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(70) Proprietor: International Business Machines
Corporation
Old Orchard Road
Armonk, N.Y. 10504 (US)

(72) Inventor: Applegate, Steven Lewis
3426 Winthrop Road
Lexington Kentucky 40503 (US)
Inventor: Molloy, James John
1412 Pipestone Court
Lexington Kentucky 40502 (US)

(74) Representative: Siccardi, Louis
Compagnie IBM France Département de
Propriété Intellectuelle
F-06610 La Gaude (FR)

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Description

Background of the Invention Technical Field of the Invention

The present invention relates to a ribbon cartridge for a printer and to an arrangement for loading said cartridge on the printer.

Art Discussion

Ribbon cartridges greatly facilitate the mounting of a ribbon on a printer by eliminating all or most of the unpleasant tasks of threading the ribbon along the ribbon path. This advantage is quickly compromised, however, if ribbon pulls loose from the cartridge during handling to produce a frustrating tangle. For printers that cause electrodes to sweep across the ribbon during printing, there is, additionally, raised the possibility of damaging the printhead if a crimp or twist is inadvertently formed in the ribbon as a result of handling.

To avoid problems that might arise if a ribbon threading loop is accidentally pulled, it is desirable to prevent ribbon release during handling while nonetheless allowing normal movement during printing. Such restraining of the ribbon is desirably achieved with little cost added to the cartridge and should be easily disabled upon mounting of the cartridge.

Brief Summary of the Invention

In a ribbon cartridge with first and second coaxial ribbon reels, flexible blades formed in the floor of the cartridge urge the reels together and against a top cover to constrain the reels from moving. Preferably, a reel surface adjacent the cover includes shaped projections that mate with corresponding projections of an inner cover surface to restrain rotational reel movement. By so constraining the reels, shifting of the reels within the reel container of the cartridge is prevented and there is reduced likelihood of breakage if the cartridge is dropped or otherwise abused.

During mounting to a support frame, hook-like arms of a rotatable loading member enter apertures in the base of the cartridge and engage the resilient blades with camming edges which, upon rotation of the loading member to a clamping position, drive the projecting portions of the blades toward the cartridge floor, thereby releasing the reels to drop to their normal operative positions where they rotate freely. By so controlling the resilient blades, the arms serve not only to release the reels but also hold the cartridge firmly against the support frame.

For a preferred implementation of the invention, the loading member is also connected through linkages so that, when rotated to the load position, tension control and ribbon drive instrumentalities that nip the ribbon during printer operation are drawn to locations where they do not interfere with the ribbon threading path defined by guide arms of the cartridge. Upon rotation of the loading member to the operating position, the tension and drive instrumentalities

are freed to redefine the ribbon path for normal printing operation.

Brief Description of the Drawing

The invention will be described in detail with reference to the drawings wherein:

Fig. 1 is a perspective view of a cartridge according to the invention, mounted on a support;

Fig. 2 is a cross-sectional view taken as indicated by the line 2—2 in Fig. 1;

Fig. 3 is a cutaway perspective view emphasizing instrumentalities cooperating with resilient blades according to the invention;

Fig. 4 is a cutaway perspective view emphasizing the mating cover and reel surfaces according to the invention;

Fig. 5 is a partial plan view indicating the position of loading arms in apertures defined in the floor of a cartridge according to an aspect of the invention; and

Fig. 6 is a simplified view taken from under the support for the cartridge and serves to emphasize linkages to the load lever that serve to drive ribbon nipping devices to withdrawn positions to facilitate ribbon insertion.

Detailed Description of the Invention

Referring to Figs. 1 and 2, a ribbon cartridge generally denoted 10 includes a container 12 that is preferably molded of high impact strength polystyrene. The container 12 has a base section 14 that includes a generally planar floor 16 and a sidewall 18. A ribbon chamber 20 is defined by the base section 14 in conjunction with a cover 22 that is received on the sidewall 18.

To permit access to the ribbon chamber 20, the cover 22 may be hinge mounted by hinge members 24 and 26, so as to be fastenable to the sidewall 18 using cooperating latch members 28 and 30. Alternatively, the cover 22 may be bonded or fixed by other permanent means to be integral with the sidewall 18 to provide a substantially sealed container 12.

A drive aperture 32 is defined in the floor 16 by a cylindrical bearing projection 34 having a collar 36 adjacent the floor 16. Arranged to slip over and rotate on the cylindrical bearing projection 34 is a core 38 of a first reel 40 for a ribbon 42 (preferably a supply reel). Also arranged in the chamber 20 is a second reel 44 (preferably a take-up reel) that includes flange 46 and a core 48 that is coaxial with and is rotatable on the core 38. Extending axially from the center of the core 48 is a cylindrical knob 50 that projects through the cover 22 at an aperture defined by the edge 52 to permit operator access for manually rotating the second reel 44.

