

PATENT SPECIFICATION

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(54) TYPEWRITER RIBBON CARTRIDGE

(71) We, SCM CORPORATION, a Corporation of the State of New York, United States of America, of 299 Park Avenue, New York, State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a device for supplying ribbon from a supply, for use with machines for making a printed record which will hereinafter be referred to as typewriters. Such a device is removably mounted on a typewriter and will hereinafter be referred to as a ribbon cartridge.

The present invention provides a ribbon cartridge adapted to be removably mounted on a typewriter, said cartridge comprising a base and an arm pivotally mounted on said base for guiding ribbon in a direction from a supply position to a utilisation position, and from the utilisation position in a reverse direction to a take-up spool, feed means operable by drive means in said typewriter or the like to pull ribbon from the supply position, and ribbon transport means mounted on said base in the path of ribbon between said supply position and said feed means for advancing ribbon between said supply position and said feed means.

A preferred form, the cartridge, includes a housing having a base and a cover, and an arm extending laterally from the housing for guiding typewriter ribbon from the housing to a print point and back to the housing. The arm is mounted 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, the roll being freely rotatable around the hub. A take-up spool rests on top of the hub and has an integral axial shaft with a gear at the end opposite the spool which passes through the hollow hub to engage a drive gear in the machine. A friction roller is provided which co-operates with a drive roller in the machine to pull the ribbon from the supply roll through the arm and 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 being entrained on 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 resilient detent finger formed in its upper flange which co-operates with a circular detent train on the inner surface of the cover to prevent unwinding of the ribbon on the takeup spool.

The cartridge is laterally insertable in 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 cartridge is removable by laterally sliding the cartridge from the typewriter thus enabling easy replacement or variation in colour or type of ribbon, e.g. carbon ribbon or fabric ribbon.

Cartridges of the above type store a large

[Price 25p]

Price 33p

supply of ribbon and feed that ribbon to the print point reliably and efficiently thus allowing maximum utilisation of the ribbon.

Further features and advantages of the present invention will become apparent from the following description of an embodiment thereof, given by way of example only, when taken in conjunction with the accompanying drawings, in which:—

Figure 1 is a partial perspective view of a typewriter including a typewriter ribbon cartridge according to the present invention;

Figure 2 is an exploded perspective view of the typewriter ribbon cartridge shown in Figure 1 including its relationship to the platform upon which it is mounted in the typewriter;

Figure 3 is a rear perspective view of the typewriter ribbon cartridge shown in Figure 2 with its cover removed;

Figure 4 is a front perspective view of the typewriter ribbon cartridge shown in Figure 2 with portions broken away to show the interior mechanisms;

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

Figure 6 is an enlarged cross-sectional view of the detent means of the takeup spool and the cartridge cover, and

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

Referring to the drawings and specifically to Figure 1, there is shown a typewriter ribbon cartridge 10 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 carrier arm 16 is the subject of our co-pending application No. 21112/73 (Serial No 1375356) and therefore only so much of the carrier arm 16 will be described herein as is necessary to understand the operation of the cartridge 10 and reference may be made to said application for further details.

The carrier arm 16 has a stud 18 which projects therefrom to engage lever 20 of lift mechanism 22 of the typewriter 12 when the cartridge 10 is inserted in the typewriter. 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, not shown, of the typewriter 12.

Referring next to Figures 2—5, the cartridge housing includes a base 30 and a cover 32. On the base 30 is a circularly shaped flange 34 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 freely 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 shaft 44 which passes through circular bore 46 in hub 40. Gear wheel 48 on the end of shaft 44 extends below the underside of base 30 for engagement with a gear wheel 50 projecting above platform 52 for reasons to be explained hereinafter. Coaxial with shaft 44 but extending in the opposite direction from spool 42 is extension 54 which engages circular aperture 56 in cover 32 when the cover 32 is mounted to the base 30. Spool 42 is made of resilient plastics material and has a finger 43 formed in its upper flange 45. Finger 43 co-operates with circular detent train 47 on the inside of cover 32 when the cover is secured to base 30. The detent train 47 has saw-tooth shaped teeth as seen in Figure 6 to co-operate with finger 43 and prevent rotation of spool 42 in a clockwise direction.

The carrier arm 16 has a stud 58 which rests on fulcrum 60 and is secured to the base 30 by spring 62 which has one end secured in aperture 64 of fulcrum 60, (Figure 3), 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 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.

Flange 34 has an opening therein at 78 to permit the passage of ribbon therefrom. 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 geared section 86 separated by a flange 88.

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

Also mounted to the base 30 is a 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, co-operates with drive or 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 ensure the secure connection of projections 35 in apertures 37 and thus the secure connection of cover 32 to base 30.

