclosed in U.S. Pat. No. 3,643,777 entitled TYPEWRITER RIBBON CARTRIDGE and U.S. Pat. No. 3,643,779 entitled RIBBON MECHANISM FOR CARTRIDGE SUPPORTED RIBBONS both granted on Feb. 22, 1972 and U.S. Pat. application Ser. No. 150,946 filed June 9, 1971 entitled TYPEWRITER RIBBON CARTRIDGE all assigned to the assignee of the instant application.

Ribbon cartridges and other devices for typewriters or like printing machines have been provided to assist in the installation of ribbons into such machines and to minimize the soiling of fingers during such process. In this connection, a recent advance in the art of typewriter ribbon cartridges has been the development of typewriter ribbon cartridges of the type disclosed in the above referred to patent applications assigned to the present assignee. These cartridges employ a housing for a supply of ribbon and a carrier arm laterally extending from the housing for guiding the ribbon from the housing to a print point within the typewriter and back to the housing.

These cartridges are laterally insertable into the typewriter to a position where the arm is engaged by a lift mechanism in the typewriter. Thus, there is no need for threading of the ribbon nor other manipulations which are time consuming and cause soiling of the fingers. Furthermore, the cartridges are removable by laterally sliding the cartridge from the typewriter thus enabling easy replacement or variation in color or type of ribbon, e.g., carbon ribbon or fabric ribbon.

Cartridges of the above type, however, present a number of problems related to the flow of ribbon from supply to print point and back to a takeup spool. Furthermore, since these cartridges will frequently be used but once, they must be economically produced and they must be made to store a maximum supply of ribbon and feed that ribbon to the print point for efficient usage thereof.

It is therefore the object of the instant invention to achieve an economical typewriter ribbon cartridge of the type having an arm laterally extending therefrom for guiding a ribbon from a housing to a print point and back to the housing wherein the flow of ribbon is highly reliable.

SUMMARY OF THE INVENTION

The present invention consists of a typewriter ribbon cartridge having a housing and a ribbon carrier arm laterally extending therefrom for guiding a ribbon from the housing to the print point and back to the housing. The arm is pivotally mounted on the base of the housing at an oblique angle thereto for movement to the print point during a typing operation and is normally biased to a rest position on the base. A ribbon supply compartment is provided in the base and a takeup spool is mounted above it. A pair of rollers are provided to regulate the tautness of the ribbon pulled from the supply and detent means are provided for preventing the unwinding of ribbon from the takeup spool. The cartridge may be assembled almost entirely without the use of tools and is thus adaptable for production by automation.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partial perspective view of a typewriter having the typewriter ribbon cartridge of the instant invention therein;

FIG. 2 is an exploded perspective view of the typewriter ribbon cartridge of the instant invention including its relationship to the platform upon which it is mounted in the typewriter;

FIG. 3 is a rear perspective view of the typewriter ribbon cartridge of the instant invention with its cover removed;

FIG. 4 is a front perspective view of the typewriter ribbon cartridge of the instant invention mounted upon a platform with portions broken away to show the interior mechanisms;

FIG. 5 is a perspective view of the interior of the cartridge cover as viewed from its bottom;

FIG. 6 is an enlarged cross-sectional view of the detent means of the takeup spool and the cartridge cover; and

FIG. 7 is an enlarged cross-sectional view of the means connecting the cover to the cartridge base.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing and specifically to FIG. 1, there is disclosed generally the typewriter ribbon cartridge **10** of the instant invention mounted in a typewriter **12.** The cartridge **10** includes a housing **14** and a ribbon guide or carrier arm **16** laterally extending from the housing **14.** The present invention is not concerned with the specifics of the carrier arm **16** which is the subject of U.S. Pat. application Ser. No. 249,954 filed of even date herewith by Aaron C. Zeamer and assigned to the present assignee. Thus, only so much of the carrier arm **16** will be described herein as is necessary to understand the instant invention and reference may be had to said application Ser. No. 249,954 for further details.