Projecting guide structures 60, 61, 62 and 63 (see Fig. 1) are molded into the container 12 in rigid channel-like shapes and serve to guide the ribbon 42 along a threading path extending from reel 40 to reel 44. Supported on the arms 60—63 are plural rounded guide surfaces 66 that contact the ribbon to define the threading path which

includes apertures 64 in the sidewall 18 that allow a loop of the ribbon 42 to extend externally of the ribbon chamber 20. The arms 60—63 define three ribbon access windows 68, 70 and 72 along the ribbon threading path at which the ribbon 42 is exposed on all sides, for example, to interact with printer instrumentalities such as a tension brake 74 (with cooperating shock roller 73 and pressure roller 75), a printhead 76, and a pair of drive rollers 78 (these elements are not shown in Fig. 2) which are mounted to a support frame 80.

According to the invention, one or more resilient blades 82 are arranged on the floor 16 of the container 12 (see also Fig. 3) to enter the ribbon chamber 20 with an inclination toward the bearing projection 34 so as to urge against the core 38 of the first reel 40. A pad 84 on each blade 82 is located to establish engagement with the core 38 at the outer periphery. Preferably, a pair of resilient blades 82 are provided to balance forces about the axis of the core 38 and, to achieve low cost, the resilient blades 82 are molded as a part of the base section 14.

At the surface of core 48 adjacent the cover 22, a circular ridge 86 coaxial with the core 48 is provided with a series of irregularities such as projections 100 (see Fig. 4) that are shaped to mate with corresponding projections 102 formed on the inner surface of the cover 22.

The projections 100 and 102 are preferably asymmetrical angled teeth that, when mating, offer moderate resistance to rotation of the core 48 for a rotation direction to wind the ribbon 42 onto the reel 44 (counterclockwise as viewed in Fig. 1). For the direction corresponding to unwinding of the ribbon 42 from reel 44, the projections 100 and 102 interfere, for the preferred implementation, preventing rotation.

Now considering mounting of the cartridge 10 on the support 80, two tabs 200 are positioned to cooperate in two sets of guide ridges 202 to promote a proper orientation. A ribbed drive key 204 (see Fig. 2) is positioned relative to tabs 200 for entering the drive aperture 32 and extends into a mating recess (not shown) of the core 48 to establish a drive connection. The ribbed drive key 204 is mounted to a shaft 206 that is supported in a bearing 208.

For mounting, the bearing 208 is preferably formed (e.g. using an acetal plastic) to be integral with a flange 210 that is constrained in tabs 212 of the support frame 80. Rotational motion is provided by a drive system (not shown) through a cable 214 that wraps around a pulley 216 which is connected to rotate with the shaft 206. The flange 210 has a recess 218 that encircles the bearing 208 and receives a washer-like pivot section 220 (see also Fig. 6) of a loading member 222 that includes a handle 224 and preferably two projecting arms 226 (one for each resilient blade 82).

For a "load" position of the loading member 222, the arms 226 are positioned (see also Fig. 5) to enter a pair of corresponding apertures 228 formed in the floor 16 of the base section 14 adjacent the collar 36. Referring again to Fig. 3,

interaction results when the arms 226 are rotated from the "load" position (phantom) to a "clamp" position to cause a camming edge 230 to drive the resilient blades 82 toward the floor 16. With the resilient blades 82 depressed, the reels 40 and 44 are free to move toward the floor 16 reducing the friction therebetween and disengaging the projections 100 and 102 to allow free rotation relative to the cover 22. To further reduce friction between the two spools, reel 44 comes to rest atop bearing projection 34 while reel 40 rests against collar 36, the spacing being such that the spools are separated from one another. Also, shoulder projections 19 are formed in the chamber 20 to prevent the ribbon 42 from slipping over the edge of the flange 46.

According to a special aspect of the invention, a compact cartridge 10 is achieved by arranging the arms 226 to enter a channel 236 formed in the core 38. It will be appreciated that upon returning the arms 226 from the clamp position to the load position, the resilient blades 82 are released to urge the reels 40 and 44 toward the cover 22 for restraining movement.

For a further aspect of the invention that is best understood with reference to Fig. 6, the loading member 224 is provided with a cam projection 400 and a bent tab 402 for coupling motion to linking members 404 and 406 to be used in opening nip points that occur along the path for the ribbon 42. Rotation of the loading member 224 causes the link member 404 to rotate counterclockwise (as viewed) about the pivot pin 403 to couple motion through a fork section 405 to the pin 408 mounted to a linking member 410, thereby causing rotation about a pivot pin 412. Such rotation about pivot pin 412 results in contact with a pin 414 to drive a pivot arm 416, supported at pivot pin 418, counterclockwise (as viewed) against the biasing force of a spring 420. (Note the flange 210 has been cut away to better illustrate the loading member 224).

