

[54] **ENDLESS PRINTER RIBBON CARTRIDGE APPARATUS**

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[22] Filed: **Mar. 18, 1974**

[21] Appl. No.: **451,951**

[52] **U.S. Cl.** 197/168; 101/336; 197/151; 197/171; 226/187

[51] **Int. Cl.²** **B41J 33/10**

[58] **Field of Search**... 197/151, 168, 153, 157-159, 197/171; 101/336; 170/100.2; 242/55.19 A, 197, 198, 199, 200; 226/168, 187; 352/72, 78

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[57] **ABSTRACT**

An endless ribbon printer cartridge and cartridge mechanism apparatus is provided having a cartridge having a plastic housing with a pair of spaced rollers rotatably attached inside the housing. An endless inked ribbon is wrapped around the rollers with a feed from between the rollers over a predetermined path and back onto the ribbon wrapped on the rollers. A pair of elongated arms extend from the housing and the ribbon is fed from one arm to the other. The cartridge fits onto a cartridge holding mechanism mounted for horizontal movement with a rotatable cylindrical printing head. When the cartridge is mounted on the holder mechanism the arms extend on either side of the printing wheel to locate that portion of the ribbon passing between the arms between the rotatable printing head and a platen of a computer terminal printing mechanism. The cartridge may be easily inserted and removed by the operation of a latching mechanism.

7 Claims, 7 Drawing Figures

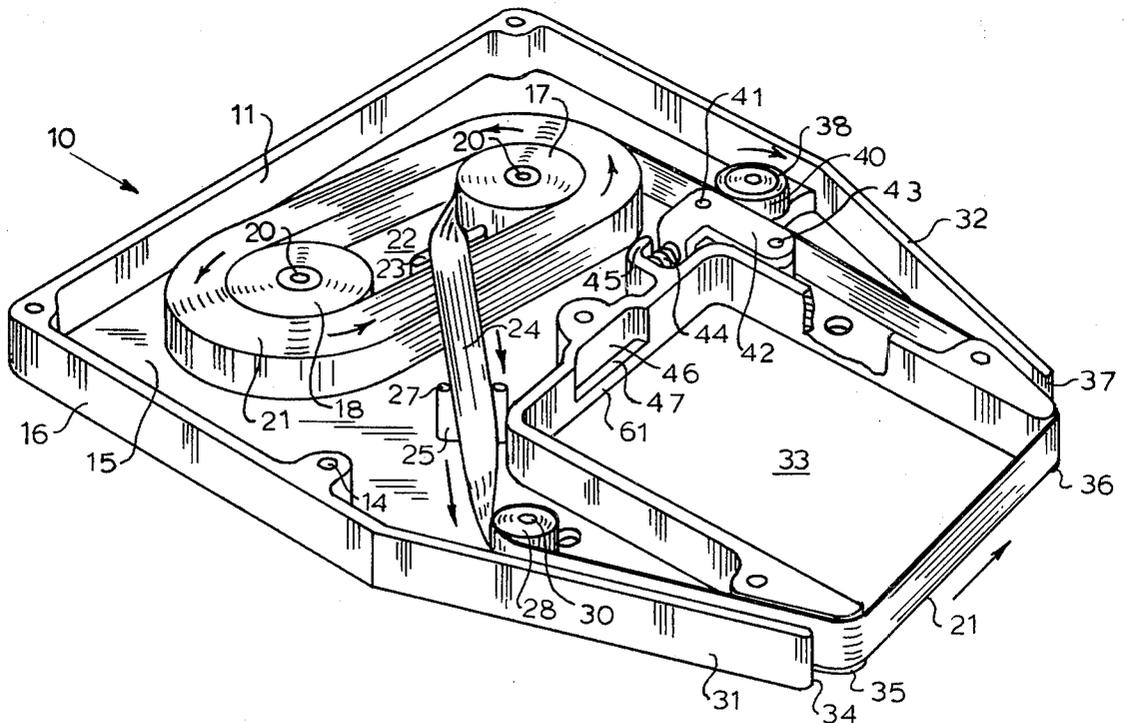


Fig. 1.