The carrier arm **16** has a stud **18** which projects therefrom to engage a slot **18*a*** in a lever **20** of lift mechanism **22** of the typewriter **12** when the cartridge **10** is inserted in the typewriter **12.** An aperture **24** is provided in the carrier arm **16** adjacent typebar guide **26** to expose a portion of the ribbon **28** to a type element **26*a*** of the typewriter **12.** The print point of the typewriter is indicated generally at **29.**

Referring next to FIGS. **2 – 5,** the cartridge housing **14** includes a base **30** and a cover **32.** On the base **30** is a circular flange **34** forming a ribbon supply area indicated generally at **34*a*** for storing a supply of ribbon **36** wound around core **38.** Concentric with flange **34** is a hub **40** of slightly smaller diameter than core **38** permitting the supply roll **36** to rotate around hub **40.** Flange **34** prevents unwinding of the supply roll **36** by vibration or shaking during shipping and thus prevents entanglement.

Takeup spool **42** is provided to rest upon hub **40** and includes an extended axial shaft **44** which passes through circular aperture **46** in hub **40.** Gear **48** on the end of shaft **44** extends below the underside of base **30**

surrounding aperture 46 for engagement with gear 50 on platform 52 for reasons to be explained hereinafter. Coaxial with shaft 44 is extension 54 which engages circular aperture 56 in cover 32 when the cover 32 is mounted on the base 30. Spool 42 is made of flexible plastic and has a lower flange 45a and a finger 43 formed in its upper flange 45. Finger 43 aligns with circular detent train 47 on the inside of cover 32 when the cover 32 is secured to base 30. The detent train 47 has saw-tooth shaped elements or teeth 47*a* as seen in FIG. 6 to cooperate with finger 43 and act as means for preventing rotation of spool 42 in a clockwise or unwind direction.

The carrier arm 16 has a stud 58 which rests on open fulcrum 60 and is secured to the base 30 by spring 62 which has one end secured in aperture 64 of fulcrum 60 and which has its opposite end hooked over hook-like tab 66 on carrier arm 16. Thus, spring 62 maintains carrier arm 16 in a normal rest position against base 30. Projection 76 in cover 32 aligns with stud 58 when the cartridge 10 is assembled to prevent carrier arm 16 from being accidentally knocked off fulcrum 60. Surface 68 of fulcrum 60 is at an oblique angle to base 30 as is surface 70 of member 72 and edge 74 of cover 32. Thus, carrier arm 16 is mounted for pivotal movement in a plane oblique to the base 30.

Flange 34 has an opening therein at 78 to permit the passage of ribbon 28 therefrom. To regulate tautness of the ribbon 28, a tautness regulating roller 80 is mounted in opening 78 upon stud 82 and is freely rotatable thereon. Roller 80 has a lower tapered section 84 and an upper gear 86 separated by a circular flange 88.

Mounted adjacent roller 80 is a second or tautness drive roller 90 which is supported by stud 92. Roller 90 includes an upper tapered section 94 and a lower gear 96 separated by a circular flange 98. Roller 90 is supported by stud 92 so that the gear 96 meshes with the gear 86 of roller 80.

Also mounted on the base 30 is a feed or friction roller 100 which is freely rotatable on stud 102. Friction roller 100 is tapered slightly more than roller 90 and, as will be explained hereinafter, cooperates with driving means including a feed roller 104 mounted on platform 52 of typewriter 12 to effect feeding of ribbon 28 from supply roll 36 to takeup spool 42. Upstanding members 106, 108 and 110 are provided on base 30 to guide ribbon 28 as will be explained hereinafter.

Cover 32 fits within flanges 31 and 33 of base 30 and has wedge-shaped projections 35 thereon which engage flanges 31 and 33 at apertures 37. Studs 39 are provided to insure the secure connection of projections 35 in apertures 37 and thus the secure connection of cover 32 to base 30.

Platform 52 is particularly suitable for supporting the cartridge 10 of the instant invention, but does not form a part thereof. Thus, only so much of the platform 52 will be described herein as is necessary to understand the present invention. The platform 52 has a floor 112 and a pair of parallel flanges 114 and 116 having lips 118 and 120 thereon, respectively. Cartridge 10 is insertable into the platform 52 by placing flanges 31 and 33 under lips 118 and 120, respectively, and laterally sliding the cartridge 10 into the position shown in FIG. 1. Carrier arm 16 is maintained at the correct orientation by spring 62 for the stud 18 to enter the slot 18*a* in lever 20. The central portion 122 of base 30 is higher than its ends 124 and 126 to permit gear 50 to fit beneath base 30 to cooperate with gear 48 and to permit the securement of the cartridge 10 to the platform 52 by latch 111 as disclosed in a copending U.S. Pat. application Ser. No. 288,635 filed Sept. 13, 1972 by Samuel D. Cappotto et al. The latch 111 is removable from engagement with the cartridge 10 by pressing a lever 113 which is operatively associated therewith as disclosed in the application Ser. No. 288,635.