The pivot pins 403, 412 and 418 are mounted to the support frame 80 (shown cutaway). Attached to pivot member 416 to extend above support frame 80 is one of the drive rollers 78 (see Fig. 1) and the motion transitted from the cam projection 400 causes the drive rollers 78 to separate, thereby facilitating ribbon threading as the cartridge 10 is loaded.

The linking member 406 is moved by the bent tab 402 along a path defined in part by a pin 420 that is mounted to the support frame 80 and is arranged in a guide slot 422. A finger 424 engages a pivot member 426 that pivots about a pivot pin 428 and provides force opposite the bias of a spring 430 to cause counter-clockwise rotation (as viewed). This motion is transmitted to a pivot member 434 through a set of bent tabs 432 to cause rotation about a pin 435 against the bias of a spring 436. Motion transmitted by the linking member 406, when the loading member 222 is transferred to the load position, separates the brake member 74 and the pressure roller 75. Such separation facilitates threading of the ribbon 42

during loading and shifts the shock roller 73 to come within the opening 68 (see Fig. 1).

The invention has been described in detail with reference to a presently preferred implementation thereof. It will be appreciated, however, that variations and modifications within the scope of the claimed invention will be suggested to those skilled in the art.

For example, the invention could be adapted to various kinds of printers and both moveable printhead carrier printers or moveable platen printers may use the invention.

Also, the ribbon could be an ink ribbon or a lift-off tape.

Claims

1. A printer ribbon cartridge (10) of the type comprising:

first and second ribbon reels (40, 44) arranged to have a common rotational axis;

a container (12) for said reels (40, 44) having a cover section (22) and a base section (14) including a generally flat floor (16) that is opposite said section (22), and a sidewall (18) extending to receive said cover section (22), said first reel (40) being arranged toward said floor (16) and said second reel (44) being arranged toward said cover section (22);

said cartridge being characterized in that it further includes:

resilient means (82), projecting from said floor section (16), for engaging said first reel (40) and for urging said first reel (40) toward said second reel (44) and said cover section (22), to constrain the reels from moving and

at least one access aperture (228) in said base section (14) to permit interaction with said resilient means (82), from outside said container (12), for relaxing said resilient means (82) whereby said reels (40, 44) may be released for rotation.

2. A cartridge according to Claim 1 wherein said first reel (40) is a supply reel for a ribbon (42) and said second reel (44) is a take-up reel and a ribbon path is defined to extend from said supply reel (40) through a first aperture (64) in said sidewall (18) then externally of said container (12) and back through a second aperture (64) to said take-up reel (44).

3. A cartridge according to Claim 1 or 2 wherein said resilient means (82) comprises at least one resilient blade extending from said floor (16) into said container (12) and toward the axis of said reels (40, 44) to engage said first reel (40) at a core section (38) thereof.

4. A cartridge according to Claim 3 wherein there are two resilient blades (82) arranged on opposite sides of said reel axis.

5. A cartridge according to any one of Claims 1 to 4 wherein said second reel (44) has a side toward said cover section (22) of said container (12) that includes projecting means (86) for engaging said cover section (22) of said container (12) to resist relative motion.

6. A cartridge according to Claim 5 wherein said

projecting means (86) is a circular ridge with asymmetrical triangular projections (100) and said cover section (22) includes corresponding projections (102) whereby relative rotational motion in one direction is resisted more strongly than for the other direction when said projections (100, 102) are urged into contact.

7. A loading arrangement for the ribbon cartridge (10) of any one of claims 1 to 6, with a member (80) support for receiving said cartridge (10) and a drive shaft (206) projecting from said support member (80), characterized in that it includes a loading member (222) mounted to said support (80) and including cam means (226, 230) arranged for entering said access aperture (228) and being moveable for pressing against said resilient means (82) to release said first reel (40) from the urging thereof.

8. A loading arrangement according to Claim 7 wherein said loading member (222) is a lever coupled through linkages (400, 404, 402, 406) to move ribbon nipping and guiding members (73, 74, 75) mounted on said support (80) along a ribbon threading path.