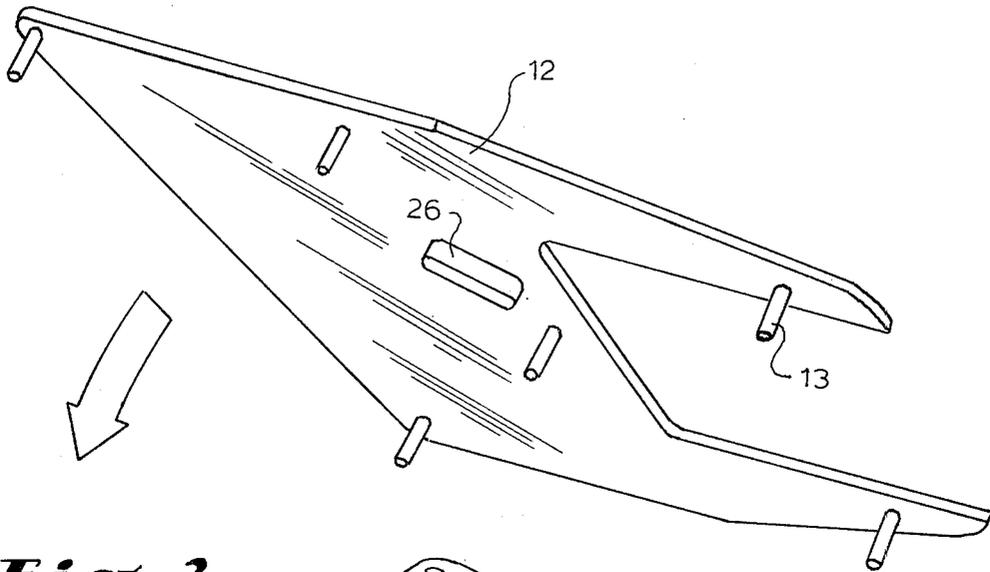


Fig. 2.

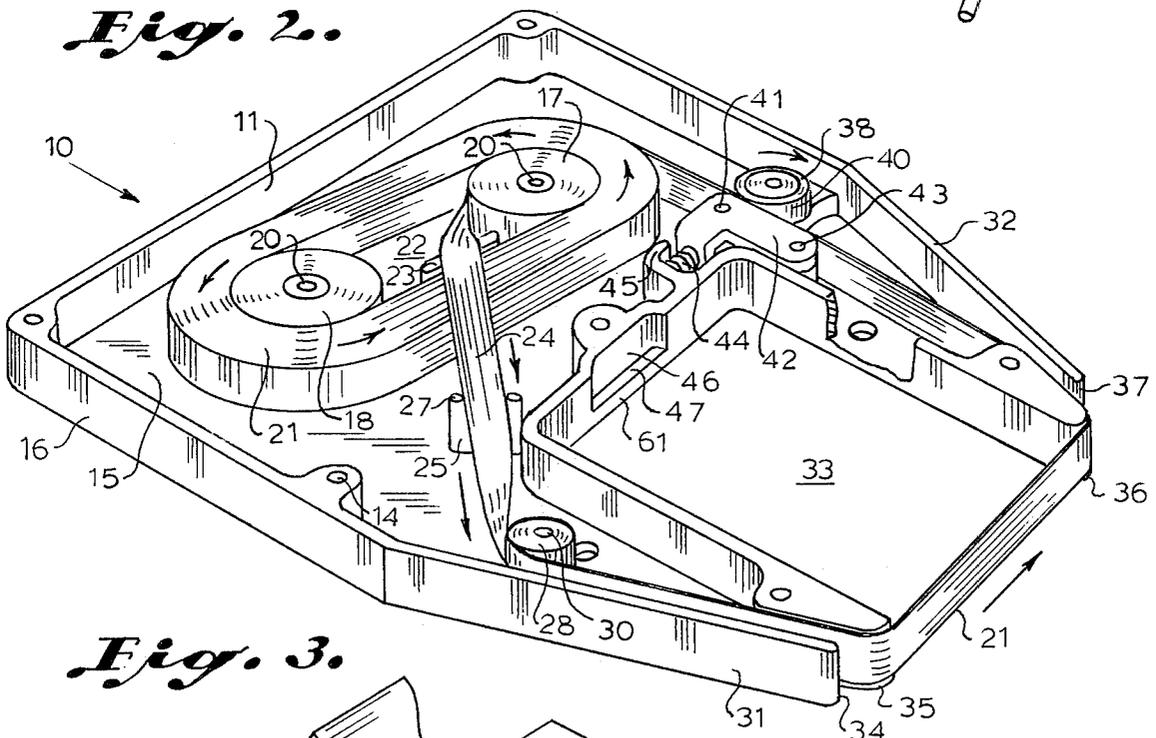


Fig. 3.

