

SELECTIVE PRINTER FOR PRINTING A PLURALITY OF COLOURS

The present invention relates to a selective printer which can print a plurality of colours, in that the printer has a ribbon shifting apparatus for
5 changing the position of a ribbon cassette containing a multicoloured ink ribbon.

Conventional printers for printing a plurality of colours are of the stationary type and the carriage mount type.

10 The stationary type printer, which is disclosed, for example, in Japanese Utility Model Laid Open No. Sho 63-37248, filed by the present applicant, has a ribbon cassette containing a multicoloured ink ribbon adjustably mounted on the printer body.

15 This apparatus has a ribbon cassette containing a multicoloured ink ribbon and a ribbon guide plate with a ribbon guide portion for guiding the multicoloured ink ribbon past the position of the print head. The ribbon cassette has sleeves or projections on the upper
20 and lower surface.

The ribbon guide plate has hooks for elastically and slidably engaging with the sleeves or projections. On the carriage or print head, further projections or sleeves are provided on which the sleeves or
25 projections which engage with sleeves or projections formed on the ribbon guide plate.

The colour of the printing produced by the printer is changed by moving the ribbon cassette around an axis parallel to the running direction of the print head.

30 The carriage mount type printer, which is disclosed, for example, in Japanese Patent Laid Open No. Sho 61-220884, carries out printing by running a carriage having both a ribbon cassette and the print head thereon. This type of apparatus has a ribbon
35 cassette containing a multicoloured ribbon in a cassette case, a carrier with the print head thereon, a

cassette holding rack which is mounted on the carrier for holding the ribbon cassette, and a driving mechanism for moving the cassette holding rack in the width direction of the ink ribbon. This printer has as
5 many hooks as there are colours on the ribbon, and has pair of engaging parts for engaging with said hooks. One type has the cassette movably mounted on the cassette case for movement up and down through an adjusting screw, and another type has the cassette
10 movably mounted on the carrier for movement up and down while being pressed toward the engaging part.

There are, however, problems with these prior art type printers.

The stationary type printer does not have a fine
15 adjusting mechanism for changing the position of the ribbon cassette up and down with a fine adjustment. If the printing position of the ribbon is not fixed accurately when the machine is assembled, printing occurs at the line between coloured parts of the
20 ribbon. It is difficult to overcome this problem.

The carriage mount type printer has a fine adjusting mechanism for fine adjustment of the printing position of the ink ribbon. But the mechanism is complex, and it is hard to adjust.

25 As there are not many volume of ink ribbon which is been containing in the cassette, the cassette has to be exchanged very often. The volume of the cassette get bigger and many time requires for acceleration and reduction. Therefore, printing efficiency does not
30 rise. In order to avoid these problems, the power of the motor has to be raised.

This present invention has been made to overcome these problems. This is accomplished by providing a fine adjusting mechanism which has a simple structure
35 and by which the printing position of the multicoloured ink ribbon can be finely adjusted.

According to the present invention, there is provided a selective printer for printing a plurality of colours, comprising:

- an exchangeable ribbon cassette from which is
5 drawn, and to which is returned, a multicoloured ink ribbon having a plurality of longitudinal colour swathes in side-by-side relationship such that any desired swathe can be brought into registry with the print head of the printer by movement of the cassette
10 so as to shift the ribbon laterally of its length;
 - a cassette holder for removably holding the ribbon cassette and mounted for the aforesaid movement of the ribbon cassette held therein;
 - an adjusting lever adjustably mounted on said
15 cassette holder and having a cam roller thereon;
 - a cam engaging said cam roller;
 - a spring urging said cassette holder for urging said cam roller against said cam; and
 - a pulse motor rotatable through a plurality of
20 angles of rotation respectively corresponding to the swathes of the multicoloured ribbon to position one swathe thereof in registry with the print head, whereby the colour printed can be changed by rotating said pulse motor through different angles of rotation and
25 whereby the fine position of the ribbon relative to the print head can be adjusted by relative movement of said adjusting lever and said cassette holder.