Feed mechanism 130 is also particularly suitable for use with cartridge 10 of the instant invention. This mechanism 130 includes a power driven chamfered gear 132 meshed with a driven chamfered gear 134 on pulley wheel 136. Pulley wheel 136 is coaxial with drive or feed roller 104 and is rigid therewith. Thus, rotation of pulley wheel 136 by the power driven gear 132 causes equal angular rotation of roller 104.

Also connected to pulley wheel 136 is spring belt 138 which is trained around pulley wheel 136 and pulley wheel 140. Pulley wheel 140 is rigid with gear 50. Spring belt 138 permits slippage for reasons to be explained hereinafter.

Ribbon 28 flows in a path from supply roll 36 around tapered surface 84 of roller 80 where it is orientated at an oblique angle to the base 30 to reduce its angular orientation with respect to the carrier arm 16, along the lower half of carrier arm 16 where it is protected by shield 17, around the free or V-shaped end of carrier arm 16 where it is protected by cap 19 to the upper half of carrier arm 16, past the aperture 24 where it is exposed to the type element 26*a*, back along the upper half of carrier arm 16, past member 106 which reorients the ribbon 28 toward a plane perpendicular to the base 30 to adjust the plane of flow toward that of roller 100, between roller 100 and feed roller 104, around member 108 which again adjusts the plane of ribbon flow, past member 110 which insures that the ribbon 28 is maintained at a proper height to enter upon roller 90, around tapered surface 94 of roller 90 and onto takeup spool 42.

In operation, during each typing action lift mechanism 22 functions to lift carrier arm 16 and thus raise ribbon 28 in aperture 24 at an oblique angle toward the print point 29 in the typewriter 12 where a character is transferred to a record medium by the type element 26*a* striking the ribbon 28.

The ribbon feed is also operated during type action either before or after the type element 26*a* strikes the ribbon 28. During the feed, power driven gear 132 rotates counterclockwise to rotate pulley wheel 136 clockwise thus causing roller 104 to rotate clockwise. Ribbon 28 which is frictionally engaged between roller 104 and roller 100 in the cartridge 10 is thus pulled through carrier arm 16 from supply roll 36. Since roller 104 is rotated a fixed angular distance for each type action, the ribbon feed is in uniform incremental amounts. Thus, there is an efficient usage of the ribbon 28. The ribbon 28 is fed by rollers 100 and 104 to the takeup spool 42 which is driven counterclockwise by the power chain including power driven gear 132, gear 134, pulley wheel 136, spring belt 138, pulley wheel 140 and gear 50. Rotation of gear 132 is sufficient to cause the takeup of the length of ribbon 28 fed through rollers 100 and 104 regardless of the amount of ribbon 28 on takeup spool 42. However, the power train cannot cause takeup spool 42 to pull ribbon 28 through rollers 100 and 104 due to the slippage between spring

belt 138 and the pulley wheels 136 and 140 when the tension on ribbon 28 between rollers 100 and 104 and takeup spool 42 reaches a predetermined amount less than that which would cause ribbon 28 to slide over rollers 100 and 104.

As was mentioned in the preceding paragraph, rollers 100 and 104 pull the ribbon 28 from the supply roll 36 through the carrier arm 16. As a result of the length of the path and the varying quantity of ribbon 28 on supply roll 36, absent means to regulate the tautness of the ribbon 28, the tautness of the ribbon 28 between rollers 100 and 104 and supply roll 36 could vary to a great degree and cause tearing or deforming of the ribbon 28. In order to avoid the necessity of employing a thick ribbon of greater strength which would increase the cost of the cartridge 10 as well as decrease the length of ribbon 28 storeable in the cartridge 10, rollers 80 and 90 are provided to regulate the tautness of ribbon 28 between rollers 100 and 104 and the supply roll 36.