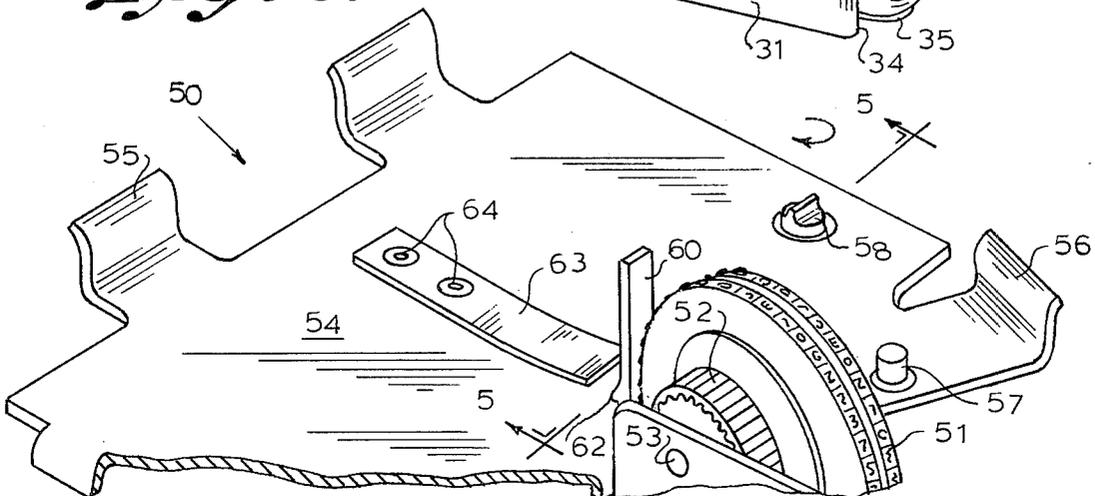


Fig. 4.

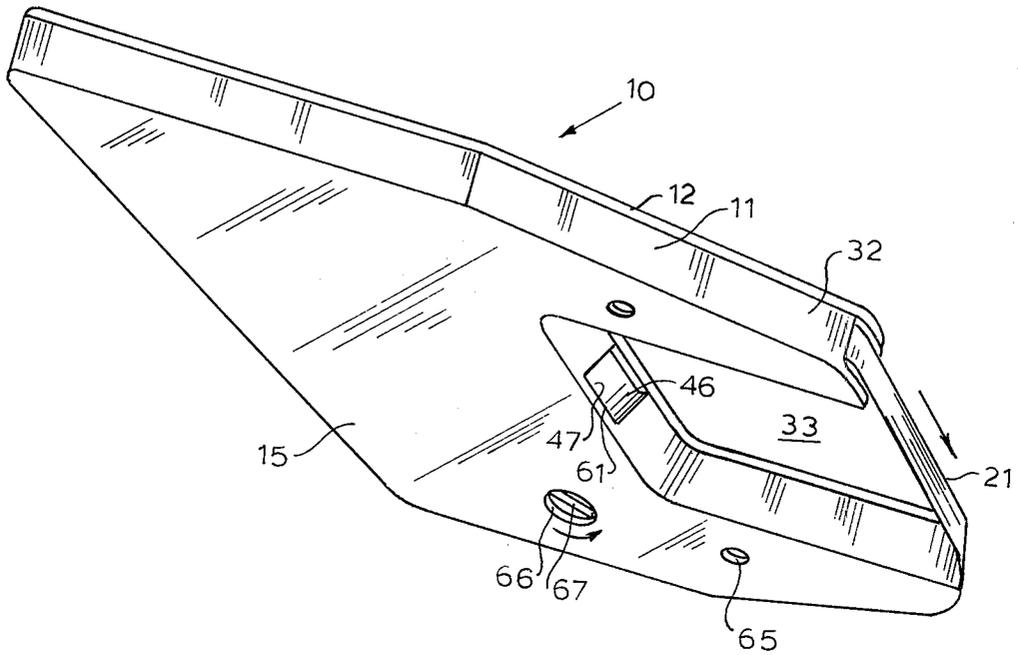


Fig. 5.

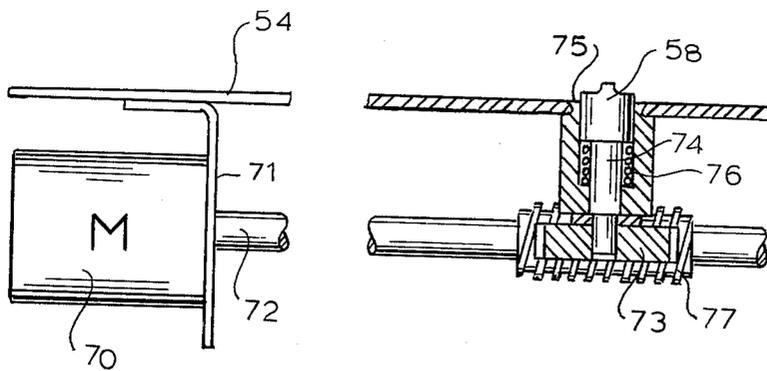


Fig. 6.

