

"A PRINTER PROVIDED WITH AN INK RIBBON CASSETTE"

The present invention relates to a printer provided with an ink ribbon cassette and, although the invention is not so restricted, it relates more particularly to a printer using an ink ribbon cassette of the stationary type, in which an ink ribbon is arranged to face a printing head throughout the range of movement of the printing head.

In a prior ink ribbon cassette of the stationary type, the ink ribbon cassette has a cassette body having a pair of arms integrally extending from opposite end portions of the cassette body, the latter being longer than the reciprocating range of movement of a printing head of a computer or other printer with which the ink ribbon cassette is to be used. Ribbon take-out and take-in slits are formed in the leading ends of the respective arms. Thus, the printing head and the ink ribbon are positioned to face each other within the range of movement of the printing head while a portion of the ink ribbon is externally exposed between the ribbon take-out and take-in slits.

If, however, such an ink ribbon cassette is used in a printer in which the said range of movement of the printing head is a long one, the cassette body also has to be a long one. This in turn increases the distance between the ribbon

take-out and take-in slits so that the ink ribbon portion which is exposed between the ribbon take-out and take-in slits becomes slack and the positional relationship between the printing head and the ink ribbon is displaced. As a
5 result, the printing head and the ink ribbon may fail to face each other accurately. This disadvantage has previously been coped with in some cases by enlarging the width of the ink ribbon. However, if the ink ribbon is a multi-colour ink ribbon having a plurality of parallel colour bands which
10 extend to the longitudinal direction, the positional relationship between the printing head and a particular colour band which has been moved by a colour band switching device is displaced with the result that it is difficult to perform the desired multi-colour printing operation. For making
15 prints of high quality, however, strict adjustment of the relative positions of the ink ribbon and the printing head is indispensable.

According, therefore, to the present invention, there is provided a printer having an ink ribbon cassette comprising
20 a cassette body which contains an ink ribbon, the cassette body having spaced apart arms between which extends an exposed portion of the ink ribbon; a guide shaft which is supported by the cassette body and which extends longitudinally of the latter; and a ribbon guide which is slidably mounted
25 on the guide shaft and which is provided with ribbon position

restricting means which allow the exposed portion of the ink ribbon to slide longitudinally therethrough while restricting the extent to which the said exposed portion can move transversely of the ribbon guide; the printer having
5 a printing head which is disposed adjacent to the said exposed portion and which is mounted for reciprocation longitudinally thereof, the ribbon guide being slidably mounted on the printing head for sliding movement with respect thereto in a direction transverse to the ink ribbon cassette, the printing
10 head and ribbon guide being arranged to slide in unison longitudinally of the exposed portion.

The cassette may thus be such that there is substantially no unintended relative displacement between the printing head and the ink ribbon so that prints of high quality may be
15 obtained even if the ribbon take-out and take-in slits are spaced at a long distance from each other.

Preferably, the ribbon guide and a projecting portion of the printing head have interengaging projecting and groove portions. Thus the projecting portion of the printing
20 head and the ribbon guide may have interengaging leg and rib portions.

Preferably, the ribbon position restricting means comprises at least one pair of claws which are adapted to engage opposite longitudinally extending edges of the said
25 exposed portion.

There may be two pairs of claws each pair of which is provided on a U-shaped structure carried by the ribbon guide.

5 Resilient means may be provided for ensuring engagement between the said exposed portion and the ribbon guide.

The ink ribbon may have a plurality of parallel, longitudinally extending bands which are impregnated with inks of different colours.

10 In the preferred form of the present invention, the ribbon guide is mounted on the printing head to slide in unison with the latter along the guide shaft, and the exposed portion of the ink ribbon is forced without fail to face the printing head with a predetermined positional relationship by virtue of the ribbon position restricting means.