The invention will now be described, by way of example, in connection with the accompanying drawings,
30 in which:

Fig. 1 is a perspective view illustrating one embodiment of the present invention;

Fig. 2 is an exploded perspective view of part of Fig. 1; and

35 Fig. 3 is a sectional partially schematic view for illustrating the mechanism of the present invention.

A preferred embodiment of the printer according to the invention is shown in detail in Figs. 1-3.

Referring to Fig. 1, a base plate 1 is shown which forms a part of the printer body. A platen 2 is
5 rotatably supported on the printer body. A print head 3 is movably mounted on the base plate for reciprocating movement parallel to the surface of the platen 2.

A ribbon cassette 4 is provided which is
10 constituted by a multicoloured ink ribbon 5 contained in a cassette case 6. This multicoloured ink ribbon 5 has a plurality of longitudinal colour swathes in a side-by-side relationship. The cassette case 6 has two projections 7 on one end of the ribbon cassette.

15 On the other end of the ribbon cassette 4 is one projection which is not visible in Fig. 2. This projection forms a centre around which rotational motions of the cassette case 6 can take place so as to move the ribbon 5 up and down (i.e. laterally of its
20 length).

A cassette holder 8 is provided having two hollows 9 for engaging with the two projections 7 of the cassette case 6. As illustrated on an enlarged scale in Figs. 2 and 3, the two hollows 9 are open upwardly.
25 In the bottom portion of the cassette holder 8 is a hole, and a bushing is inserted into the hole to form a bearing 10.

A vertical supporting plate 11 is mounted on the base plate 1. A supporting shaft 12 mounted on the
30 supporting plate 11 is loosely inserted into the bearing 10.

Thus, the cassette holder 8 can be rotated around the axis of the supporting shaft 12 and the ribbon 5 can be moved up and down transversely to the running
35 direction of the print head 3.

An adjusting lever 14 is rotatably mounted on a

main shaft 13 on the lower part of the cassette holder 8 on the opposite side from the ribbon cassette 4. This adjusting lever 14 can be pivoted so that the upper end is moved up and down. On the upper part of the adjusting lever 14 is mounted an interiorly threaded sleeve 17 into which a fixing screw 16 is threaded. The fixing screw 16 extends through an elongated slot 15 in the cassette holder 8 and when tightened, fixes the adjusting lever 14 to the cassette holder 8. The upper end of the adjusting lever 14 has a position indicator 18 thereon bent towards the cassette holder 8.

An adjusting scale 19 is provided on the upper edge of the cassette holder 8 and is between the two hollows 9, and the indicator 18 moves along the scale 19. The adjusting scale 19 indicates increments of positions of the width of the multicoloured ink ribbon 5 relative to the print head 3 to which the adjusting lever 14 can adjust the position of the ribbon.

A cam roller 20 is rotatably mounted on the adjusting lever 14 near the part supported on the main shaft 13.

A tension spring 21 is stretched between the cassette holder 8 and the base plate 1 and normally urges the cassette holder 8 counterclockwise in Fig. 3 around shaft 12 so as to urge the cam roller 20 towards a cam 22.

The cam 22 is mounted on a gear 23 which in turn is rotatably mounted on a supporting shaft 11a on the supporting plate 11. The gear 23 is engaged with a pinion 24. The pinion 24 is fixed to the drive shaft of a pulse motor 26 which is mounted on the supporting plate 11 by screws 25.

The operation of the apparatus is as follows.

Multicoloured prints can be prepared by the use of the multicoloured ink ribbon 5 by changing the

positions of the ribbon cassette 4 so as to position the swathes of the multicoloured ribbon corresponding to the colour to be printed at the position of the print head 3.

5 When the pulse motor 26 is driven through a particular angle and the driving power is transmitted to the gear 23 through the pinion 24, the cam 22 on the gear 23 is rotated through an angle corresponding to the angle through which the shaft of the pulse motor 26
10 has been rotated.

