

Description

Description of the Prior Art

Figure 5 shows the principal parts of a conventional thermal type printing mechanism 1. This printing mechanism 1 is provided with a thermal print head 2 constituted of dot elements that heat up in accordance with specific print pattern signals, and a platen 3 that is in contact with the thermal print head 2 under a prescribed pressure.

A print medium, such as a thermal label strip 4, and print material are passed at a prescribed speed between the thermal print head 2 and the platen 3 for the thermal transfer of carbon ribbon 5 or the like onto the print medium, thereby producing the requisite printing on the thermal label strip 4.

The thermal label strip 4 consists of a backing sheet 6 coated with a separating agent such as silicon oil to form a separating layer and having a plurality of labels 7, each of which is coated with a pressure-sensitive adhesive, detachably adhered continuously along its length. Label tear-off perforations 8 allow labels 7 to be torn off one at a time.

The thermal label strip 4 and carbon ribbon 5 are each supplied by respective supply spindles (not shown) and are each taken up by respective take-up spindles (not shown). If required, just the backing sheet 6 can be bent at a label peeling plate 9 to separate the labels 7 from the backing sheet 6, and a take-up spindle may be provided for taking up just the backing sheet 6.

The carbon ribbon 5 receives heat from the thermal print head 2 which has to be transmitted to the thermal label strip 4 and the labels 7. Because of this, the carbon ribbon is usually very thin, no more than several hundredths of a millimeter.

As such, there is no particular problem when the thermal label strip 4 and the carbon ribbon 5 are narrow, but when the kind of wide thermal label strip 4 and labels 7 that are being employed recently need to be used, differences in tensile force across the width direction of the carbon ribbon 5 cannot be ignored, and it becomes necessary to feed the carbon ribbon 5 precisely at right-angles to the thermal print head 2 and platen 3. Therefore, the parallelness of the carbon ribbon 5 and the guide spindles along the feed path of the carbon ribbon 5, starting with the carbon ribbon 5 supply spindle, becomes extremely important.

In particular, unless the set angle between the frame inside which the carbon ribbon 5 is moved and the carbon ribbon 5 supply spindle is precisely 90 degrees, differences in tensile force will arise across the width of the carbon ribbon 5, causing snaking and wrinkling W of the ribbon, as shown in the drawing. This has an adverse effect on print

quality, causing the carbon ribbon to be printed on parts of the labels 7 where there is overlapping of the wrinkling W, resulting in printing of non-standard printing patterns P.

However, if the printing content is for example in conventional human-readable character form, the problem of print quality caused by the wrinkling W is only a problem of the print system, and as such is not of much consequence. However, in this case of machine-readable characters such as bar-codes and the like which have come into widespread use recently, reading of the data by means of an optical character reader becomes impossible, a major problem that is disastrous in this type of printer.

Basically, such snaking and wrinkling of the carbon ribbon 5 can be minimized by making the carbon ribbon 5 supply spindle, the platen 3 and the carbon ribbon 5 take-up spindle, each of which is mounted perpendicularly to the frame, precisely parallel to one another.

However, the precision of the various parts of the product and the accuracy of the assembly thereof are such that, because of the required thinness of the carbon ribbon 5 and the large width thereof, in practice it is not possible to achieve a sufficiently perfect parallelness. This has given rise to a demand for a mechanism that can appropriately prevent wrinkling.

EP-A-0 176 009 discloses a carbon ribbon transport device resembling the device shown in figures 1 and 5. Said device solves the problem of snaking and wrinkling of the carbon ribbon downstream the printing zone by means of an adjusting member on a guide spindle, said guide spindle being situated downstream said printing zone and supported at each end and having a hole at one end in which said adjusting member is bolted, said hole being offset from the axis of the spindle, so that by rotating the said member the orientation of the spindle is changed, enabling the tension acting on the edges of the ribbon to be made uniform, thereby eliminating wrinkling and misalignment of the ribbon in the downstream path.

SUMMARY OF THE INVENTION

With the present invention, even when the precision of the parts and of the assembly is not enough, because it is possible to adjust the angle of inclination of the supply spindle relative to the printing portion, it is possible to minimize snaking and wrinkling of the carbon ribbon along the entire path of movement thereof.