15 The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is a front elevational view showing the relationship between an ink ribbon cassette and a printing head of a printer according to the present invention,

20 Figure 2 is a partially cut-away top plan view showing the state in which the ink ribbon cassette is mounted on the printing head;

Figure 3 is a partially cut-away cross sectional plan view, taken along the line III-III of Figure 1;

Figure 4 is a partially cut-away top plan view showing a portion of the printing head; and

5. Figure 5 is a partially cut-away side elevational view showing a portion of the printing head.

As shown in Figures 1 and 2 an ink ribbon cassette which may be used in a printer according to the present invention comprises a cassette body 1 which contains an ink
10 ribbon 6, the cassette body 1 having spaced apart hollow arms 2, 3 which extend integrally from the opposite end portions of the cassette body 1. The arms 2, 3 are respectively provided with a ribbon take-in slit 2a and a ribbon take-out slit 3a, so that an exposed portion 6A of the ink ribbon 6 extends from the
15 take-out slit 3a to the take-in slit 2a. The arms 2, 3 are respectively formed with projections 2b, 3b which act as supports for a guide shaft 4 which extends parallel to the direction of movement of a printing head 8. A ribbon guide 5 has a bearing portion 5a which is slidably mounted on the
20 guide shaft 4.

From the bearing portion 5a, there extend legs 51 and 52 which face each other with a predetermined gap therebetween. The legs 51 and 52 are formed at their outer end portions (i.e. their end portions remote from the bearing portion 5a)
25 with engagement projections 51a and 52a respectively. From the legs 51 and 52, there extend forward engagement arms

53 and 54 respectively so that each leg 51, 52 and its respective arm 53, 54 together form a U-shaped structure (as shown in Figure 3) which, in operation, slidably engages with the exposed portion 6A of the ink ribbon 6. The engagement arms 53 and 54 are formed at their opposite end portions with retaining claws 53a, 54a, and 53b and 54b, respectively, which, in operation, engage with the opposite longitudinally extending edges of the exposed portion 6A, respectively. The retaining claws 53a, 54a, 53b and 54b together constitute ribbon position restricting means which allow the exposed portion 6A of the ink ribbon 6 to slide longitudinally therethrough but which restrict the extent to which the exposed portion 6A can move transversely of the ribbon guide 5.

Between the retaining claws 53a and 53b and between the retaining claws 54a and 54b, moreover, there are retained from the front of the exposed portion 6A thin resilient plates 7a and 7b which ensure engagement between the ribbon guide 5 and the ink ribbon 6.

The ink ribbon 6 is a multi-colour endless ink ribbon which is composed of a plurality of colour bands 6a, 6b, 6c and 6d which extend longitudinally thereof and which are respectively impregnated with inks of different colours. The endless ink ribbon 6 is sequentially fed in the longitudinal direction through a drive roller 1a

(Figure 2) disposed in the cassette body 1 by the action of a ribbon feeder (not shown) which is disposed in a printer body (not shown).

5 The remaining portion of the ink ribbon 6, i.e. the portion other than the exposed portion 6A between the ribbon take-out slit 3a and the ribbon take-in slit 2a, is accommodated in a zig-zag form in the cassette body 1, as shown in Figure 2.

10 The printing head 8 is mounted on a carriage 9 which is slidably mounted on head guides 10a and 10b. A wire guide 8a, which constitutes a projecting portion of the printing head 8, as best seen in Figures 4 and 5, is provided to guide the passage of a plurality of printing wires 11 (Figure 1) which pass therethrough. The wire guide 8a is formed at its
15 opposite side walls with engagement grooves 8b and 8c which are slidably engaged, in a direction transverse to the ink ribbon cassette, by the engagement projections 51a and 52a formed at the outer end portions of the legs 51 and 52 of the ribbon guide 5.

20 Reference numerals 8d and 8e denote ribs engaging with the sides of the legs 51 and 52, and reference numeral 8f denotes the front cover of the printing head 8.