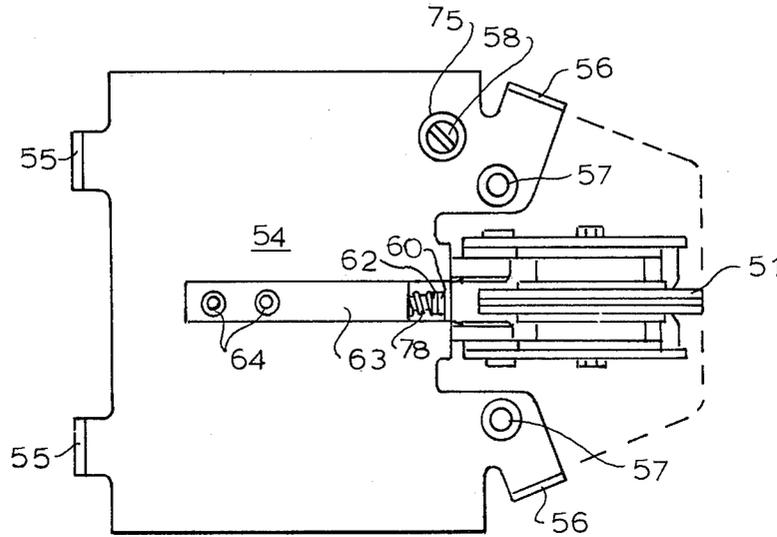
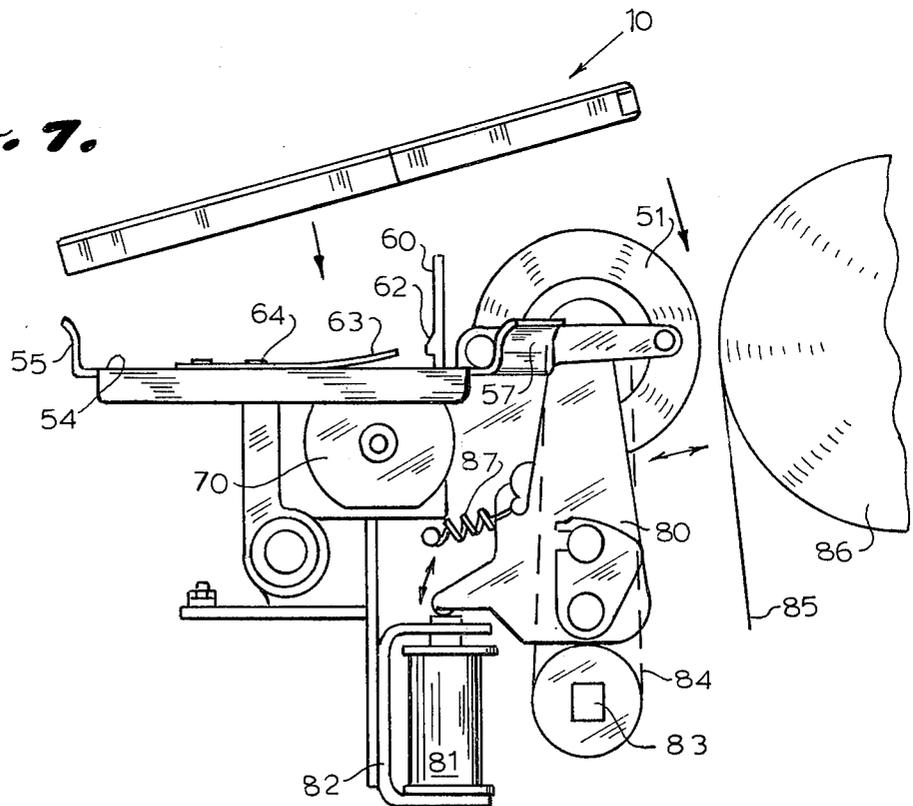


Fig. 7.



ENDLESS PRINTER RIBBON CARTRIDGE APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to ribbon cartridges and especially to a cartridge for an endless inked ribbon for a printing mechanism for use with computer terminals, and the like.

