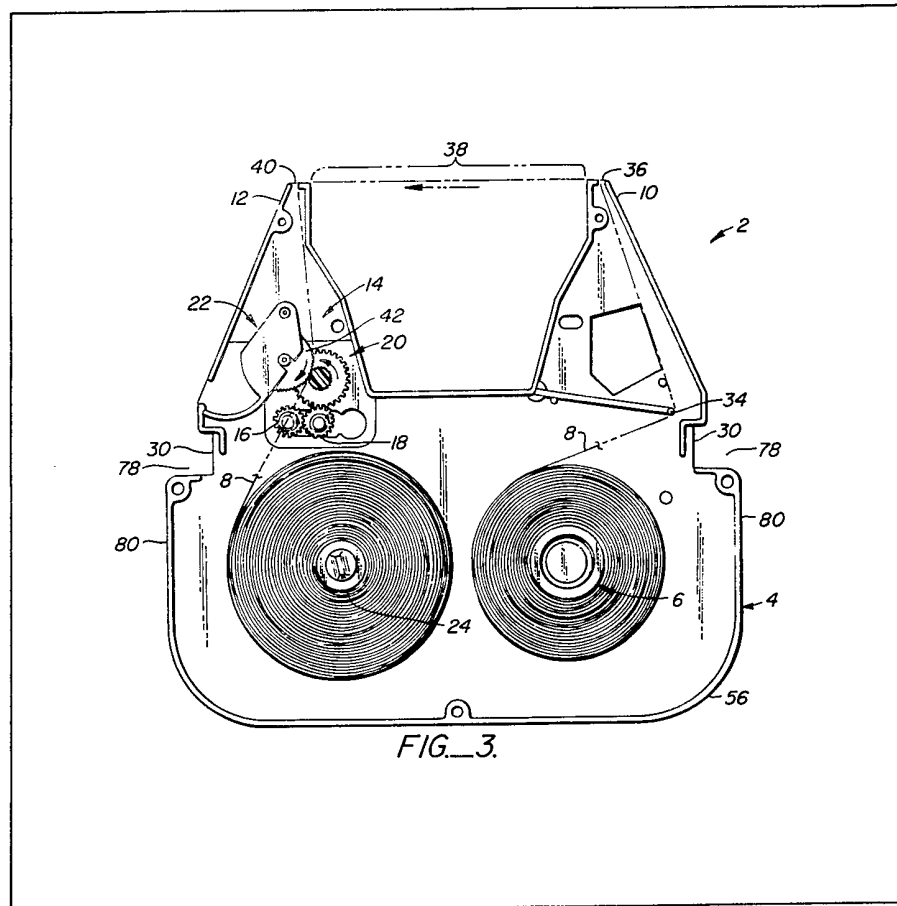


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(54) Universal ribbon cartridge

(57) A cartridge for accommodating a daisy wheel type printer. The cartridge

contains a supply spool 6 wound with a fresh supply of ribbon 8, and a take up spool 24. The cartridge has paired extending arms 10, 12, each including respectively a ribbon exit 36 and a ribbon entry 40. The arms define a path for the ribbon to pass therealong. Two drive gears 16, 18 are serially engaged with each other and the ribbon drive means 20. When the first drive gear 16 is driven by the drive shaft of the printer, the second acts as an idler gear so that the direction of ribbon take-up is the same as the direction of rotation of the drive shaft. When the second gear 18 is driven, it drives the ribbon drive means directly with it so that the rotational direction of ribbon take-up is opposite that of the drive shaft. The drive gears are located and their lower portions are configured to engage the respective drive shafts of various printers.