Rollers 80 and 90 operate in the following manner. As ribbon feed occurs, the ribbon 28 between rollers 100 and 104 and takeup spool 42 frictionally engage roller 90 to rotate the latter roller 90 clockwise. Frictional engagement of the ribbon 28 and roller 90 during substantially the entire feeding operation is insured by the cooperation of detent finger 43 on flange 45 of the takeup spool 42 and detent train 47 on the inside of cover 32 which prevent takeup spool 42 from unwinding more than the distance between any two adjacent teeth 47*a* of the detent train 47. Rotation of roller 90 clockwise causes the rotation of roller 80 counterclockwise through their meshing gears 96 and 86, respectively. If the ribbon 28 between rollers 100 and 104 and supply roll 36 is taut, the ribbon 28 will be in frictional engagement with roller 80 and thus driven thereby as a result of the rotation of that roller 80 counterclockwise. If the ribbon 28 between the rollers 100 and 104 and supply roll 36 is not taut and the ribbon 28 is, thus, not in frictional engagement with roller 80 or if roller 80 has rotated sufficiently to reduce the tautness of the ribbon 28 and, thus, has reduced the frictional engagement between roller 80 and the ribbon 28 below that necessary to pull the ribbon 28 from the supply roll 36, then roller 80 will not drive the ribbon 28. Hence, the tautness of the ribbon 28 between rollers 100 and 104 and supply roll 36 is regulated.

The above described embodiment of the instant invention is preferrably made of plastic with the exception of spring 62 and cap 19. Furthermore, all of the component parts of the cartridge 10 including carrier arm 16, rollers 80, 90 and 100, supply roll 36, takeup spool 42 and cover 32 can be assembled and/or secured to the base 30 without the use of tools. Thus, economic manufacture of the cartridge 10 may be accomplished either manually or by automated machinery.

While a preferred embodiment of the instant invention has been described for illustrative purposes, many modifications and variations will now become obvious to those of ordinary skill in the art. It is, thus, desired that the scope of the present invention not be limited by the foregoing but rather by the appended claims.

What is claimed is:

1. An improved cartridge for a ribbon for a typewriter having means for driving the ribbon, the cartridge having a housing, a supply area for the ribbon in the housing, a take-up spool for the ribbon journaled in the housing at a different level than the supply area, means for connecting the take-up spool to the driving means in the typewriter to rotate the take-up spool, and an arm having a free end, the arm extending from the housing for guiding the ribbon from the supply area in the housing to the free end of the arm and back to the take-up spool in the housing, wherein the improvement comprises:

a. a feed roller journaled in the housing in the path of the ribbon between the supply area and the take-up spool at substantially the same level as the take-up spool for rotation by the driving means in the typewriter and engagement with the ribbon;

b. a tautness regulating roller journaled in the housing in the path of the ribbon between the supply area and the feed roller for frictional engagement with the ribbon to pull the ribbon from the supply area only when the ribbon is taut enough to frictionally engage the tautness regulating roller; and

c. means for rotating the tautness regulating roller in direct and continuous contact with the tautness regulating roller.

2. The cartridge of claim 1 in which the rotating means includes a tautness drive roller journaled in the housing in the path of the ribbon between the feed roller and the take-up spool at substantially the same level as the feed roller and the take-up spool for continuous engagement with the ribbon to be rotated by the ribbon.

3. The cartridge of claim 2 in which the rotating means further includes a first gear for rotating the tautness regulating roller and a second gear for rotation with the tautness drive roller, the second gear in mesh with the first gear.

4. The cartridge of claim 3 in which the tautness regulating roller has an end close to the tautness drive roller, the first gear is on the end of the tautness regulating roller that is close to the tautness drive roller, the tautness drive roller has an end close to the tautness regulating roller, and the second gear is on the end of the tautness drive roller that is close to the tautness regulating roller, and further comprising a first circular flange between the tautness regulating roller and the first gear, the first circular flange having a diameter at least as great as the greatest diameter of the first gear, and a second circular flange between the tautness drive roller and the second gear, the second circular flange having a diameter at least as great as the greatest diameter of the second gear, the first and the second circular flanges partially overlapping when the first and the second gears are in mesh to help keep the first and the second gears in alignment.

* * * * *