In the past a great many manufacturers have provided ribbon cartridges for use with their typewriters or printing mechanisms to replace the individually wrapped ribbons which must be individually threaded to the typewriter from a ribbon wrapped upon a spool to an empty spool. This in turn results in the operator's hands becoming smudged or messy during the replacement of a ribbon. Cartridge ribbons, on the other hand, may be connected from the wound spool to an empty spool and may be snapped in place with a minimum of inconvenience and time lost. A typical cartridge ribbon may operate with a pre-inked ribbon, as well as with carbon ribbons which are destroyed once used, or with ribbons that are continuously inked during the operation.

Typical prior art ribbon cartridges for typewriters or printer mechanisms may be seen in U. S. Pat. No. 3,621,968 for a ribbon cartridge with mobius loop in the ribbon which utilizes an endless ribbon through a serpentine path within a cartridge and uses a mobius loop configuration to effectively double a link of the ribbon and includes an ink pad mounted in contact with the ribbon for continuously inking the ribbon. A similar endless ribbon feeding mechanism may be seen in U.S. Pat. No. 2,755,905 in which an endless ribbon feeding device is adapted for shorthand typewriters and in U.S. Pat. No. 2,685,357 an endless ribbon feeding mechanism for typewriters is randomly looped inside a casing and fed out of the opposite end of the casing.

Typewriter ribbon cartridges are also utilized for feeding from a full to an empty spool, such as illustrated in U.S. Pat. No. 3,731,781 for a ribbon supply cartridge. An endless ribbon cartridge may also be seen in U.S. Pat. No. 3,726,381 and in the U.S. Pat. No. 3,728,963. In addition there have been cartridge feeding mechanisms utilized for prerecorded magnetic tapes feeding spools of plastic ribbon coated with an iron-oxide or similar materials past magnetic record and playback heads.

The present ribbon cartridge and cartridge mechanism provides a pre-inked endless ribbon and cartridge which is especially suitable for a printing mechanism on a computer terminal, or the like, utilizing a rotating cylindrical head printing mechanism. The cartridge is adapted to fit into a cartridge holding mechanism with arms extending on either side of the cylindrical printing head with a tape passing between the ends of the arms which is located between the rotating print head and the printing mechanism platen. The mechanism can be conveniently slipped into place and removed with a minimum of effort by a single latching arm and moves horizontally with the printing head as the printing head shifts from one position to the next.

SUMMARY OF THE INVENTION

The present invention relates to an endless inked ribbon cartridge and cartridge mechanism having a cartridge with a housing having top, bottom and side walls, and a pair of spaced rollers rotatably attached to and

located in the housing. An endless inked ribbon is wrapped around the pair of spaced rollers so that the endless ribbon can be fed from between the rollers through a predetermined path and back onto the outside of the spaced rollers. Wrapping on a pair of spaced rollers allows a ribbon guide to be placed between the rollers for feeding the ribbon from between the rollers in a ninety degree turn to pass over the wrapped ribbon and then twisting the ribbon back to the normal alignment for feeding over the rest of a predetermined path. The ribbon cartridge has a pair of elongated arms adapted to extend on either side of a printing head and the path of the ribbon extends through one arm and out the tip thereof over to the other arm, then through a rotating pinch roller drive mechanism and back onto the pair of spaced rollers.

The cartridge fits upon a cartridge holding mechanism adjacent a rotating print head with the arms extending on either side of the rotating print head so that the ribbon is aligned between the print head and the platen or the printing mechanism. The cartridge holding mechanism, along with the cartridge attached to it, moves horizontally with the print head during a printing operation while driving a ribbon when the drive mechanism is actuated. The cartridge holding mechanism includes edge aligning members for directing the cartridge in the proper position along with alignment studs and a single latch mechanism which latches the cartridge onto the cartridge mechanism and allows for quick release of the cartridge. The latch mechanism includes a latching arm located between the print head and the cartridge for engaging the cartridge housing between the arms in a groove in the cartridge housing. The spring loaded latching arm can be easily pushed to disconnect the cartridge from the cartridge mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of this invention will be apparent from a study of the written description and the drawings in which:

FIG. 1 is a perspective view of the housing cover of the ribbon cartridge in accordance with the present invention;

FIG. 2 is a perspective view of a ribbon cartridge having the housing cover removed therefrom to show the operation of the cartridge;

FIG. 3 is a perspective view of a portion of the cartridge holding mechanism and print head;

FIG. 4 is a perspective view of the assembled cartridge;

FIG. 5 is a sectional view taken along line 5—5 of FIG. 3 with a portion thereof cut away;

FIG. 6 is a top sectional view of the cartridge housing holding mechanism; and

FIG. 7 is a side sectional view of the cartridge holding mechanism and a portion of the print head mechanism and platen.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 through 3, the preferred embodiment of an endless inked ribbon cartridge along with a portion of the cartridge holding mechanism attached to the printer mechanism is illustrated with all three figures forming a generally exploded view. The cover of the cartridge in FIG. 1, attaches to the cartridge in FIG. 2 and the cartridge in turn attaches to the

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cartridge holding mechanism in FIG. 3.