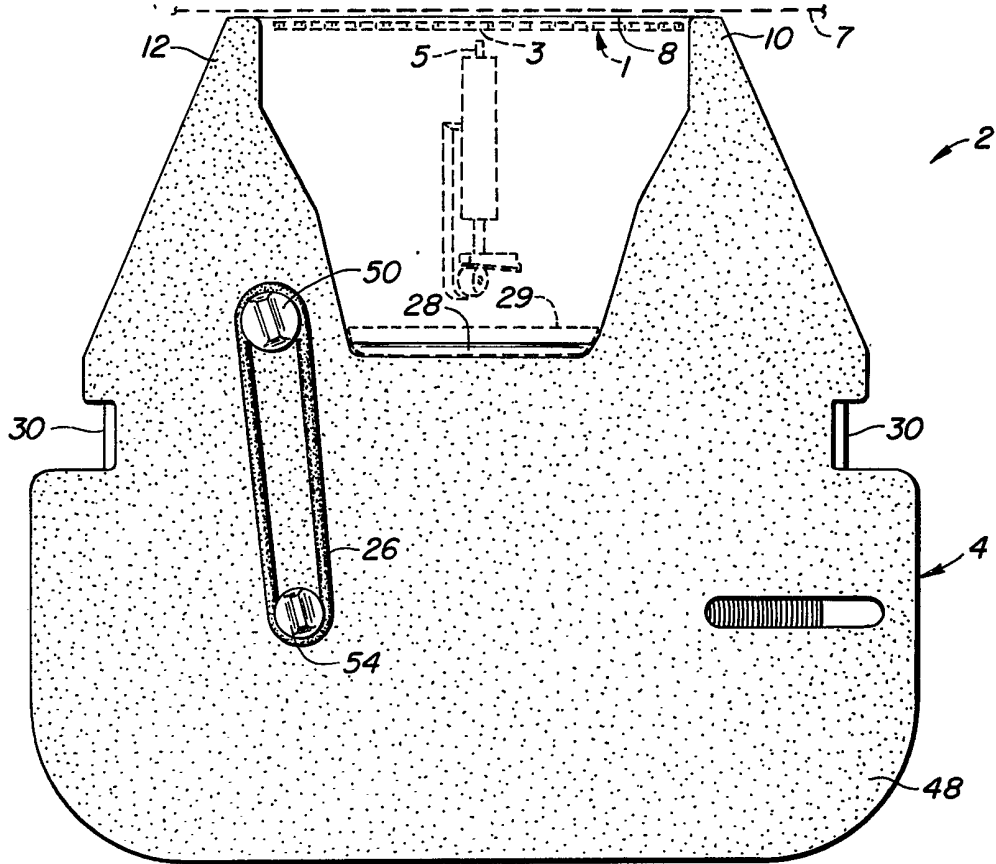


FIG. 1.

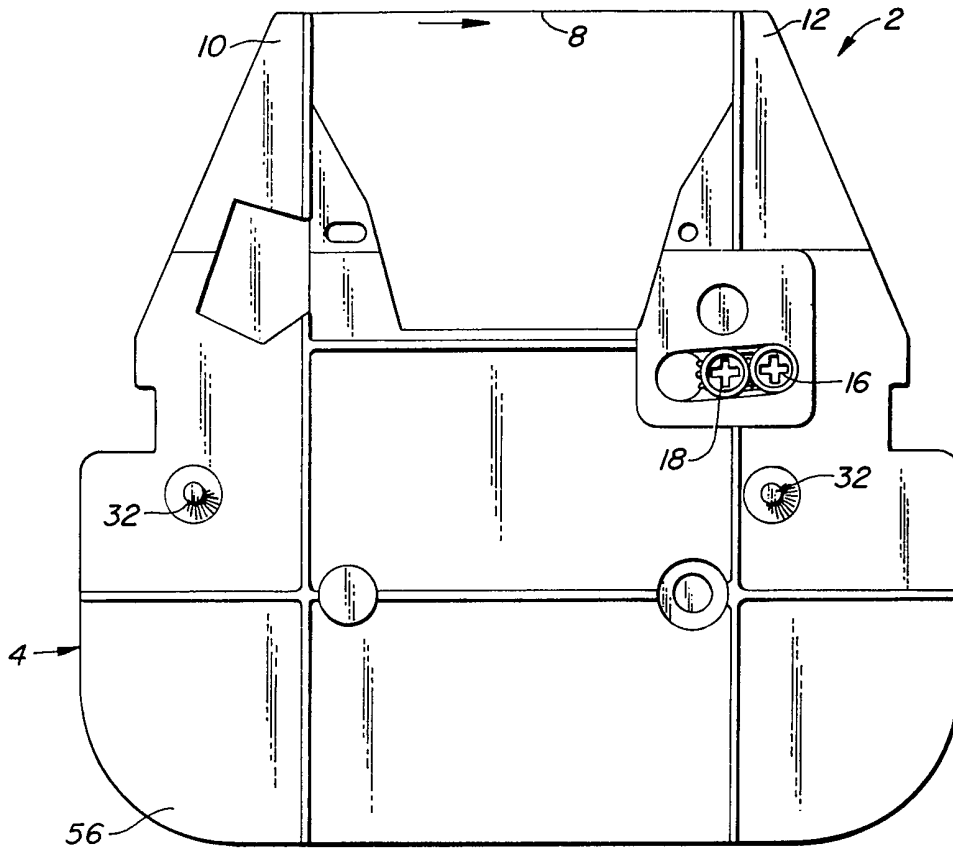


FIG. 2.