Specifically, the carbon ribbon supply spindle is held at one end, the end away from the ribbon replenishment portion being supported by means of a first bearing and a second bearing adjacent to the first bearing, the axis of the second bearing

being slightly off-center of the axis of the first bearing, and a round adjustment plate supporting the second bearing is rotatably attached to the frame, and by rotating this plate the second bearing is off-centered relative to the first bearing, enabling the carbon ribbon supply spindle to be adjusted to maximum parallelness with the printing mechanism guide spindle, platen and take-up spindle.

By rotating the round adjustment plate, the spindle portion of the carbon ribbon supply spindle supported by the second bearing is made to describe a conical path relative to the part of the carbon ribbon supply spindle supported by the first bearing, enabling a specific angle of inclination to be set relative to the frame on which is mounted the printing mechanism and the carbon ribbon feed path, the absorption of differences in the precision of the parts and of the assembly and, therefore, the attainment of optimum parallelness with other mechanisms.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a general plan view of a printing apparatus incorporating an embodiment of the present invention;

Figure 2 is a longitudinal sectional view of the carbon ribbon supply spindle 13 portion;

Figure 3 is a plan view of the round plate 57 for adjustment purposes;

Figure 4 is a general longitudinal sectional view showing the positional relationship of the first bearing 55 and the second bearing 56.

Figure 5 is an explanatory view of a thermal label strip.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will now be described with reference to Figures 1 to 4. Parts thereof that are identical with those in Figure 5 are denoted by like reference numerals, and details thereof are omitted.

Figure 1 is a general plan view of a thermal label strip 4 and carbon ribbon 5 supply mechanism of a label printing apparatus incorporating an embodiment of the carbon ribbon feeder according to the present invention.

The thermal label strip 4 is paid out from a label strip pay-out spindle 11 provided on a first frame 10 of the above label printing apparatus and is fed between a thermal print head 2 and a platen 3. If necessary the backing sheet 6 alone is redirected at a label peeling plate 9, and after the labels 7 have been peeled off the backing sheet 6 is taken up on a backing sheet take-up spindle 12.

When the labels 7 do not readily peel off, the thermal label strip 4 may be fed out to the front of the label peeling plate 9 without the backing sheet 6 being redirected at the label peeling plate 9.

The carbon ribbon 5 is paid out from a carbon ribbon supply spindle 13, is fed via a guide roller 14 between the thermal print head 2 and the platen 3 (thermal label strip 4), passes via other guide rollers 15 and 16, a carbon ribbon feed mechanism 19 comprised of a drive roller 17 and a follower roller 18, and another guide roller 20 to be taken up on a carbon ribbon take-up spindle 21.

A stepping motor 22 is provided as the driving source for this feeding and take-up, the output of the output shaft 23 of which is transmitted via a timing belt 24, a intermediate gear 25, a intermediate pulley 26 and a belt 28 to the backing sheet take-up spindle 12, the backing sheet take-up spindle 12 being rotated in the direction indicated by the arrow in the figure.

The output shaft 23 of the stepping motor 22 has a timing belt 29. The platen gear 30 that rotates integrally with the platen 3 is driven by means of the said timing belt 29. In addition, there is another belt 33 that is stretched between the platen pulley 31 that rotates integrally with the platen gear 30, and a carbon ribbon take-up pulley 32 of the carbon ribbon take-up spindle 21, and which rotates the carbon ribbon take-up spindle 21 in the carbon ribbon 5 take-up direction.

The carbon ribbon take-up pulley 32 is attached it rotates integrally with a carbon ribbon take-up gear 34, the rotational output of the said carbon ribbon take-up gear 34 being transmitted via an intermediate gear 35, an intermediate gear 36, a timing belt 38 and a drive roller 37 to a carbon ribbon feed mechanism 19, the arrangement being such that the carbon ribbon feed mechanism 19 can feed the carbon ribbon 5 in the direction of the carbon ribbon take-up spindle 21.