The cartridge 10 has a plastic housing 11 with a housing cover and top portion 12 adapted to be attached to the remainder of the housing 11. The top portion has a plurality of protruding studs 13 located to be inserted in a plurality of openings 14 of the casing 11. Casing 11 also has a bottom portion 15 and side or edge portions 16. In the final assembly of the cartridges 10, the housing cover 12 is placed onto the remainder of the housing 11 with the studs 13 fitting into the openings 14 glued or otherwise attached to form a complete housing 11. Inside of housing 11 is a pair of rollers 17 and 18 rotatably mounted on pins 20 to the bottom 15 of the housing 11. These rollers have an endless ribbon 21 wrapped around the rollers 17 and 18 so as to leave a space 22 therebetween, in which space is located a raised surface ribbon guide 23 so that the ribbon 21 inner portion 24 can be fed directly from the rollers 17 and 18 over the guide 23 while being twisted 90° or generally perpendicular to the wrapped portion of ribbon 21 during passage thereover. The ribbon is held flat or horizontal to the housing cover 12 and bottom 15, and is guided by a bottom ribbon guide 25 fixedly attached to the bottom 15 of the housing 11, and a top ribbon guide 26 fixedly attached to the housing cover 12. The bottom ribbon guide has a pair of slotted protruding ends 27 with a smooth surface therebetween for the ribbon to ride across and the top ribbon guide 26 has a smooth surface that fits so as to push down on the ribbon portion 24 adjacent the bottom ribbon guide 25 but not directly over guide 25 so that both the bottom guide 25 and the top guide 26 will have the ribbon portion 24 riding thereagainst. The portion 24 of ribbon 21 is fed through another 90 degree twist by roller 28 rotatably attached to the bottom 15 of the housing 11 by pin 30 so that the flat ribbon portion 24 extends only between the portion where it comes off of roller 17 until it is twisted by roller 28. The rollers 17 may be porous inking rollers for supplying additional ink to the ribbon 21 without departing from the spirit and scope of the invention.

The cartridge housing 11 has a pair of protruding arm portions 31 and 32 which form a generally square or rectangular open area 33 therebetween. The ribbon 21 passes as illustrated by the arrow from the roller 28 through the arms 31 and out of an opening 34 across an end guide portion 35 to pass over the front of the open area 33 to the second arm 32 where it is received by guide portion 36 on the arm 32 and enters an end slot 37 in the arm 32. The ribbon 21 then passes through the arm portion 32 and is engaged between a pair of pinch rollers. Roller 38 is the drive roller which when connected and actuated is driven by an electric motor to rotate on a base 40 to frictionally engage the ribbon 21 to drive the ribbon back onto the rollers 17 and 18. The ribbon 21 is held against the drive roller 38 by a second pinch roller rotatably mounted on a pin 41 to a pivoting arm 42 which pivots on a pin 43 attached to the bottom portion 15 of the cartridge housing 11. Pivoting arm 42 is spring biased with a spring 44 pushing against the pivoting arm, and being held in place by a slotted area 45 formed in the housing 11. Housing 11 also has a groove 46 with a ledge 47 which is a snap-catch ledge used to snap the cartridge 10 onto the cartridge holding mechanism 50.

As can be seen from FIG. 2, the majority of the ribbon is wrapped in a plurality of turns on the rollers 17 and 18 with the ribbon 21 being fed from between the

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middle of the rollers 17 and 18 and twisted by a guide 23 between the rollers and by upper guide 26 and lower guide 25 to direct the ribbon over the remainder of the wrapped portion of ribbon 21. The ribbon is guided through a predetermined path out of the cartridge and across the slotted area 33 back into the cartridge and through the drive mechanism where it is wrapped back upon the rollers 17 and 18 on the outside of the wrapped ribbon. Thus a continuously moving endless inked ribbon is provided in a small compact cartridge which fits upon a ribbon mechanism of a terminal printer 50 which printer has cylindrical printing wheels 51 with mechanism 50 positioned so that the cartridge slot portion 33 will fit around the printing wheel 51 with arms 31 and 32 extending on either side of the wheel 51 to position the ribbon portion extending across the slot 33 in front of the wheel 51. The printer wheel 51 is driven by a cogged belt or similar drive mechanism 52 and shifts horizontally substantially parallel to the supporting shaft 53. The cartridge supporting mechanism 50 shifts horizontally along with the printer wheel shifting the cartridge 10 and the ribbon back and forth with the printer wheel 51.