Revendications

1. Une cartouche de ruban d'imprimante (10) du type comprenant:

des première et seconde bobines de ruban (40, 44) montées sur un axe de rotation commun,

un boîtier (12) pour lesdites bobines (40, 44) composé d'un couvercle (22) et d'une embase (14) comprenant un fond généralement plat (16) opposé audit couvercle (22) et une paroi latérale (18) recevant ledit couvercle (22), ladite première bobine (40) étant installée contre ledit fond (16) et ladite seconde bobine (44) étant installée contre ledit couvercle (22).

ladite cartouche étant caractérisée en ce qu'elle comprend en outre:

des moyens flexibles (82) partant dudit fond (16) sont en contact avec ladite première bobine (40) et la sollicite vers ladite seconde bobine (44) et ledit couvercle (22) pour interdire de mouvement des bobines et

au moins une ouverture d'accès (228) dans ladite embase (14) permettant l'exercice d'une interaction avec lesdits moyens flexibles (82) depuis l'extérieur dudit boîtier (12) pour relâcher lesdits moyens flexibles (82) et libérer lesdites bobines (40, 44) pour permettre leur rotation.

2. Une cartouche selon la revendication 1 dans laquelle ladite première bobine (40) est une bobine d'alimentation d'un ruban (42) et ladite seconde bobine (44) est une bobine de réception et un chemin est défini pour le ruban de ladite bobine d'alimentation (40) au travers d'une première ouverture (64) dans ladite paroi latérale (18), puis extérieurement audit boîtier (12) et de retour au travers d'une seconde ouverture (64) à ladite bobine de réception (44).

3. Une cartouche selon la revendication 1 ou 2 dans laquelle lesdits moyens flexibles (82) comprennent au moins une lame flexible partant dudit

fond (16) dudit boîtier (12) et orientée vers l'axe desdites bobines (40, 44) pour solliciter ladite première bobine (40) au moyeu (38) de celle-ci.

4. Une cartouche selon la revendication 3 dans laquelle il y a deux lames flexibles (82) disposées sur des côtés opposés dudit axe des bobines.

5. Une cartouche selon l'une quelconque des revendications 1 à 4 dans laquelle ladite seconde bobine (44) présente un côté du côté dudit couvercle (22) dudit boîtier (12) qui comprend des moyens en relief (86) qui engrenent ledit couvercle (22) dudit boîtier (12) pour interdire tout mouvement relatif.

6. Une cartouche selon la revendication 5 dans laquelle lesdits moyens en relief (86) sont continués par une couronne présentant des projections triangulaires asymétriques (100) et ledit couvercle (22) présente des projections correspondantes (102), ce qui fait que le mouvement rotatif relatif dans un sens est plus fortement freiné que dans l'autre sens lorsque lesdites projections (100, 102) sont engrenées.

7. Un agencement de chargement pour la cartouche de ruban (10) de l'une des revendications 1 à 6 avec un élément de support (80) pour recevoir ladite cartouche (10) et un axe d'entraînement (206) dépassant de la surface dudit élément de support (80), caractérisé en ce qu'il comprend:

un élément de chargement (222) monté sur ledit élément de support (80) et comprenant des moyens de guidage (226, 230) disposés pour pénétrer dans ladite ouverture d'accès (228) et étant mobiles pour pouvoir porter contre lesdits moyens flexibles (82) afin de libérer ladite première bobine (40) de toute sollicitation.

8. Un agencement de chargement selon la revendication 7 dans lequel ledit élément de chargement (222) est un levier raccordé par l'intermédiaire d'éléments de liaison (400, 404, 402, 406) pour déplacer les éléments de saisie et de guidage de ruban (73, 74, 75) montés sur ledit support (80) sur un chemin d'engagement du ruban.

Patentansprüche

1. Eine Druckerfarbbandkassette (10) vom Typ, das folgendes umfasst:

eine erste und eine zweite Farbbandspule (40, 44), so angeordnet, dass sie eine gemeinsame Rotationsachse haben;

einen Behälter (12) für die genannten Spulen (40, 44), der eine Abdeckplatte (22) und eine Grundplatte (14) einschliesslich eines der genannten Abdeckplatte (22) gegenüberliegenden überhaupt flachen Bodens (16) besitzt, sowie eine sich erstreckende Seitenwand (18) zur Aufnahme der genannten Abdeckplatte (22), wobei die genannte erste Spule (40) zum genannten Boden (16) und die genannte zweite Spule (44) zur genannten Abdeckplatte (22) gebracht werden;

die genannte Kassette wird dadurch gekennzeichnet, dass sie weiterhin enthält:

ein aus dem genannten Boden (16) vorspringendes elastisches Mittel (82) zum Eingriff der genannten ersten Spule (40) und zum Treiben

der genannten ersten Spule (40) gegen die genannte zweite Spule (44) und die genannte Abdeckplatte (22), um eine Verstellung der Spulen zu verhindern und

mindestens eine Zugangsöffnung (228) in der genannten Grundplatte (14), um von ausserhalb des genannten Behälters (12), eine Wechselwirkung mit dem genannten elastischen Mittel (82) zu ermöglichen, zur Entspannung des genannten elastischen Mittels (82), wodurch die genannten Spulen (40, 44) losgelassen werden können.