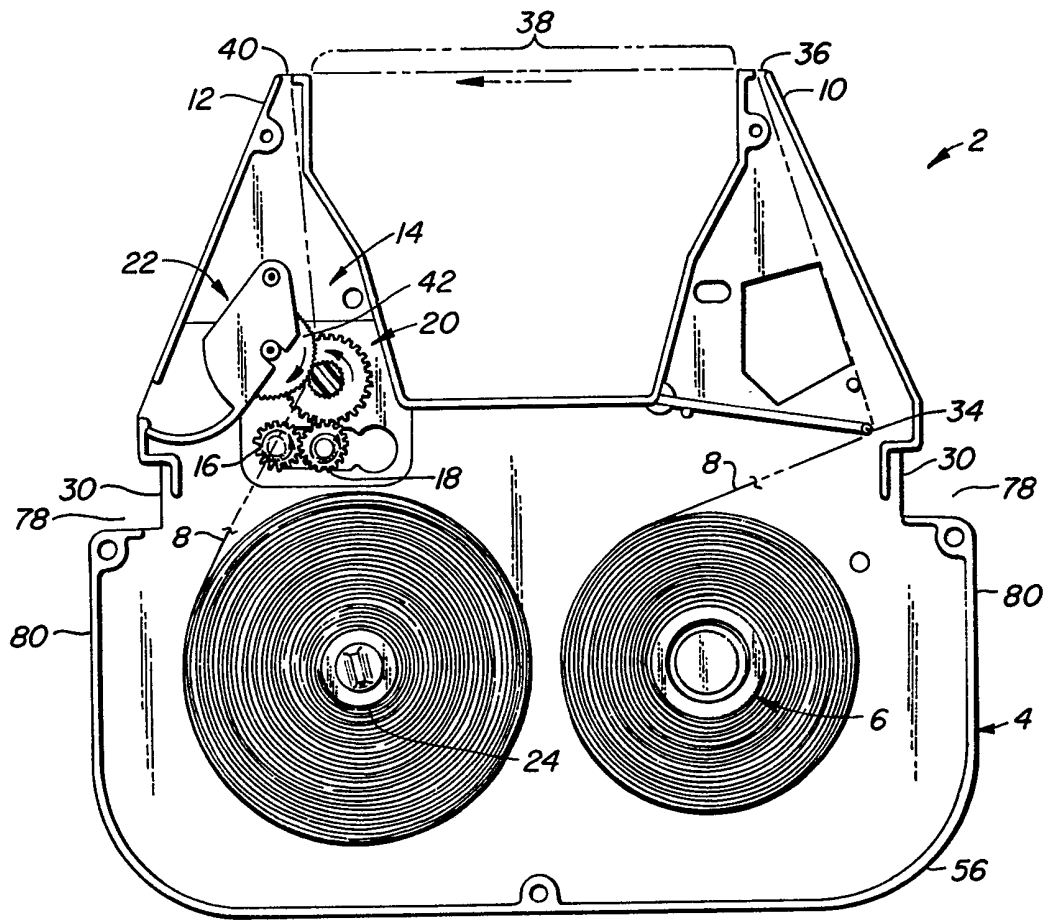


FIG. 3.