The cartridge holding mechanism 50 has a base or bottom support surface 54 with a pair of rear edge loading guides 55 and a pair of angled forming centering guides 56 for directing the cartridge into the proper position onto the support base 54. A pair of cartridge guide studs 57 further position the cartridge onto the base 54 and allow a roller drive key 58 to be properly positioned to fit on the drive roller 38 for engaging the drive roller 38 of the cartridge 10 for driving the drive roller when rotated. The combination of the edge guides 55 and 56 in connection with the guide studs 57 maintain the cartridge 10 in its proper position on the platform 54 but as it slides into position, a spring loaded latching 60 is pushed back by an edge portion 61 of the cartridge 10 until a latching surface 62 engages the latching ledge 47 of the cartridge 10 to hold the cartridge securely in place on the platform 54. A leaf spring 63 is held by rivets 64 to the surface 54 and places a lifting pressure under the cartridge 10 just below the latching ledge 47 applying additional pressure against the latching surface 62 of latching arm 60 while a spring (not illustrated in this view) holds a latching arm 60 surface 62 forward onto the ledge 47 of the cartridge 10. It should be clear at this point that a cartridge as illustrated in FIGS. 1 and 2 as assembled can be quickly snapped as a unit onto the cartridge holding mechanism 50 and will be properly aligned and engaged with a drive mechanism and locked in place with the linked ribbon 21 extending in front of the print wheel 51.

Referring now to FIG. 4, cartridge 10 can be seen assembled with the housing 11 having the top portion 12 attached thereto with the bottom portion 15 and edges 16 visible and with the arms 31 and 32 forming the open area 33 therebetween with the ribbon 21 passing between the end of arms 31 and 32. The guides 36 are illustrated guiding the ribbon 21 into the slot 37. This view also illustrates the openings 65 for receiving the aligning studs 57 of FIG. 3 and an opening 66 having a drive roll 38 with a slot 67 for receiving the drive key 58 of FIG. 3. The grooved portion 46 along with the ledge 47 and the surface 61 may also be seen in this view.

FIG. 5 more clearly illustrates the operation of the drive system for driving the endless ribbon and has an

electric motor 70 held by motor holding brackets 71 attached to the bottom of the surface 54. The motor 70 drives the shaft 72 which drives a worm gear 77 which in turn drives a gear 73 which drives the shaft 74 and the drive key 58 through an opening 75 in the surface 54. A spring 76 pushes the key 58 in an upward direction but allows it to act in a resilient manner to be pushed in with the shaft 74 with the helical gear 73 sliding a small amount on worm gear 77 so that the key 58 can be slightly pushed in until it rotates to align with the slot 67 of drive roll 38 of the cartridge 10. Thus at all times when a cartridge 10 is located on cartridge holding mechanism 50 and when the motor 70 is actuated, the cartridge ribbon 21 will be moved in a continuous endless loop off of a wrapped portion and back onto a wrapped portion on rollers 17 and 18. The motor 70 can be actuated in any manner desired but would typically be actuated to operate only when terminal keys were actuating the front wheel 51.

Referring now to FIGS. 6 and 7, cartridge holding mechanism 50 is illustrated in more detail with the cartridge 10 about to be placed on the mechanism 50, in FIG. 7. Surface 54 having the rear cartridge edge guide 55 and the forward angled cartridge edge guides 56 along with the alignment studs 57 is illustrated having the drive key 58 protruding therefrom through the opening 75. Spring 63 held by the rivet 64, along with the latching arm 60 with latching surface 62 is illustrated being spring biased by a spring 78. A pair of print wheels 51 are attached to a pair of print wheel pivoting arms 80 which are driven by a pair of solenoids 81 attached to a solenoid holding bracket 82. Square shaft 83 drives a cog belt or similar drive 84 to rotate print wheels 51 to the proper character being printed. The printing is performed on a printing surface 85 being fed over a platen 86 so that the printing wheel 51 is directed forward against the exposed portion of the ribbon 21 of the cartridge 10 and against the surface 85 supported by the platen 86. The character printing mechanism including the cartridge mechanism 54 cartridge 10 and print wheels 51 may then be shifted for printing the next character. The ribbon actuating motor 70 may be seen in this view attached to the bottom of the surface 54. The arms 80 that support the wheels 51 may also be seen as being spring retracted by a spring 87 but it should be clear that this portion of the printing mechanism is illustrated in this view to more clearly illustrate the operation of the cartridge but that the cartridge and cartridge mechanism can be readily adapted for use with other printing mechanisms without departing from the spirit and scope of the invention. Accordingly, this invention is not to be construed as limited to the particular forms disclosed herein since these are to be regarded as illustrative rather than restrictive.