The carbon ribbon take-up gear 34 also engages with a back-tension gear 39 to exert a back-tension on the carbon ribbon 5. A belt 42 is provided between a back-tension pulley 40 which turns integrally with the back-tension gear 39, and a carbon ribbon pay-out pulley 41 of the carbon ribbon supply spindle 13, so that it is possible to urge the carbon ribbon supply spindle 13 in the opposite direction to the direction in which the carbon ribbon 5 is paid out from the carbon ribbon supply spindle 13, exerting a resistance to the paying-out of the carbon ribbon 5, thereby helping to prevent wrinkling W.

In order to apply resistance for back-tensioning purposes, a slip mechanism is required at the carbon ribbon supply spindle 13. This slip mechanism will now be described in the following, with reference to Figure 2.

Figure 2 is a longitudinal sectional view of the carbon ribbon supply spindle 13 portion showing the carbon ribbon feed apparatus* incorporating the said slip mechanism according to this invention.

This carbon ribbon supply spindle 13 is supported from one end horizontally from the flat-plate-shaped first frame 10. Also, for the purpose of moving the thermal label strip 4 and the carbon ribbon 5 along a prescribed path, also supported horizontally from the first frame 10 similarly to the carbon ribbon supply spindle 13 are other parts, starting with the label strip pay-out spindle 11, the backing sheet take-up spindle 12, the carbon ribbon take-up spindle 21, and the thermal print head 2, the platen 3, the carbon ribbon feed mechanism 19 and the guide rollers 14, 15, 16 and 20.

Provided in the vicinity of the said first frame 10 is a second frame 52 which is fixed to the first frame 10 by bolts 50, a small space being formed therebetween by collars 51, the arrangement being such that one of the end portions of the carbon ribbon supply spindle 13 is supported in the said small space.

The first frame 10 has a through-hole 53 in which, with the insertion of the carbon ribbon supply spindle 13, a bearing retainer plate 54 is fixed by bolts, and by means of a first bearing 55 the carbon ribbon supply spindle 13 can be rotatably supported at a position away from the carbon ribbon 5 replenishment portion.

The second frame 52 is also provided with a second bearing 56 at the portion where the carbon ribbon supply spindle 13 is rotatably supported at a position away from the carbon ribbon 5 replenishment portion, in the same way as described above. A round plate 57 for adjustment purposes that fixes the second bearing 56 is rotatably inserted in a through-hole 58 formed in the second frame 52. The second bearing 56 portion is fixed by a washer 59 and a fixing bolt 60. The first bearing 55 and second bearing 56 are constituted of ball-bearings or the like, but may be constituted of any other type of bearing desired.

As shown in Figure 3, the round plate 57 has arc-shaped slots 61 spaced at equal angles. Adjustment bolts 63 are screwed via the respective slots 61 into clamp-screw holes 62 formed in the second frame 52, by means of which the round plate 57 can be affixed in a prescribed rotational position relative to the second bearing 56.

The carbon ribbon pay-out pulley 41 is fixed on the carbon ribbon supply spindle 13 in the space between the first frame 10 and the second frame 52.

Reverting to Figure 2, there is a carbon ribbon fixing shaft 64 on the carbon ribbon supply spindle 13 at the opposite end to the first bearing 55 and the second bearing 56. A core 5A of the carbon

ribbon 5 is also fitted onto the carbon ribbon supply spindle 13, thereby allowing the roll of carbon ribbon 5 to be attached. A steel flange 65 is attached to the carbon ribbon fixing shaft 64, and a cork pad 66 is provided between the flange 65 and the first bearing 55.

The portion of the carbon ribbon supply spindle 13 protruding from the carbon ribbon fixing shaft 64 is formed into a reduced-diameter portion 13A from which is projected a key 67 for engagement with a keyway 69 on a stainless steel round plate 68. A cork pad 70 is provided between the round plate 68 and the carbon ribbon fixing shaft 64. The end portion of the reduced-diameter portion 13A of the carbon ribbon supply spindle 13 is threaded for a nut 71. A thrust spring 72 is provided between the nut 71 and the round plate 68, the carbon ribbon fixing shaft 64 being urged via the round plate 68 and the cork pad 70, in the direction of the first frame 10. The degree of force applied by the thrust spring 72 can be adjusted by adjusting the position of the nut 71.