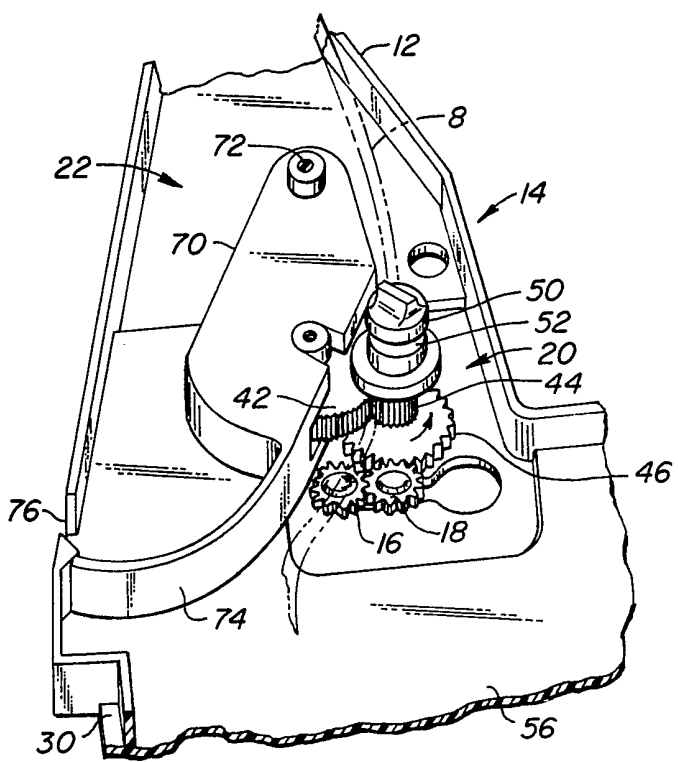


FIG. 4.

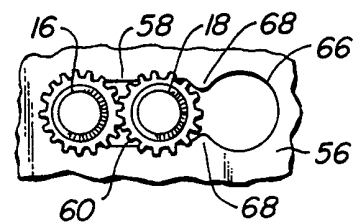


FIG. 5.

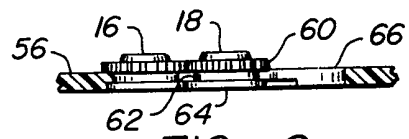


FIG. 6.

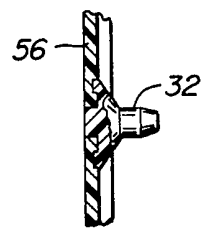


FIG. 7.

SPECIFICATION

Universal ribbon cartridge

5 The present invention relates to a printer cartridge which can be adapted to differing machines in which the printer cartridge is held at differing locations and is provided with a drive for ribbon take-up at varied locations and rotating in opposite directions.

10 High speed printers of the daisy wheel type are known. In such printers a wheel with a protruding group of petals - typically one for each character - is provided. While operating at speeds well beyond human visual discrimination, the printer sequentially registers a wheel petal with a character to be printed thereon over a position on a piece of paper. Once registered, a hammer strikes the petal. Upon striking, the petal moves forward into the ribbon, leaving an indicia of the desired letter on the paper to be printed.

20 These daisy wheel type printers commonly employ ribbon cartridges in their design. Such a ribbon cartridge has a supply spool with a supply of fresh ribbon on it. It also has a take-up spool for winding the used ribbon around. The cartridge has two arms. The ends of the arms define a path along which the ribbon passes as it is wound onto the take-up spool. A drive shaft from the printer engages the bottom portion of a drive gear. The drive gear has a complementarily-shaped recess for engagement with the driving head of the drive shaft. The drive gear rotates a typically serrated drive wheel. The ribbon passes between the drive wheel and a biased idler wheel and is thereby advanced along the path between the daisy wheel printer and the paper. The take-up spool is typically rotated by an external drive band, such band being driven by an extension of the drive wheel.

40 Such printers, while having common printing mechanisms, have surprisingly varied mechanisms for holding the cartridge in place and driving the ribbon. For example, in one common type of cartridge, the cartridge is grasped at the sides with pegs registered to apertures in the printer. Exemplary of such a cartridge are those cartridges which fit the printer known as the Diablo II, a product of the Diablo Systems Division of the Xerox Corporation.

45 Another type of printer includes a mechanism whereby a second type of cartridge is grasped between the extended tape exit and tape entrance arms.

50 In both of the above type cartridges, drive is provided by driving shafts having driving heads which protrude into the cartridge at differing locations. Moreover, the driving shaft turns in a first direction in one printer and a second direction in the other printer.

60 It will be remembered that the cartridges are of the replaceable variety. They are typically consumed at the rate of one cartridge per working shift. This being the case, the cartridges are consumed on a volume basis.

65 Even though the printers and printer applications are highly similar, supplies of such ribbons must provide different cartridges for different machines.

Inventory problems can result because of the number of types of cartridges which must be supplied. Moreover, confusion as to the required supply of each type may also arise.