The cam roller 20 is moved an amount corresponding to the angle through which the cam 22 is rotated. The adjusting lever 14 with the cam roller 20 thereon and the cassette holder 8 to which it is fixed by screw 26
15 are moved around the axis of the supporting shaft 12 a corresponding amount. Therefore, the ribbon cassette 4 which is held on the cassette holder 8 is moved in pivoting movement to move the ribbon 5 at right angles to the running direction of the print head 3. As a
20 result, the print position of the multicoloured ink ribbon 5 which is positioned in front of the print head 3 is changed to a position in which a swathe of the multicoloured ink ribbon corresponding to the colour it is desired to print is at the printing position.

25 By selecting the proper angle of rotation of the pulse motor 26, any desired colour on the multicoloured ink ribbon 5 can be printed on paper provided on the platen.

In such manner, the desired colour on the
30 multicoloured ink ribbon 5 is positioned on a front surface of the print head 3 and can be printed by running of the printer head 3. In case of changing to another colour, the print head 3 is stopped.

An accurate print position of the multicoloured
35 ink ribbon 5 is not provided at the time of assembling of the printer, and the print position of the ribbon 5

can be finely adjusted as follows.

When the multicoloured ink ribbon 5 is to be finely adjusted downwardly because the position of the ribbon is slightly above the point of the print head 3, first the fixing screw 16 is loosened, and then the adjusting lever 14 is moved in the clockwise direction in Fig. 3 by a suitable adjusting length N for moving the position of the ribbon cassette 4 fixed to the cassette holder 8 from the chain line position shown in Fig. 3 to the position which is shown by a solid line.

The fixing screw 16 is tightened again at the adjusted position and the fine adjustment is completed.

When the multicoloured ink ribbon 5 is to be adjusted upwardly, this is accomplished by moving the adjusting lever 14 counterclockwise in Fig. 3 in the same manner as described above.

The adjusting lever 14 rotates around the axis of the shaft 13 on the cassette holder 8 in a relatively fine movement.

By such an adjusting operation, it is possible to accomplish correct positioning of each colour swathe of the multicoloured ink ribbon 5 relative to the print head 3.

As described above, the present invention provides a ribbon cassette containing a multicoloured ribbon, a cassette holder holding the ribbon cassette so that the part where the ribbon passes the print head can be moved up and down, an adjusting lever adjustably holding the cassette holder, a spring for pressing a cam roller on the adjusting lever against a cam, and a pulse motor for moving the cassette holder by driving the cam through a suitable angle of rotation to bring the desired colour swathe of the ink ribbon in front of the print head. If the correct position of the ribbon is not produced at the time of assembly of the printer, a fine adjustment can be accomplished simply and

correctly by changing the position of the cassette holder by fine adjusting movement of the adjusting lever.

This adjustment requires no skill. Therefore,
5 unskilled users can adjust the ribbon position easily.

Since the mechanism is simple, the printer with the ribbon adjusting apparatus can be provided at relatively low cost.



CLAIMS

1. A selective printer for printing a plurality of colours, comprising:

an exchangeable ribbon cassette from which is
5 drawn, and to which is returned, a multicoloured ink ribbon having a plurality of longitudinal colour swathes in side-by-side relationship such that any desired swathe can be brought into registry with the print head of the printer by movement of the cassette
10 so as to shift the ribbon laterally of its length;

a cassette holder for removably holding the ribbon cassette and mounted for the aforesaid movement of the ribbon cassette held therein;

an adjusting lever adjustably mounted on said
15 cassette holder and having a cam roller thereon;

a cam engaging said cam roller;

a spring urging said cassette holder for urging said cam roller against said cam; and

a pulse motor rotatable through a plurality of
20 angles of rotation respectively corresponding to the swathes of the multicoloured ribbon to position one swathe thereof in registry with the print head, whereby the colour printed can be changed by rotating said pulse motor through different angles of rotation and
25 whereby the fine position of the ribbon relative to the print head can be adjusted by relative movement of said adjusting lever and said cassette holder.

2. An apparatus as claimed in claim 1 in which said adjusting lever is pivotally mounted on said
30 cassette holder and said cassette holder has an edge having markings indicating adjusted positions of the multicoloured ribbon, and said adjusting lever has an indicator portion on the end thereof bent over said edge markings.

35 3. An apparatus as claimed in claim 1, substantially as hereinbefore described with reference



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to, and as shown in, the drawings.