As a result, the carbon ribbon 5 is paid out along the feed path by the carbon ribbon feed mechanism 19, at which time back-tension applied from the carbon ribbon pay-out pulley 41 is received by the carbon ribbon 5, the back-tension force acting in the opposite direction to the direction in which the carbon ribbon 5 is paid out. As a result of the attenuation of the back-tension force arising from slippage between the flange 65 and the cork pad 66, or the round plate 68 and the cork pad 70, the paying-out proceeds under a resistance of a prescribed value.

Figure 4 is a general longitudinal sectional view similarly to Figure 2 showing the positional relationship between the first bearing 55 and the second bearing 56. With reference to Figure 4, if the center line C2 of the second bearing 56 is deviated relative to the center line C1 of the first bearing 55 by a deviation D that is in the order of several tenths of a millimeter, for example, and the round plate 57 that affixes the second bearing 56 is rotated relative to the second frame 52, the center line of the carbon ribbon supply spindle 13 describes a cone-shaped path in which the apex is at the first bearing 55 portion, as a result of which the carbon ribbon 5 coming from the carbon ribbon supply spindle 13 is paid out in a state of tension, the distribution of the tension corresponding to the position of inclination of the carbon ribbon supply spindle 13.

With the carbon ribbon supply apparatus thus configured, if wrinkling W arises in the carbon ribbon 5 during printing tests following the assembly of the printing apparatus product, the adjustment bolt 63 is loosened and the round plate 57 is rotated either clockwise or counterclockwise, with

respect to Figure 3, and at the fixing position the adjustment bolt 63 is tightened. Also at this time, because of the arc-shaped slots 61 formed in the round plate 57, it is possible to rotate the round plate 57 by just loosening the adjustment bolts 63 slightly.

By means of this adjusting operation, it is possible to incline the second bearing 56 that rotates integrally with the round plate 57 in a prescribed direction relative to the first bearing 55. This permits dimensional error in the parts themselves and assembly precision error to be absorbed, and enables the carbon ribbon supply spindle 13 can be kept as parallel as possible, relative to the carbon ribbon 5 supply guide mechanism.

Consequently, from pay-out from the carbon ribbon supply a spindle 13 to take-up, the carbon ribbon 5 is subjected to a uniform tensile force across its width, thereby making it possible to prevent wrinkling W.

The degree of inclination of the second bearing 56 relative to the first bearing 55 can be set in accordance with the width and thickness of the carbon ribbon 5, and with the various components of the carbon ribbon 5 supply guide mechanism.

As has been described in the foregoing, in accordance with the present invention, one end of a carbon ribbon supply spindle is rotatably supported by a first bearing and a second bearing provided in a first frame, and it is possible to adjust the inclination of the first and second bearings relative to the first frame. Therefore, if necessary it is possible to adjust the angle of inclination of the carbon ribbon supply spindle relative to the first frame to thereby prevent snaking or wrinkling of the carbon ribbon, ensuring that the printing apparatus provides print of the proper quality.

Claims

1. A carbon ribbon supply apparatus for a printer comprising:

- a carbon ribbon supply spindle for supplying a carbon ribbon of a printing apparatus possessing a thermal type printing mechanism;

- a first frame that supports the carbon ribbon supply spindle at a portion of the spindle that is away from a carbon ribbon replenishment portion, has mounted thereon the said printing mechanism and is provided with an internal feed path for the said carbon ribbon;

- a second frame provided adjacent to the first frame for supporting the carbon ribbon supply spindle at another portion of the spindle which is away from the same side;

- a first bearing that is attached to the first frame and which rotatably supports the carbon ribbon supply spindle;

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- a second bearing attached to the second frame off-center of the central axis of the first bearing and which rotatably supports the carbon ribbon supply spindle;

- a round plate for adjustment purposes rotatably provided between the second bearing and the second frame;

- a fixing member for fixing the round plate to the second frame at an arbitrary position;

- arranged so that in accordance with the rotational position of the round plate the carbon ribbon supply spindle can be fixed at an arbitrary position of inclination relative to the first frame.

2. The carbon ribbon supply apparatus for a printer according to claim 1 wherein the round plate is provided with arc-shaped slots, the second frame is provided with clamp-screw holes and an adjustment bolt is provided as the said fixing member, whereby the round plate can be fixed at the adjustment position of the second frame by passing the adjustment bolts through the said slots and screwing them into the clamp-screw holes.