70 Accordingly, the present invention provides a cartridge of the type which contains two spools. One spool (the supply spool) has wound about it a fresh supply of typing or printing ribbon. The other spool (the take-up spool) is used to wrap the used ribbon on. The cartridge has paired extending arms, including a ribbon exit on one arm and a ribbon entry on the other arm. These exits define a path for the ribbon to pass therealong. Along such path the ribbon stands between the paper and the printer mechanism, which is typically of the daisy wheel type. The two drive gears are serially engaged with each other and the ribbon drive means. When the first drive wheel is driven by the printer, the second acts as an idler gear so that the ribbon drive means rotates in the same direction as the drive shaft of the printer. When the second gear is driven, the ribbon drive means is driven directly so that the drive means rotates in the opposite direction to the drive shaft of the printer. The drive gears are located and their lower portions are configured to engage the respective drive shafts of various printers. The cartridge can accommodate drive shafts which rotate in opposite directions because of their serial engagement. Ribbon take-up can thus occur between varied drives having drive locations of varying spatial location as well as direction of rotation. Provision is made to gather the ribbon between an engaged ribbon drive wheel and an idler wheel to the take-up spool. Improved bias of the idler wheel against the drive wheel for ribbon engagement, resulting in improved assembly of the cartridge, is provided.

75 Thus the cartridge can be driven from more than one drive gear location by gears rotating in opposite directions and a tape drive wheel is mounted to a biased idler wheel with the tape passing therebetween, preferably near the tape entrance arm of the cartridge. The drive wheel is driven by first and second gears which first and second gears are in series. These respective first and second gears, because of their series alignment, rotate with the first gear rotating in one direction and the second gear rotating in the opposite direction. Rotation of the drive wheel in the same direction as the first drive wheel results. By placing the gears to overlay the respective drive shafts of differing printers, and by configuring the lower portion of the drive gears for rotational engagement with the corresponding drive shafts, one cartridge can accommodate several drives from several printers.

80 An advantage of this aspect of the invention is that a single cartridge can now be adapted for the first time to two different printers.

85 A further advantage is that even though the drive shafts of printers rotate in different directions, their respective opposite direction drives can be used to obtain ribbon passage in the same direction.

90 A further aspect of this invention is that a periphery of the tape cartridge can be adapted for mounting on various types of printers.

Improved biasing of the idler wheel against the drive wheel is also disclosed. According to this aspect of the invention, the idler wheel is mounted on an idler wheel carrying arm, which arm is
 5 pivotally mounted on a post. A generally flat spring extends outwardly from the carrying arm in registry to an aperture in the exterior of the cartridge. The unit is typically assembled with the flat spring protruding inwardly and through the aperture in the
 10 side. When the unit is assembled, an object such as a screwdriver pushes the protruding end of the spring back through the aperture and to a flexed position in the interior of the cartridge. Forces which bias the idler wheel to the drive wheel thus exist only after
 15 the cartridge is fully assembled.

The lack of biasing forces on the components before assembly reduces the tendency of support components, such as the spindle on which the drive wheel is supported, to be pushed out of their normal
 20 vertical alignment. This greatly facilitates assembly.

The present invention is further illustrated in the accompanying drawings, wherein:

Figure 1 is a top or plan view of the cartridge of the present invention with a daisy wheel printer schematically shown;
 25

Figure 2 is a bottom view of the cartridge of the present invention;

Figure 3 is a top view of the cartridge of the present invention with the top half of the body removed;
 30

Figure 4 is a detailed view of the ribbon gathering means and the first and second drive gears;

Figure 5 is a view of the first and second driving gears mounted within an elongate hole in the bottom half of the body as seen from the inside of
 35 the cartridge;

Figure 6 is a cross-sectional view of the first and second driving gears shown in Figure 5; and

Figure 7 is a cross-sectional view of a removable
 40 peg.

A typical daisy wheel printer, of the type with which the invention is generally used, will be described first to enable the reader to better understand the invention. Turning to Figure 1, universal
 45 ribbon cartridge 2 is shown together with a daisy wheel 1, a petal 3, a hammer 5, and paper 7. Daisy wheel 1, a thin, radially segmented disk-shaped element, carries the characters to be printed on the outermost ends of petals 3 of daisy wheel 1. When a
 50 character impression is to be imparted to the paper, daisy wheel 1 is rotatably indexed at a high rate of speed. Hammer 5 is then activated and strikes the proper petal 3 of daisy wheel 1. The struck petal 3 is driven forward against ribbon 8 to leave its particular
 55 impression of paper 7. The entire printing mechanism including cartridge 2 (and ribbon 8 therewith), wheel 1 and hammer 5 are then indexed for the next impression. Additionally, ribbon 8 is indexed to provide fresh ribbon 8 for the next impression.