2. Ein Kassette nach Anspruch 1, in der die genannte erste Spule (40) eine Vorratsspule für ein Farbband (42) und die genannte zweite Spule (44) eine Aufwickelspule ist, und in der ein Farbbandweg so abgegrenzt wird, um sich von der genannten Vorratsspule (40) durch eine erste Öffnung (64) in der genannten Seitenwand (18), dann ausserhalb des genannten Behälters (12) und zurück durch eine zweite Öffnung (64) zur genannten Aufwickelspule (44) zu erstrecken.

3. Ein Kassette nach Anspruch 1 oder 2, in der das genannte elastische Mittel (82) mindestens ein elastisches Blatt enthält, das sich vom genannten Boden (16) bis in den genannten Behälter (12) und zur Achse der genannten Spulen (40, 44) erstreckt, um die genannte erste Spule (40) auf einem Kernteil (38) davon in Eingriff zu bringen.

4. Eine Kassette nach Anspruch 3, in der sich zwei elastische Blätter (82) befinden, die auf den entgegengesetzten Seiten der genannten Spulenachse angeordnet sind.

5. Eine Kassette nach irgendeinem der vorangehenden Ansprüche 1 bis 4, in der die genannte zweite Spule (44) eine Seite zur genannten Abdeckplatte (22) des genannten Behälters (12) hat, die ein vorspringendes Mittel (86) zum Eingriff der genannten Abdeckplatte (22) vom genannten Behälter (12) enthält, um einer Relativbewegung zu widerstehen.

6. Eine Kassette nach Anspruch 5, in der das genannte vorspringende Mittel (86) ein kreisförmiger Grat mit asymmetrisch angeordneten dreieckigen Vorsprüngen (100) ist, und in der die genannte Abdeckplatte (22) entsprechende Vorsprünge (102) einschliesst, wobei eine relative Drehbewegung eher in einer Richtung als in einer anderen Richtung stärker ausgehalten wird, wenn die genannten Vorsprünge (100, 102) zum Eingriff getrieben werden.

7. Eine Ladeeinrichtung für die Farbbandkassette (10) aus irgendeinem der vorangehenden Ansprüche 1 bis 6, mit einem Träger (80) zur Aufnahme der genannten Kassette (10) und einer aus dem genannten Träger (80) vorspringende Antriebswelle (206), dadurch gekennzeichnet, dass sie folgendes umfasst:

Ein auf dem genannten Träger (80) angebrachtes Ladeelement (222), das zum Eingriff in die genannte Zugangsöffnung (228) Nockenmittel (226, 230) beinhaltet, und das beweglich ist, um einen Druck gegen die genannten elastischen Mittel (82) auszuüben und die genannte erste Spule (40) vom Treiben darauf zu befreien.

8. Eine Ladeeinrichtung nach Anspruch 7, in der

das genannte Ladeelement (222) ein aus zusammenarbeitenden Verbindungsstücken (400, 404, 402, 406) bestehender Hebel ist, um die Farbbandquetsch- und Führungselemente (73, 74,

75), die sich auf dem genannten Träger (80) befinden, eine Farbbandgewindebahn entlang zu bewegen.