Patentansprüche

1. Kohlebandzuführvorrichtung für einen Drucker, umfassend:
 - eine Kohlebandzuführachse für das Zuführen eines Kohlebandes für eine Druckeinrichtung, welche einen thermischen Druckmechanismus aufweist;
 - einen ersten Rahmen, welcher die Kohlebandzuführachse an einem von einem Kohlebandauffüllbereich abliegenden Achsenbereich unterstützt und welcher den Druckmechanismus aufweist und mit einem internen Zuführweg für das Kohleband versehen ist;
 - einen in der Nähe des ersten Rahmens vorgesehenen zweiten Rahmen für das Unterstützen der Kohlebandzuführachse an einem anderen Achsenbereich, welcher von der gleichen Seite abliegt;
 - ein erstes Lager, das an dem ersten Rahmen befestigt ist und die Kohlebandzuführachse rotierbar abstützt;
 - ein zweites Lager, welches mit diesem zweiten Rahmen außermittig der Zentralachse des ersten Lagers befestigt ist und welcher die Kohlebandzuführachse rotierbar abstützt;
 - eine runde Platte, welche zu Einstellzwecken rotierbar zwischen dem zweiten Lager und dem zweiten Rahmen vorgesehen ist;
 - ein Befestigungselement für das Befestigen der runden Platte an dem zweiten Rahmen in einer beliebigen Stellung;

respect to Figure 3. and at the fixing position the adjustment bolt 63 is tightened. Also at this time, because of the arc-shaped slots 61 formed in the round plate 57, it is possible to rotate the round plate 57 by just loosening the adjustment bolts 63 slightly.

By means of this adjusting operation, it is possible to incline the second bearing 56 that rotates integrally with the round plate 57 in a prescribed direction relative to the first bearing 55. This permits dimensional error in the parts themselves and assembly precision error to be absorbed, and enables the carbon ribbon supply spindle 13 can be kept as parallel as possible, relative to the carbon ribbon 5 supply guide mechanism.

Consequently, from pay-out from the carbon ribbon supply a spindle 13 to take-up, the carbon ribbon 5 is subjected to a uniform tensile force across its width, thereby making it possible to prevent wrinkling W.

The degree of inclination of the second bearing 56 relative to the first bearing 55 can be set in accordance with the width and thickness of the carbon ribbon 5, and with the various components of the carbon ribbon 5 supply guide mechanism.

As has been described in the foregoing, in accordance with the present invention, one end of a carbon ribbon supply spindle is rotatably supported by a first bearing and a second bearing provided in a first frame, and it is possible to adjust the inclination of the first and second bearings relative to the first frame. Therefore, if necessary it is possible to adjust the angle of inclination of the carbon ribbon supply spindle relative to the first frame to thereby prevent snaking or wrinkling of the carbon ribbon, ensuring that the printing apparatus provides print of the proper quality.

Claims

1. A carbon ribbon supply apparatus for a printer comprising:

a carbon ribbon supply spindle for supplying a carbon ribbon of a printing apparatus possessing a thermal type printing mechanism;

a first frame that supports the carbon ribbon supply spindle at a portion of the spindle that is away from a carbon ribbon replenishment portion, has mounted thereon the said printing mechanism and is provided with an internal feed path for the said carbon ribbon;

a second frame provided adjacent to the first frame for supporting the carbon ribbon supply spindle at another portion of the spindle which is away from the same side;

a first bearing that is attached to the first frame and which rotatably supports the carbon ribbon supply spindle;

a second bearing attached to the second frame off-center of the central axis of the first bearing and which rotatably supports the carbon ribbon supply spindle;

a round plate for adjustment purposes rotatably provided between the second bearing and the second frame;

a fixing member for fixing the round plate to the second frame at an arbitrary position:

arranged so that in accordance with the rotational position of the round plate the carbon ribbon supply spindle can be fixed at an arbitrary position of inclination relative to the first frame.