As can be seen from Figures 1 to 3 the universal ribbon cartridge 2 has a body 4, supply spool 6 on which a ribbon 8 is wound, a ribbon exit arm 10, a ribbon entry arm 12, and a ribbon take-up means 14. Take-up means 14 includes first and second drive
 60 gears 16, 18 a ribbon drive means 20, an idler wheel

assembly 22, a take-up spool 24 and an external drive band 26. A gripping surface 28, mounting means 30, and movable pegs 32 allow the cartridge to be mounted to different printers. Figure 1 shows
 70 the gripping means 29 of the printer engaging surface 28 thereby securing cartridge 2 to the printer.

Turning to Figure 3, supply spool 6 is mounted to body 4. Typically a piece of foam, not shown, is placed between supply spool 6 and body 4 to
 75 provide a drag on spool 6 so a proper tension is maintained on ribbon 8. Ribbon 8 wends its way past a first point 34 and then through an exit opening 36 at the end of exit arm 10. Ribbon 10 passes along a path 38 defined between exit and entry arms 10, 12 and re-enters body 4 through an entrance opening
 80 40 formed at the end of entrance arm 12.

As shown best at Figure 4 in conjunction with Figures 1 and 3, ribbon 8 is driven along its path by passing between the serrated surfaces of idler wheel
 85 42 and ribbon drive wheel 44. Wheel 44 is mounted on a common shaft with a ribbon drive gear 46. Ribbon drive wheel 44 and ribbon drive gear 46 comprise ribbon drive means 20. Gear 46 rotatably engages and is driven by second drive gear 18.

Also mounted on a common shaft with ribbon drive gear 46 and extending outwardly past a top half 48 of body 4 is an extension 50 defining a circular groove 52 into which drive band 26 is seated. Band 26 also seats within a like extension 54
 90 extending from take-up spool 24. Rotation of drive wheel 44 thus results in the rotation of spool 24. As the amount of ribbon 8 on spool 24 increases, band 26 slips so that the travel of ribbon 8 along path 38 is determined by the rotational speed of serrated
 100 wheel 44 and not by the rotational speed of take-up spool 24.

As seen best at Figures 2, 4 and 5, first and second drive gears 16, 18 are mounted to a bottom half 56 of body 4 with second gear 18 serially engaging both
 105 first gear 16 and drive gear 46. Gears 16, 18 are located to overlay respective ribbon drive shafts from differing types of printers. Gears 16, 18 have complementarily-shaped recesses for positive rotational engagement with their respective ribbon drive shafts, as seen at Figure 2. In the preferred embodiment gears 16 and 18 are of the same size; however, depending upon the particular requirements of the printer used, gears 16, 18 may be of differing sizes. Also, in the preferred embodiment the serial alignment of gears 16, 18 allows the universal ribbon
 110 cartridge 2 to be used on printers with printer drives which rotate in opposite directions. This advantage exists because when first drive gear 16 is driven by the driving head of the the printer drive shaft, second drive gear 18 acts as a direction reverser so that ribbon drive gear 46 turns in the same direction as the printer drive shaft. When the driving head of the printer drive shaft engages and drives the second drive gear 18, ribbon drive gear 46 turns in the
 115 opposite direction as the printer drive shaft.

Turning now to Figures 5 and 6, drive gears 16, 18 are mounted to bottom half 56 in a convenient manner. An elongate hole 58 having semi-circular ends is formed in bottom half. Gears 16, 18 are relatively thin, cylindrical elements having teeth
 120 60

around the circumference of one end, a groove 62 defined medially within the circumference of gears 16, 18, and a retaining shoulder 64 defining the circumference of the other end. The entry end 66 of hole 58 is slightly larger than the remaining portion thereby allowing shoulder 64 to be passed therethrough but not so large to allow teeth 60 to pass therethrough. Gear 16 is then slid along hole 58 past detents 68. Gear 18 is likewise positioned in hole 58 and engages gear 16. Some slight pressure is necessary to get gears 16, 18 past detents 68. Gears 16, 18 are retained in position by the engagement of the sides of holes 58 with groove 62 and by detents 68.