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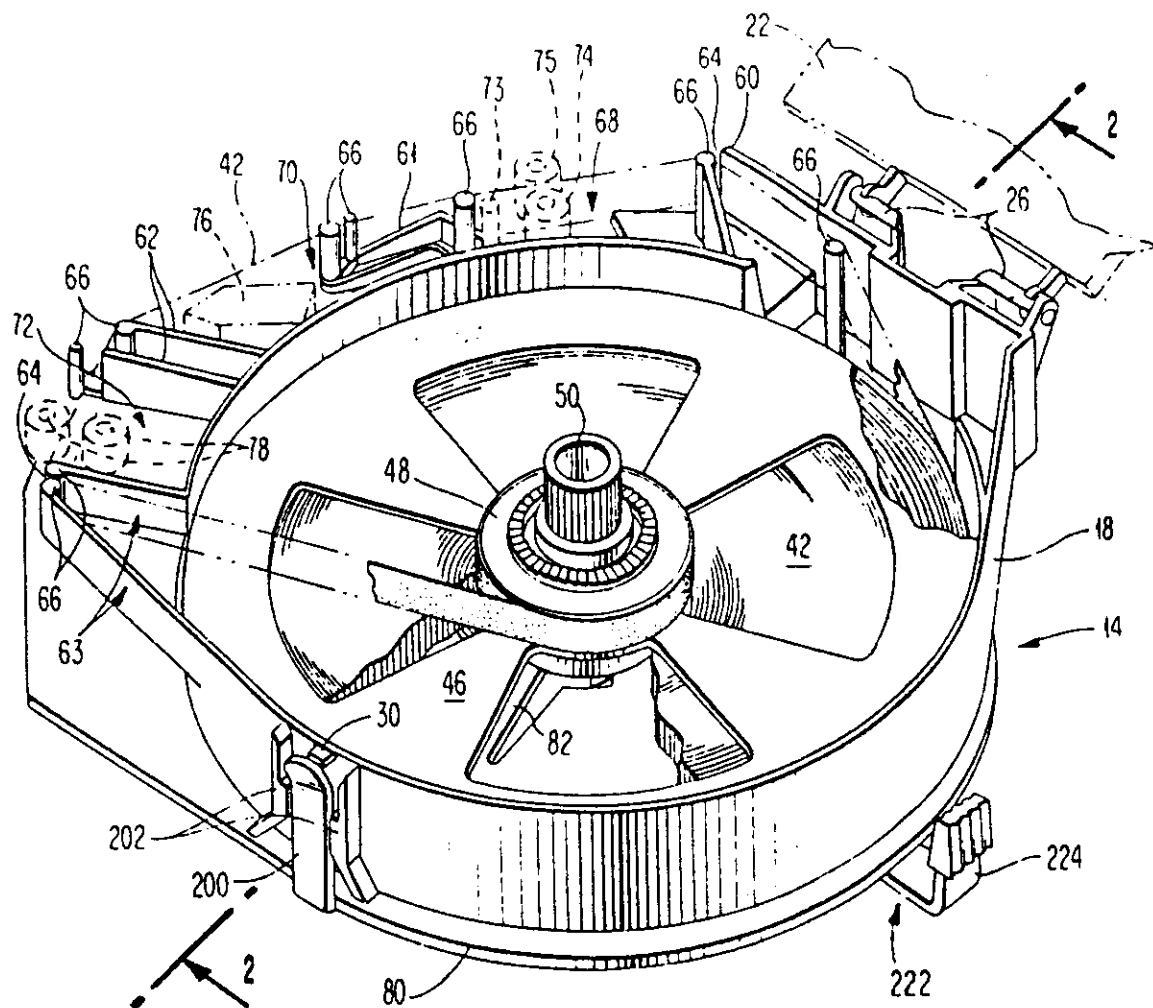
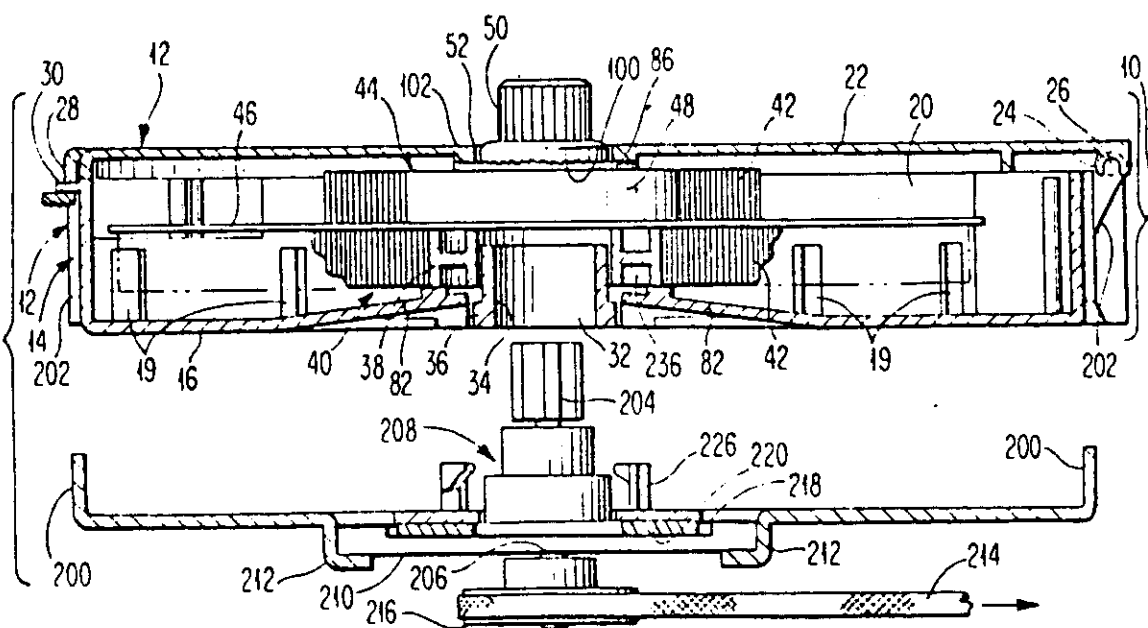