2. The carbon ribbon supply apparatus for a printer according to claim 1 wherein the round plate is provided with arc-shaped slots, the second frame is provided with clamp-screw holes and an adjustment bolt is provided as the said fixing member, whereby the round plate can be fixed at the adjustment position of the second frame by passing the adjustment bolts through the said slots and screwing them into the clamp-screw holes.

Patentansprüche

1. Kohlebandzuführvorrichtung für einen Drucker, umfassend:

eine Kohlebandzuführachse für das Zuführen eines Kohlebandes für eine Druckeinrichtung, welche einen thermischen Druckmechanismus aufweist;

einen ersten Rahmen, welcher die Kohlebandzuführachse an einem von einem Kohlebandauffüllbereich abliegenden Achsenbereich unterstützt und welcher den Druckmechanismus aufweist und mit einem internen Zuführweg für das Kohleband versehen ist;

einen in der Nähe des ersten Rahmens vorgesehenen zweiten Rahmen für das Unterstützen der Kohlebandzuführachse an einem anderen Achsenbereich, welcher von der gleichen Seite abliegt;

ein erstes Lager, das an dem ersten Rahmen befestigt ist und die Kohlebandzuführachse rotierbar abstützt;

ein zweites Lager, welches mit diesem zweiten Rahmen außermittig der Zentralachse des ersten Lagers befestigt ist und welcher die Kohlebandzuführachse rotierbar abstützt;

eine runde Platte, welche zu Einstellzwecken rotierbar zwischen dem zweiten Lager und dem zweiten Rahmen vorgesehen ist;

ein Befestigungselement für das Befestigen der runden Platte an dem zweiten Rahmen in einer beliebigen Stellung;



angeordnet, so daß die Kohlebandzuführachse in Übereinstimmung mit der Rotationsstellung der runden Platte in einer beliebig geneigten Position relativ zu dem ersten Rahmen befestigt werden kann.

2. Kohlebandzuführvorrichtung für einen Drucker nach Anspruch 1, wobei die runde Platte mit bogenförmigen Spalten, der zweite Rahmen mit Öffnungen für Preßschrauben und das Befestigungselement mit einem Einstellungsbolzen versehen ist, so daß die runde Platte in der Einstellungsposition des zweiten Rahmens durch das Durchführen der Einstellungsbolzen durch diese Spalten und deren Einschrauben in die Preßschraubenöffnungen befestigt werden kann.

Revendications

1. Dispositif d'alimentation d'un ruban carbone pour une imprimante, comprenant:

un tourillon d'alimentation de ruban carbone pour amener un ruban carbone d'un appareil d'impression présentant un mécanisme d'impression de type thermique;

un premier cadre qui supporte le tourillon d'alimentation de ruban carbone en une partie du tourillon qui est éloignée d'une partie de réapprovisionnement du ruban carbone, présente ledit mécanisme d'impression monté sur lui et est pourvu d'un chemin d'alimentation interne pour ledit ruban carbone;

un second cadre prévu de manière adjacente au premier cadre, pour supporter le tourillon d'alimentation de ruban carbone en une autre partie du tourillon qui est éloignée du même côté;

un premier palier qui est fixé au premier cadre et supporte à rotation le tourillon d'alimentation de ruban carbone;

un second palier fixé au second cadre en étant décalé de l'axe central du premier palier et qui supporte à rotation le tourillon d'alimentation de ruban carbone ;

une plaque ronde pour des buts d'ajustement, prévue à rotation entre le second palier et le second cadre;

un organe de fixation pour fixer la plaque ronde au second cadre en une position arbitraire;

agencé de manière qu'en fonction de la position de rotation de la plaque ronde, le tourillon d'alimentation de ruban carbone puisse être fixé en une position arbitraire d'inclinaison par rapport au premier cadre.

2. Dispositif d'alimentation de ruban carbone pour une imprimante selon la revendication 1, dans lequel la plaque ronde est pourvue de fentes de forme arquée, le second cadre est pourvu de trous de vis de serrage et un boulon d'ajustement est prévu à titre dudit organe de fixation, de manière que la plaque ronde puisse être fixée dans la position d'ajustement du second cadre en faisant passer les boulons d'ajustement dans lesdites fentes et en les vissant dans les trous de vis de serrage.