15 Idler wheel assembly 22, as shown at Figure 4, includes an idler wheel carrying arm 70 pivotally connected to body 4 at a pivot point 72 at one end thereof. Idler wheel 42 is rotatably connected to arm 70 at a central portion of arm 70. At the end opposite pivot point 72, arm 70 includes a flat spring 74 extending outwardly therefrom. Spring 74 is configured to rest against an inside surface of body 4 at a point near an aperture 76 thereby biasing idler wheel 42 against ribbon drive wheel 44. During assembly spring 74 extends through aperture 76 so that no force is exerted by idler wheel 42 on ribbon drive wheel 44. After assembly with top and bottom halves 48, 56 of body 4 secured, spring 74 is urged inwardly through aperture 76, thus biasing idler wheel 42 against ribbon drive wheel 44. Using this method, lateral forces on pivot point 72 and ribbon drive wheel and gear 44, 46 are greatly reduced thus promoting alignment of components and easing assembly considerably.

35 The preferred embodiment of universal ribbon cartridge 2 is adapted for mounting to at least two types of classes of printers. A first type engages cartridge 2 at gripping surface 28, shown at Figure 1, which surface is defined along the edge of top half 48 of body 4 between arms 10, 12. A second type grips bottom half 56 at gripping means 30, shown at Figure 3. Means 30 is a narrow planar extension located within a notch 78 medially along both sides 80. Cartridge 2 also has movable pegs 32, as seen at Figures 2 and 7, positioned within bottom half 56 for registry with corresponding apertures in the second type printer. Other means, such as pivotable pegs, not shown, could also be used in lieu of removable pegs.

50 In the preferred embodiment all elements, except drive band 26 and ribbon 8, are made of plastic, however, other suitable materials can be used. Spring 74 could, for example, be made of phosphor bronze as well as nylon.

55 CLAIMS

1. A ribbon cartridge capable of being used on more than one type of printer, the printer including a drive shaft with a driving head at one end thereof, the driving heads of the different types of printers being located in different positions and rotating in different directions, the ribbon cartridge comprising a body, a supply spool having a supply of ribbon mounted within the body, the body having a ribbon

exit arm and a ribbon entrance arm, the arms defining a path therebetween for passage of ribbon from the supply spool, out through the exit arm, along the path, and in through the entrance arm, means for gathering ribbon mounted on the body and having a ribbon drive means, a first drive gear mounted on the body in a first location, a second drive gear mounted on the body in a second location and situated for rotatable engagement with the first drive gear, the first and second drive gears configured and located for driven engagement with the driving head of a printer and a take-up spool mounted on the body and rotatably coupled to the gathering means so that the gathered ribbon is collected on the take-up spool.

2. A ribbon cartridge capable of being used in at least two types of printers, the printers having a drive shaft with a driving head formed at the outer end thereof for driving engagement with a drive gear of a cartridge, one type of printer having a drive shaft in a first location and the other type of printer having a drive shaft in a second location; the ribbon cartridge includes a body having a ribbon exit arm and a ribbon entry arm, the arms defining a path for the passage of ribbon therebetween, the ribbon in the cartridge passing from a supply spool, housed within the body, out through the exit arm, past the printing mechanism, in through the entry arm, a first drive gear mounted on the body at a first location, a second drive gear mounted on the body at a second location and situated for rotatable engagement with the first drive gear, the first and second drive gears defining recesses within the outer surfaces thereof adapted for driven engagement with a driving head of a printer, means for gathering the ribbon which is in rotatable engagement with the second drive gear whereby the engagement of the printer with either or both of the drive gears imparts driving motion for the gathering means thereby effecting advancement of the ribbon and a take-up spool mounted on the body and rotatably coupled to the gathering means so that the advanced ribbon is collected on the take-up spool.

3. A ribbon cartridge as claimed in Claim 1 or 2, wherein a driving head of the printer is arranged to engage the first drive gear to effect ribbon gathering.

4. A ribbon cartridge as claimed in Claim 1 or 2, wherein the second drive gear is engaged by a driving head of a printer thereby effecting ribbon gathering.