I claim:

1. An endless printer ribbon cartridge comprising in combination:

- a. housing having top, bottom and side walls;
- b. a pair of spaced rollers rotatably attached to said housing, at least one of said pair of spaced rollers being a porous inking roller, said ribbon being inked as it passes over said porous inking roller;
- c. an endless inked ribbon being partially wrapped around said pair of spaced rollers, for a plurality of turns so as to leave an open space between said rollers;

d. an inside ribbon guide located between said pair of spaced rollers for guiding and twisting said endless ribbon from between said pair of spaced rollers generally perpendicular to and over said wrapped portion;

e. outside ribbon guide means located on the opposite side of said wrapped portion of said endless ribbon from said inside ribbon guide for guiding said ribbon being fed from between said pair of spaced rollers including means for twisting said ribbon into a predetermined path and back onto the outside of said wrapped portion of said ribbon on said pair of rollers;

f. ribbon drive means engaging said ribbon for driving said ribbon over said predetermined path from between said rollers onto the outside of said partially wrapped ribbon on said spaced pair of rollers;

g. said outside ribbon guide means having a ribbon guide having a bottom portion protruding from said bottom wall, and a top portion protruding from said top wall whereby top and bottom portions hold said ribbon therebetween perpendicular to the wrapped portion of said ribbon as it passes over said partially wrapped portion of said ribbon; and

h. said housing also having a pair of protruding arms with said endless ribbon passing therebetween, passing out the end of one said arm and back into said cartridge at the end of said other arm, and each said arm having an opening in the end thereof and a ribbon alignment guide for directing said ribbon passing out one opening and into the other.

2. The ribbon cartridge in accordance with claim 1 in which said housing has a snap catch ledge located between said arms for receiving a latching member for holding said cartridge in a cartridge holding mechanism.

3. The ribbon cartridge in accordance with claim 2 in which said outside ribbon guide has at least one guide roller for guiding said ribbon between said wrapped ribbon.

4. The ribbon cartridge in accordance with claim 3 in which said ribbon drive means includes a drive roller and a spring biased pivoted arm having a roller thereon for pinching said inked ribbon between said drive roller and said spring biased roller.

5. An endless printing ribbon cartridge mechanism comprising in combination:

- a. printing mechanism frame;
- b. rotatable print wheel mounted to said printing mechanism frame for horizontal movement therewith for printing upon paper located against a platen;
- c. cartridge holding mechanism attached to said printing mechanism frame adjacent said rotatable printing wheel and mounted for horizontal movement with said rotatable printing wheel;
- d. endless inked ribbon cartridge removably attachable to said cartridge holding mechanism on one side of said print wheel, said cartridge having elongated arms extending therefrom to guide an endless inked ribbon between said arms on the other side of said print wheel and between said print wheel and said platen, said endless inked ribbon cartridge having a latching ledge thereon between said elongated arms;
- e. ribbon drive means attached to said cartridge holding mechanism and having engaging means for en-

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gaging a cartridge ribbon drive mechanism for driving said ribbon upon actuation of said drive means;

f. latching means attached to said cartridge holding mechanism for removably latching said cartridge to said cartridge holding mechanism, said latching mechanism located between said one side of said print wheel and said cartridge thereby preventing accidental engagement of said cartridge with said print wheel, said latching means having a spring biased pivotable latching surface for engaging said latching ledge on said endless inked ribbon cartridge;

g. alignment guide means attached to said cartridge holding mechanism for positioning said cartridge in

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proper alignment when inserting said cartridge in said cartridge holding mechanism.

6. The apparatus in accordance with claim 5 in which said cartridge holding mechanism aligned with guide means includes protruding studs for engaging openings in said cartridge and cartridge edge guides for centering said cartridge onto a flat surface and onto said studs.

7. The apparatus in accordance with claim 6 in which said ribbon drive means includes a ribbon drive motor for continuously moving said endless ribbon when said motor is actuated.

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