Platform 52 is adapted to support the cartridge 10 but since it does not form a part of the invention only so much of the platform 52 will be described herein as is necessary to understand the operation of the cartridge. The platform 52 has a floor 112 and a pair of opposed parallel flanges 114 and 116 having lips 118 and 120 thereon, respectively. Cartridge 10 is insertable on to the platform 52 by placing flanges 31 and 33 under lips 118 and 120, respectively, and laterally sliding the cartridge into the position shown in Figure 1. Carrier arm 16 is maintained at the correct orientation by spring 62 to enter the slot 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 co-operate with gear 48 and to permit the securement of the cartridge 10 to the platform 52 by latch 111 which is spring biased by a spring, not shown, on the underside of the platform 52 to engage a rib, not shown, on the underside of the cartridge 10. The latch 111 is removable from engagement with the rib by pressing a lever 113 which is operatively associated therewith.

Feed mechanism 130 associated with platform 52 will now be described. This mechanism includes a drive bevel gear 132 meshing with a driven bevel 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 entrained 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 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 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 a typing element, back along the upper half of carrier arm 16, past member 106 which reorientates the ribbon 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 ad-

justs the plane of ribbon flow, past member 110 which ensures that the ribbon is maintained at a proper height to enter upon roller 90, around tapered surface 94 of roller 90 and on to 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 in the typewriter 12 where a character is transferred to a record medium by the typebar striking the ribbon 28.

The ribbon feed is also operated during the typing action either before or after the typebar strikes the ribbon. 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. 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 138, pulley wheel 140 and gear 50. Rotation of gear 132 is sufficient to cause the takeup of the length of ribbon fed through rollers 100 and 104 regardless of the amount of ribbon 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 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 on supply roll 36, and in the absence of means to regulate the tautness of the ribbon, the tautness of the ribbon between rollers 100 and 104 and supply roll 36 could vary to a great degree and cause tearing or deforming of the ribbon. In order to avoid the necessity of employing a thick ribbon of greater strength which would increase the cost of the cartridge as well as decrease the length of ribbon storeable in the cartridge, rollers 80 and 90 are provided to regulate the tautness of ribbon 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 between rollers 100 and 104 and takeup

spool 42 frictionally engage roller 90 to rotate the latter roller clockwise. Frictional engagement of the ribbon on roller 90 during substantially the entire feeding operation is ensured by the co-operation 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 of the detent train 47. Rotation of roller 90 clockwise, as viewed from above in Figure 2, causes the rotation of roller 80 counter-clockwise through their meshing gears 96 and 86, respectively. If the ribbon between rollers 100 and 104 and supply roll 36 is taut, the ribbon will be in frictional engagement with roller 80 and thus driven thereby as a result of the rotation of that roller counter-clockwise. If the ribbon between the rollers 100 and 104 and supply roll 36 is not taut and the ribbon is, thus, not in frictional engagement with roller 80 or if roller 80 has rotated sufficiently to reduce the tautness of the ribbon and, thus has reduced the frictional engagement between roller 80 and the ribbon below that necessary to pull the ribbon from the supply roll 36, then roller 80 will not drive the ribbon. Hence, the tautness of the ribbon between rollers 100 and 104 and supply roll 36 is regulated.

The above described embodiment of the cartridge is preferably made of plastics 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.

WHAT WE CLAIM IS:—

1. A ribbon cartridge adapted to be removably mounted on a typewriter, said cartridge comprising a base and an arm pivotally mounted on said base for guiding ribbon in a direction from a supply position to a utilisation position, and from the utilisation position in a reverse direction to a takeup spool, feed means operable by drive means in said typewriter or the like to pull ribbon from the supply position, and ribbon transport means mounted on said base in the path of ribbon between said supply position and said feed means for advancing ribbon between said supply position and said feed means to regulate the tautness of said ribbon between said supply position and said feed means.

2. A cartridge according to claim 1, wherein said ribbon transport means comprises a roller in the path of said ribbon between said supply position and said feed means, and means for rotating said roller to

frictionally pull ribbon from said supply position when said ribbon is sufficiently taut.

3. A cartridge according to claim 1 or 2, wherein said takeup spool has drive means comprising an axial shaft extending from said takeup spool for engaging external drive means for rotating said takeup spool to takeup ribbon fed thereto by said feed means.

4. A cartridge according to claim 2 or 3, wherein said ribbon transport means includes a further roller defining a path for the flow of ribbon from said feed means to said takeup spool and frictionally engaging said ribbon to be driven thereby, said means for rotating said first-mentioned roller being arranged to rotate said first-mentioned roller in response to the driving of said further roller whereby said first-mentioned roller advances ribbon from said supply position to said arm until the frictional engagement between said first-mentioned roller and said ribbon is insufficient to advance said ribbon.

5. A cartridge according to claim 4, wherein said means for rotating said first-mentioned roller comprises gear means integral with said first-mentioned roller and in mesh with gear means integral with said further roller.

6. A cartridge according to any preceding claim further including means for preventing said takeup spool from unwinding thereby maintaining said ribbon between said feed means and said takeup spool in frictional engagement with said further roller.