25 When the cassette body 1 is to be mounted on a colour band switching device (not shown) which is itself mounted on a printer (not shown), the ribbon guide 5, as indicated in Figure 1, is mounted for transverse sliding movement on

the printing head 8 by bringing the engagement projections 51a and 52a into engagement with the engagement grooves 8b and 8c, respectively, and by sliding the ribbon guide 5 in the direction of the arrow 12. The ribbon guide 5 is thus carried by and moves with the printing head 8, the ribbon guide 5 sliding along the guide shaft 4 by means of the bearing portion 5a. Thus the ribbon guide 5 can move in sliding engagement with the exposed portion 6A of the ink ribbon 6 at a constant transverse position with respect to the cassette body 1 while restricting the transverse position of the exposed portion 6A. As a result, the exposed portion 6A of the ink ribbon 6 will not become slack, even if there is a considerable distance between the ribbon take-in and take-out slits 2a and 3a. Consequently, the exposed portion 6A always faces the printing head 8 with a predetermined positional relationship.

For multi-colour printing operations, on the other hand, the cassette body 1 may be moved transversely with a predetermined displacement via the colour band switching device (not shown) so as to bring each of the colour bands 6a, 6b, 6c and 6d into a suitable position to face the corresponding printing wires 11 in accordance with the colour to be printed. At this time, the ribbon guide 5 is so slidably supported on the guide shaft 4 as to follow the

transverse movements of the cassette body and so control the transverse position of the exposed portion 6A of the ink ribbon 6 while holding its longitudinal position with respect to the cassette body 1. As a result, the exposed portion 6A of the ink ribbon 6 accurately follows the transverse movements of the cassette body 1 so that a predetermined colour band accurately faces the corresponding printing wires 11 of the printing head 8 in the predetermined positional relationship.

As described in detail above, no unintended displacement arises in the positional relationship between the printing head 8 and the exposed portion 6A of the ink ribbon 6 even if there is a considerable distance between the ribbon take-out and take-in slits, so that the printing head 8 and the exposed portion 6A can always face each other accurately. As a result, the ribbon cassette can be thin without the need to increase the width of the ink ribbon more than necessary. Moreover, the positional adjustment of the ink ribbon for assembly is facilitated, so that the working efficiency is improved and the production costs can be reduced.

C L A I M S

1. A printer having an ink ribbon cassette comprising a cassette body which contains an ink ribbon, the cassette body having spaced apart arms between which extends an exposed portion of the ink ribbon; a guide shaft which is supported by the cassette body and which extends longitudinally of the latter; and a ribbon guide which is slidably mounted on the guide shaft and which is provided with ribbon position restricting means which allow the exposed portion of the ink ribbon to slide longitudinally therethrough while restricting the extent to which the said exposed portion can move transversely of the ribbon guide; the printer having a printing head which is disposed adjacent to the said exposed portion and which is mounted for reciprocation longitudinally thereof, the ribbon guide being slidably mounted on the printing head for sliding movement with respect thereto in a direction transverse to the ink ribbon cassette, the printing head and ribbon guide being arranged to slide in unison longitudinally of the exposed portion.
2. A printer as claimed in claim 1 in which the ribbon guide and a projecting portion of the printing head have interengaging projecting and groove portions.
3. A printer as claimed in claim 2 in which the projecting portion of the printing head and the ribbon guide have interengaging leg and rib portions.



4. A printer as claimed in any preceding claim in which the ribbon position restricting means comprises at least one pair of claws which are adapted to engage opposite longitudinally extending edges of the said exposed portion.
- 5 5. A printer as claimed in claim 4 in which there are two pairs of claws each pair of which is provided on a U-shaped structure carried by the ribbon guide.
6. A printer as claimed in any preceding claim comprising resilient means for ensuring engagement between the said exposed
- 10 portion and the ribbon guide.
7. A printer as claimed in any preceding claim in which the ink ribbon has a plurality of parallel, longitudinally extending bands which are impregnated with inks of different colours.
- 15 8. A printer substantially as hereinbefore described with reference to and as shown in the accompanying drawings.
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