5. A ribbon cartridge as claimed in any of claims 1 to 4, wherein the ribbon gathering means further comprises a ribbon drive means driven by the second drive gear and an idler wheel assembly comprising an idler wheel mounted on an idler wheel carrying arm, the carrying arm pivotally mounted on the body at one end of the arm and having a spring at the other end of the arm which biases the carrying arm and idler wheel therewith inwardly for rotational engagement of the idler wheel with the ribbon drive means, whereby the ribbon's passing between the engaged idler wheel and ribbon drive means is advanced.

6. A ribbon cartridge as claimed in Claim 5, wherein the body has an aperture formed therein so

that the free end of the spring may extend there-
through in an unstressed condition and the spring
may be urged inwardly to a stressed condition
thereby biasing the carrying arm and idler wheel
5 therewith inwardly for the rotational engagement of
the idler wheel with the ribbon drive means.

7. A ribbon cartridge as claimed in any of claims
1 to 6, wherein the body has a gripping surface
located between the exit and entrance arms so that
10 the cartridge can be gripped by a printer.

8. A device as claimed in any of claims 1 to 7,
wherein the body has a mounting means located
along a side of the body and a movable locating peg
protruding from the bottom of the body, the mount-
15 ing means and the movable locating peg positioned
and arranged for proper engagement with a printer.

9. A ribbon cartridge for use on more than one
type of printer, the printer including a drive shaft
with a driving head at the end thereof, the driving
20 heads of the printers located in different positions
and rotating in different directions, the ribbon car-
tridge comprising a body, a supply spool having a
supply of ribbon mounted within the body, the body
having a ribbon exit arm and a ribbon entrance arm,
25 the arms defining a path therebetween for passage
of ribbon from the supply spool, out through the exit
arm, along the path, and in through the entrance
arm, means for gathering ribbon mounted on the
body and having a ribbon drive means, a first drive
30 gear mounted on the body in a first location, a
second drive gear mounted on the body in a second
location, the second gear rotatably engaged with
both the first drive gear and with the ribbon drive
means so that the first gear and the ribbon drive
35 means rotate in a first direction while the second
gear rotates in a second direction, the first and
second drive gears configured and located for driven
engagement with the driving head of a printer
whereby the cartridge is adaptable for use with
40 printers having different driving head locations and
different directions of driving rotation and a take-up
spool mounted on the body and rotatably coupled to
the gathering means so that the gathered ribbon is
collected on the take-up spool.

45 10. A ribbon cartridge as claimed in Claim 9,
wherein the printer is arranged to drive the first drive
gear.

11. A ribbon cartridge as claimed in Claim 9 or
10, wherein the ribbon gathering means further
50 comprises means for rotatably engaging the ribbon
drive means and means for biasing the rotatable
engaging means against the ribbon drive means so
that the ribbon which passes therebetween is posi-
tively advanced from the supply spool to the take-up
55 spool by the action of the printer rotating the drive
gear.

12. A ribbon cartridge comprising a body, a
supply spool, an exit arm, an entry arm, means for
gathering the ribbon including a ribbon drive wheel,
60 a take-up spool and idler wheel rotatably mounted
on an idler wheel carrying arm having a pivot point
at one end thereof for pivotal attachment to the body
of the ribbon cartridge and a spring extending from
the other end thereof, the idler wheel having a first
65 position where the free end of the spring extends

outwardly through an aperture in the body so that
the spring is not stressed and therefore the idler
wheel is spaced apart from the drive wheel and the
idler wheel having a second position where the free
70 end of the spring is enclosed within the interior of
the body after being urged inwardly through the
aperture so that the spring is in a stressed condition
thereby biasing the idler wheel against the drive
wheel.

75 13. A ribbon cartridge as claimed in Claim 12,
wherein the spring is made of nylon.

14. A method for mounting a biased idler wheel
within a ribbon cartridge having a top and a bottom
comprising positioning the pivot element of an idler
80 wheel carrying arm, such arm having the idler wheel
secured thereto, onto the bottom of the cartridge so
that a spring element extending from the carrying
arm extends through an aperture in the side of the
cartridge, aligning the top of the cartridge with the
85 bottom of the cartridge, securing the top of the
cartridge to the bottom of the cartridge and urging
the spring back into the cartridge so that the spring is
flexed thereby biasing the idler wheel against a
ribbon drive wheel.

90 15. A ribbon cartridge substantially as herein
described with reference to the accompanying draw-
ings.