7. A cartridge according to claim 6, wherein said takeup spool includes an upper and a lower flange, and said preventing means comprises ratchet and pawl means on said upper flange and a cover for said cartridge.

8. A cartridge according to any preceding claim, wherein said base includes internally projecting flange means defining a storage area for a supply of ribbon, said storage area having hub means on which a supply spool is freely rotatable.

9. A cartridge according to claim 8, wherein said hub means has an axial bore through which said shaft on the takeup spool extends.

10. A cartridge according to any preceding claim, further including spring means connected between said base and said arm means biasing said arm means to a normal rest position.

11. A cartridge according to claim 10, wherein said arm is pivoted about a fulcrum having a surface at an oblique angle with said base for guiding pivotal movement of said arm means toward said utilisation location.

spool 42 frictionally engage roller 90 to rotate the latter roller clockwise. Frictional engagement of the ribbon on roller 90 during substantially the entire feeding operation is ensured by the co-operation 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 of the detent train 47. Rotation of roller 90 clockwise, as viewed from above in Figure 2, causes the rotation of roller 80 counter-clockwise through their meshing gears 96 and 86, respectively. If the ribbon between rollers 100 and 104 and supply roll 36 is taut, the ribbon will be in frictional engagement with roller 80 and thus driven thereby as a result of the rotation of that roller counter-clockwise. If the ribbon between the rollers 100 and 104 and supply roll 36 is not taut and the ribbon is, thus, not in frictional engagement with roller 80 or if roller 80 has rotated sufficiently to reduce the tautness of the ribbon and, thus has reduced the frictional engagement between roller 80 and the ribbon below that necessary to pull the ribbon from the supply roll 36, then roller 80 will not drive the ribbon. Hence, the tautness of the ribbon between rollers 100 and 104 and supply roll 36 is regulated.

The above described embodiment of the cartridge is preferably made of plastics 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.

WHAT WE CLAIM IS:—

1. A ribbon cartridge adapted to be removably mounted on a typewriter, said cartridge comprising a base and an arm pivotally mounted on said base for guiding ribbon in a direction from a supply position to a utilisation position, and from the utilisation position in a reverse direction to a takeup spool, feed means operable by drive means in said typewriter or the like to pull ribbon from the supply position, and ribbon transport means mounted on said base in the path of ribbon between said supply position and said feed means for advancing ribbon between said supply position and said feed means to regulate the tautness of said ribbon between said supply position and said feed means.

2. A cartridge according to claim 1, wherein said ribbon transport means comprises a roller in the path of said ribbon between said supply position and said feed means, and means for rotating said roller to

frictionally pull ribbon from said supply position when said ribbon is sufficiently taut.

3. A cartridge according to claim 1 or 2, wherein said takeup spool has drive means comprising an axial shaft extending from said takeup spool for engaging external drive means for rotating said takeup spool to takeup ribbon fed thereto by said feed means.

4. A cartridge according to claim 2 or 3, wherein said ribbon transport means includes a further roller defining a path for the flow of ribbon from said feed means to said takeup spool and frictionally engaging said ribbon to be driven thereby, said means for rotating said first-mentioned roller being arranged to rotate said first-mentioned roller in response to the driving of said further roller whereby said first-mentioned roller advances ribbon from said supply position to said arm until the frictional engagement between said first-mentioned roller and said ribbon is insufficient to advance said ribbon.

5. A cartridge according to claim 4, wherein said means for rotating said first-mentioned roller comprises gear means integral with said first-mentioned roller and in mesh with gear means integral with said further roller.

6. A cartridge according to any preceding claim further including means for preventing said takeup spool from unwinding thereby maintaining said ribbon between said feed means and said takeup spool in frictional engagement with said further roller.

7. A cartridge according to claim 6, wherein said takeup spool includes an upper and a lower flange, and said preventing means comprises ratchet and pawl means on said upper flange and a cover for said cartridge.

8. A cartridge according to any preceding claim, wherein said base includes internally projecting flange means defining a storage area for a supply of ribbon, said storage area having hub means on which a supply spool is freely rotatable.

9. A cartridge according to claim 8, wherein said hub means has an axial bore through which said shaft on the takeup spool extends.

10. A cartridge according to any preceding claim, further including spring means connected between said base and said arm means biasing said arm means to a normal rest position.

11. A cartridge according to claim 10, wherein said arm is pivoted about a fulcrum having a surface at an oblique angle with said base for guiding pivotal movement of said arm means toward said utilisation location.



5 12. A cartridge according to any preceding claim, wherein said base includes an internally projecting member defining a path for the flow of ribbon from said arm means to said feed means and adjusting the plane of said flow of ribbon to a plane more perpendicular to said base.

13. A ribbon cartridge as claimed in claim 1 substantially as hereinbefore described

with reference to the accompanying 10 drawings.

14. A typewriter having a ribbon cartridge according to any preceding claim.

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