FIG. 2



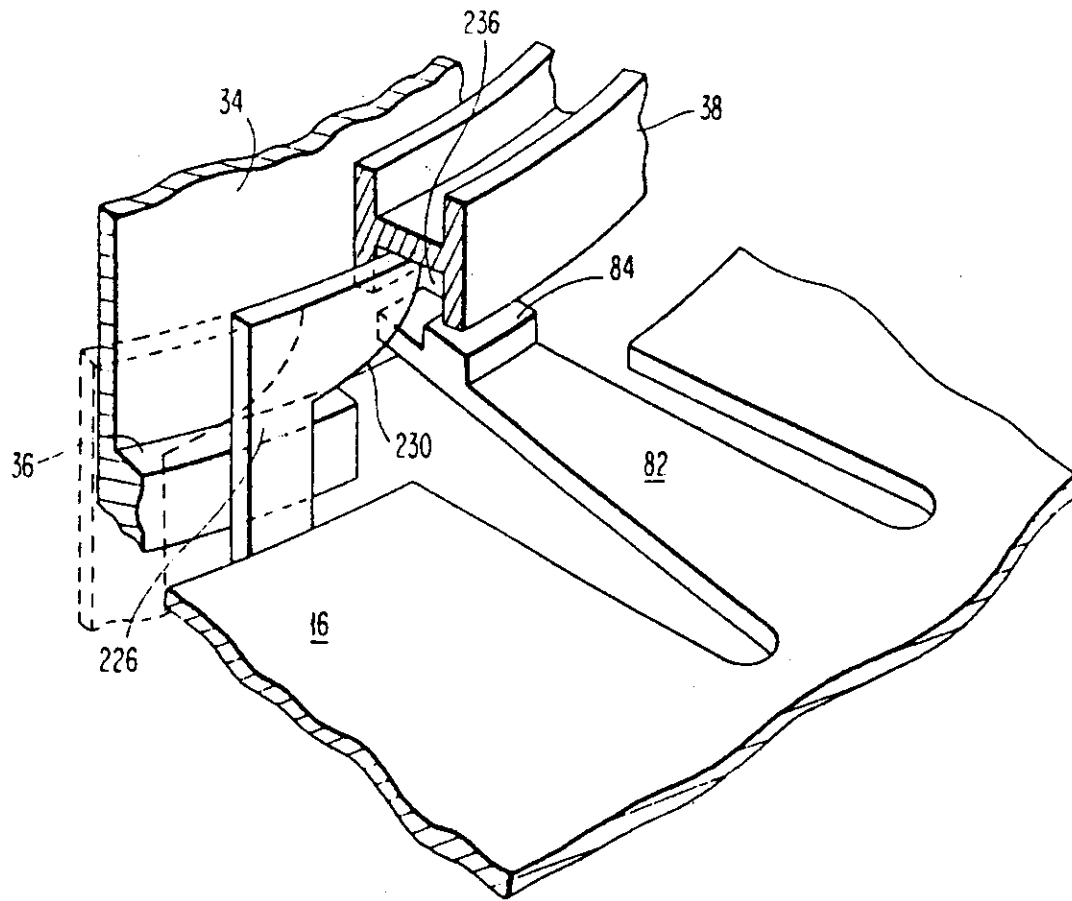


FIG. 4

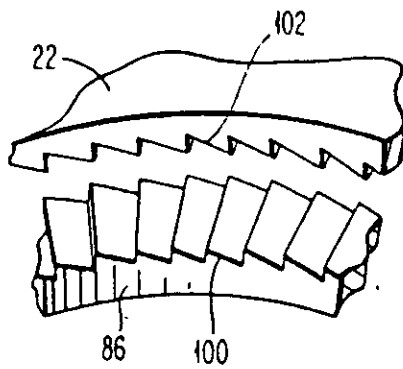
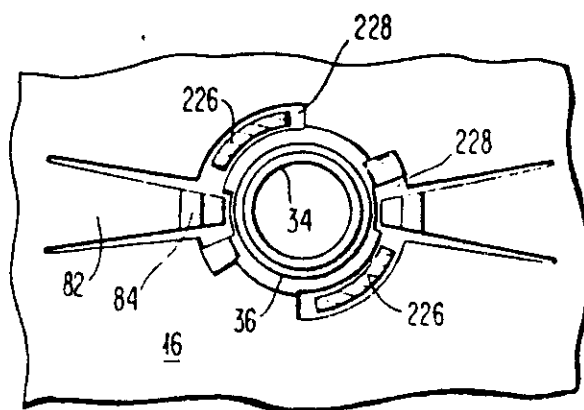
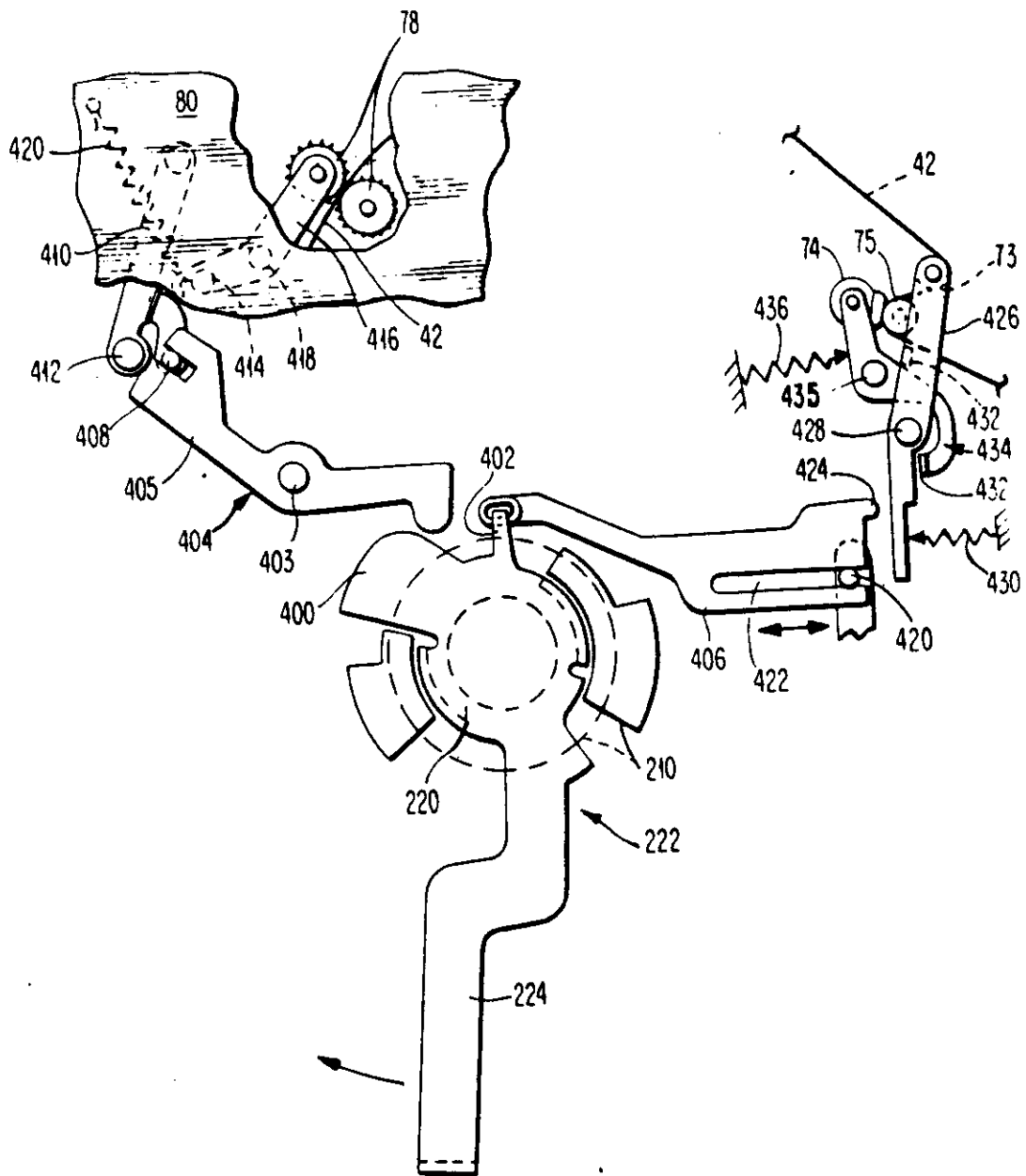


FIG. 5





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Printer ribbon cartridge and loading arrangement therefor.

(73) Proprietor:

International Business Machines Corporation, Old Orchard Road, Armonk, N.Y. 10504, United States of America.

(72) Inventors:

Applegate, Steven Lewis, 3426 Winthrop Road, Lexington Kentucky 40503, United States of America.

Molloy, James John, 1412 Pipestone Court, Lexington Kentucky 40502, United States of America.

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Address for Service: