

Description

The present invention relates to a printer for monochromatic and multi-colour printing.

Monochromatic printers have previously been used only for monochromatic printing. In such printers it has not been possible to effect colour printing, while in multi-colour printers, it has not been possible to effect monochromatic printing even if a monochromatic ink ribbon cartridge is loaded into the printer. Thus, printers have generally been either for monochromatic or for colour printing only.

According to the present invention, there is provided a printer comprising a printing head; a cartridge holder for releasably holding a multi-colour ink ribbon cartridge containing ink ribbon material different parts of which are differently coloured; and drive means for adjusting, by way of drive transmission means, the relative positions of the printing head and of a multi-colour ink ribbon cartridge held in the cartridge holder to enable a selected said part of the ink ribbon material and the printing head to be brought into alignment for printing characterised in that the cartridge holder is also adapted releasably to hold a cartridge containing a monochromatic ink ribbon, the drive means being freely removable from the printer, the arrangement being such that, when the drive means is removed from the printer, only monochromatic printing can be effected and, when the drive means is installed on the printer, either multi-coloured or monochromatic printing can be effected as desired.

The cartridge holder may be arranged to be pivotally rotated by a drive transmission means so as to bring a selected said part into alignment with the printing head.

The cartridge holder is preferably pivotally mounted in a carriage which carries the printing head and the drive transmission means.

The drive transmission means may comprise a transmission gear which is rotatably mounted in the carriage and meshes with a gear on the drive means when the latter is also mounted in the carriage, rotation of the transmission gear effecting pivotal movement of the cartridge holder by way of an oscillatable lever.

There may be means for indicating whether a monochromatic or a multi-colour ink ribbon has been loaded into the cartridge holder. Thus the last-mentioned means may comprise a pair of contacts whose open or closed state is arranged to be altered by a projection on a multi-coloured ink ribbon cartridge.

There may be means for detecting a home position of the cartridge holder. Thus the last-mentioned means may comprise a pair of contacts whose open or closed state is arranged to be

altered by a projection on the carriage.

The drive means may be controlled by a control circuit which is adjustable by means of a variable resistor.

The cartridge holder may be provided with means for providing a multi-colour ink ribbon cartridge with a pivotal mounting, the drive transmission means comprising a thrust member which is moved by the drive means and is engageable with the multi-colour ink ribbon cartridge so as to effect pivotal movement of the latter.

The drive transmission means may in this case comprise a cam having a profile which engages the thrust member.

The drive means and the drive transmission means may be mounted in a common unit. Bayonet fixing means may be provided for securing the said common unit to a carriage of the printer.

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

Figure 1 is a plan view of a first embodiment of a printer in accordance with the present invention;

Figure 2 is an exploded perspective view illustrating the assembly of a removable and attachable motor unit, a driving means and an ink ribbon cartridge holder which form part of the printer of Figure 1;

Figure 3 is a perspective view illustrating a power transmission mechanism for rotating the said ink ribbon cartridge holder;

Figure 4 is a perspective view of a transmission gear forming part of the said power transmission mechanism;

Figure 5 is a view illustrating the operation of an oscillatable lever forming part of the said power transmission mechanism;

Figure 6 is a perspective view of an ink ribbon detector, the said ink ribbon cartridge holder and the said carriage;

Figure 7 is a perspective view illustrating the construction of the said ink ribbon detector;

Figure 8 illustrates the operation of the said ink ribbon detector;

Figure 9(a) is a top plan view and Figure 9(b) is a side view of an ink ribbon cartridge adapted to be mounted in the said ink ribbon cartridge holder;

Figure 10 is a circuit diagram of the said ink ribbon detector;

Figure 11 is a schematic view illustrating the operation of positioning an ink ribbon cartridge in a second embodiment of a printer according to the present invention;

Figure 12 is a perspective view of structure employed in the embodiment of Figure 11;

Figure 13 is a block diagram illustrating the operation of the structure shown in Figures 11

and 12;

Figure 14 is a flow chart illustrating the operation of setting the number of pulses in a register forming part of the structure shown in Figure 13;

Figure 15 is a view illustrating a previously suggested colour selecting mechanism,

Figure 16 is a cross-sectional view of a third embodiment of the present invention;

Figure 17 is a cross-sectional view of a motor unit forming part of the said third embodiment;

Figure 18 is a developed view of a cam forming part of the third embodiment,

Figure 19 is a cross-sectional view of the third embodiment illustrating its use in monochromatic printing;

Figure 20 is a perspective view of an ink ribbon cartridge which may be used in the third embodiment;

Figure 21(a) is a front view of a motor unit forming part of a fourth embodiment of the present invention;

Figure 21(b) is a cross-sectional view of the structure shown in Figure 4(a); and

Figure 22 is a cross-sectional view for showing a motor unit of a fifth embodiment of the present invention.

Terms such as "upward" and "downward", as used in the description below, are to be understood to refer to directions as seen in the accompanying drawings.

Reference will be made first to Figure 15 which depicts a colour selecting mechanism of a prior multi-colour printer.

As shown in Figure 15, a motor 81 for selecting colour is provided under a paper guide 88. The power supplied by the motor 81 is transmitted to a cam 82 and to an oscillatable lever 83. The oscillatable lever 83 vertically moves a cartridge holder 84 in which an ink ribbon cartridge 85 is mounted. Such vertical movement thus selects the position of a portion of a multi-coloured ribbon (or of one of a plurality of differently coloured ribbons 86) in the cartridge holder 84 with respect to a printing head (not shown) and consequently selects the colour to be printed on a sheet of paper (not shown) on a platen 87.

In the construction shown in Figure 15, however, the motor 81, together with other parts, is permanently secured to the printer body and neither the motor 81 itself, nor the driving unit consisting of the motor 81 and its peripherals (not shown), can be easily removed by a user.

As indicated above, previously known monochromatic printers could not be easily modified into multi-colour printers. Generally, therefore, if a user of a monochromatic printer has needed multi-colour printing, he has had to buy another printer to do such multi-colour printing.

If a detecting means or the like is to be additionally incorporated in a multi-colour printer in order that the user can use both a monochromatic ink ribbon cartridge and a multi-colour ink ribbon cartridge in the same printer, it is necessary to detect both what kind of ink ribbon cartridge has been selected and the home position of the ink ribbon cartridge. In this case, accordingly, two or more detectors would normally be required.

Furthermore, in order to match the upper and the lower positions of the ink ribbon cartridge accurately, fine adjustment of the cartridge position to a predetermined value has previously been performed by manipulating an operational portion of an adjusting member (not shown) attached to the carriage (not shown) of the printer. Since, however, the carriage on which the adjusting member is provided is subject to vibration and to external shock, the said predetermined value is very likely to be unstable and consequently a positioning error of the ink ribbon cartridge often occurs.

In the embodiments of the present invention described below it is therefore arranged that (a) the user can arbitrarily and easily select monochromatic printing or multi-colour printing at any time; (b) the printer can easily detect whether a monochromatic ink ribbon cartridge or a multi-colour ink ribbon cartridge has been loaded, while a home positioning of the particular ink ribbon cartridge employed can be accurately performed by using a signal from only one switching means; and (c) fine adjustment of the upper and the lower positions of the ink ribbon cartridge can be accurately and easily performed.

Figure 1 is a plan view of a first embodiment of a printer in accordance with the present invention.

In Figure 1 there is shown a printer having a carriage 5 which is slidably mounted for oscillation on guide shafts 2, 3 which are parallel to a platen 1.

Reference is now made to Figures 2 to 5 illustrating parts of the printer of Figure 1, the said printer being adapted to be changed from a monochromatic printer to a multi-colour printer and vice versa.

As shown in Figure 2, the printer has a printing head 4 secured to the carriage 5 and a transmission gear 13 and an oscillatable lever 14, which form part of a power transmission mechanism, are engaged with each other and are axially supported separately on the carriage 5. An ink ribbon cartridge holder 15, into and out of which an ink ribbon cartridge 18 is in operation, freely loaded or removed, is supported by side walls 23, 24 of the carriage 5. An arm 16 of the ink ribbon cartridge holder 15 is adapted to engage with a joint portion 28 of the oscillatable lever 14.

The carriage 5 is provided with claws 21, 22 for

securing a colour-selecting motor unit 19. The carriage 5 is also provided with a connector 25 for electrically connecting an electric circuit to the motor unit 19. When multi-colour printing is selected the motor unit 19 is pushed down in the direction shown by an arrow A and is attached to the carriage 5. With the motor unit 19 mounted in position on the carriage, a gear 20 protruding from the motor unit 19 engages with inner teeth 30 (Figures 3-5) of the transmission gear 13, thereby permitting the power of the motor unit 19 to be transmitted, as described below, to the ink ribbon cartridge holder 15 as well as connecting the motor unit 19 to the connector 25 and consequently to the electric circuit.

As shown in greater detail in Figure 4, the transmission gear 13 is provided with the inner teeth 30 and with another group of teeth 31 which are formed integrally around a centre shaft hole 32. A stub shaft 5b (Figure 6) carried by the carriage 5 is mounted in the hole 32 so that the transmission gear 13 is rotatably mounted on and carried by the carriage 5, the transmission gear being mounted on a shoulder portion of the stub shaft 5b.

The oscillatable lever 14, as shown in Figure 3 has a bush 29 at one end thereof provided with a through hole 29a. A stub shaft 5a (Figure 6) carried by the carriage 5 is mounted in the hole 29a. The oscillatable lever 14 is thus supported by the carriage 5 and is rotatable about the fulcrum provided by the stub shaft 5a. The lower surface of the bush 29 is supported by the upper surface of the carriage 5, the upper surface of the bush 29 supporting the lower surface of the cartridge holder 15. The oscillatable lever 14 has inner teeth 33 (Figure 5) which engage with the teeth 31 of the transmission gear 13. The lower surfaces of the inner teeth 33 contact the shoulder portion of the stub shaft 5b.

When pushed into the predetermined position, the motor unit 19 is secured by the claws 21 and 22.

When the motor unit 19 is not mounted on the carriage 5, in other words, when monochromatic printing is selected, the rotation of the transmission gear 13 is controlled by a bridge or the like (not shown) to move the oscillatable lever 14 no further than a predetermined position.

A colour switching operation of an ink ribbon 17 is described below, the ink ribbon 17 having a plurality of differently coloured bands 17a, 17b, 17c, 17d (Figure 2).

Reference is now made to Figure 5. When the gear 20 of the motor unit 19 rotates in the direction shown by an arrow F, since the gear 20 engages with the inner teeth 30 of the transmission gear 13, the teeth 31 of the transmission gear 13 also rotate in the direction F and the oscillatable lever 14,

whose inner teeth 33 engage with the teeth 31, rotates in the direction shown by an arrow B around the said fulcrum. Since the arm 16 mounted on the cartridge holder 15 engages with the joint portion 28 of the oscillatable lever 14, the cartridge holder 15 rotates in the direction shown by an arrow C around projections 26, 27 thereof, the projections 26, 27 being pivotally mounted in holes 8 in the side walls 23, 24 of the carriage 5. Then the positions of the colour bands 17a, 17b, 17c, 17d of the ink ribbon 17 are changed by rotating the gear 20 of the motor unit 19 and the selected colour band stops in front of the printing head 4. At this time, the gear 20 of the motor unit 19 also stops rotating. Thus, by driving the printing head 4, a selected colour is printed on the record paper employed.

When the gear 20 of the motor unit 19 rotates in the direction shown by an arrow G (Figure 3), the oscillatable lever 14 rotates around the said fulcrum in the direction shown by an arrow D. As a result, the cartridge holder 15 rotates in the direction shown by an arrow E around the projections 26 and 27. At this time, the cartridge holder 15 rotates in the direction opposite to that when the gear 20 rotates in the direction shown by the arrow F.

As described above, the ink ribbon colour is selected by using the rotation of the motor 19 which moves the oscillatable lever 14 in the direction shown by the arrow B or by the arrow D and consequently by rotating the ink ribbon cartridge holder 15 in the direction shown by the arrow C or by the arrow E.

Moreover, by mounting the motor unit 19 on the carriage 5, monochromatic printing or multi-colour printing can be selected at will and either a monochromatic or a multi-colour ink ribbon cartridge can be used in the same printer.

The printer is provided with an ink ribbon cartridge detector 47 and with a cartridge home position detecting mechanism which are described below with reference to Figures 6 to 9.

As shown in Figure 6, on opposite sides of the carriage 5 are the holes 8 for supporting the projections 26, 27 on the opposite sides of the ink ribbon cartridge holder 15. The ink ribbon cartridge holder 15 is oscillatable around the projections 26, 27. Further, the carriage 5 is provided with a projection 9 for establishing a colour home position of the cartridge holder 15.

Figure 7 shows the construction of the detector 47. As shown in Figure 7, the detector 47 is formed of detecting members 40, 41 and 42, contact plates 43 and 44 of conductive material secured between the detecting members 41, 42 and 40, 41 respectively, and an actuator 46 which is rotatably mounted on a portion 45 of the detecting member 40. The detector 47 is secured on the cartridge holder

15 by means of claws provided at the lower portion of the detecting member 42. The contact plates 43 and 44 have wings 48, 49 and 50, 51, respectively. The wings 48 and 50 are normally open circuited and the wings 49 and 51 are normally closed circuited, thus forming a two-contact one-circuit switch.

Generally speaking, the colour ribbon, such as the ribbon 17, is divided into four strips 17a, 17b, 17c, 17d of B (black), M (magenta), C (cyan) and Y (yellow), the strips 17a - 17d extending longitudinally of the ribbon 17, and the width of the ribbon being about 1 inch (2.54 cms). On the other hand, a monochromatic ink ribbon (not shown) is about 13mm in width. Accordingly, the thickness of the ribbon cartridge which has been used in a printer has depended upon whether it is for a multi-colour ink ribbon or for a monochromatic ink ribbon. As a result, when ribbon cartridge cases of different thicknesses are loaded into the same printer, if the initial ribbon home positioning operation of the printer is fixed, the printing is not always carried out on the central portion of the colour section of the ink ribbon.

In order to eliminate this problem it is required to provide two different initial ink ribbon home positioning operations, i.e. one for a multi-colour ink ribbon and the other for a monochromatic ink ribbon. Consequently, it is necessary to detect whether a multi-colour ink ribbon or a monochromatic ink ribbon has been loaded into the printer. For this purpose, a projection 53 is provided, as shown in Figure 9, on the bottom of the multi-colour ink ribbon cartridge 18 for pushing down the actuator 46. By reason of this structure, when a multi-colour ink ribbon cartridge 18 is loaded in the cartridge holder 15, the projection 53 automatically pushes down the actuator 46. The lower portion of the actuator 46 engages with the wing portion 49 of the contact plate 43 and so, when the actuator 46 is pushed down, the normally closed contact plates 49 and 51 are opened. In other words, when a multi-colour ink ribbon 17 is loaded, the contact plates 49 and 51 are open, and when a monochromatic ink ribbon is loaded, the contact plates 49 and 51 are closed. Thus the contact plates 49, 51 serve to detect whether a multi-colour or a monochromatic ink ribbon is being used.

The other contact plates 48 and 50, which are provided for detecting the colour home positioning, are normally open. As mentioned before, the power from the motor unit 19 mounted in the carriage 5 is transmitted to the ink ribbon cartridge holder 15 by the transmission mechanism 13, 14 and consequently the ink ribbon cartridge holder 15 is rotated in the downward direction. At this time, the colour home position projection 9 provided on the carriage 5 presses and closes the contact plates 48 and 50.

In response to the contact closing signal so provided, the rotation of the motor unit 19 is decelerated and stopped. The position of the ink ribbon cartridge holder 15 at this time is called the "colour home position".

The operational sequence of the cartridge holder 15 in the ribbon detection and the colour home positioning is described below.

First, the cartridge holder 15 is rotated in the upward direction to open the contact plates 48 and 50. As a result, a signal A' in Figure 10 is read. If the signal A' indicates that the contact plates 48, 50 are "closed", the loaded ribbon is detected to be a monochromatic ink ribbon and the cartridge holder 15 moves to a suitable position such that the printing head 4 strikes the center of the total width of the monochromatic ink ribbon and stays at this position. If the signal A' indicates that the contact plates 48, 50 are "open", the loaded ribbon is detected to be a multi-colour ink ribbon and the cartridge holder 15 is rotated in the downward direction until the contact plates 48 and 50 close and is moved to a suitable position such that the printing head 4 strikes the centre of the total width of the multi-colour ink ribbon and stays at this position.

A method for adjusting the optimum position of an ink ribbon cartridge with respect to a printing head of a second embodiment of a printer according to the present invention is now described with reference to Figures 11 and 12. The printer of Figures 11 and 12 is generally similar to that described above, like reference numerals indicating like parts.

As indicated in Figure 11, the carriage 5 holds the printing head 4 which is responsive to a printing signal delivered from an host device (not shown in the drawings) for printing information on paper or other record medium (not shown) mounted on the platen 1. The carriage 5 further includes an ink ribbon cartridge holder 63 which is in contact with a power transmitting means consisting of a driving means 61, such as a stepping motor M, and an eccentric cam 62 driven by the driving means 61. The ink ribbon cartridge holder 63 moves the ink ribbon surface with respect to the printing head 4.

A semi-fixed variable resistor 67 is provided on a portion of the printer body 68 (Figure 12) accessible to instruments or tools which can be easily inserted from outside the printer body 68. The variable resistor 67 receives a reference voltage VS and outputs, from a sliding terminal 67b, a voltage corresponding to the angular setting of an adjusting knob 67a.

An analog-digital converter 69 is provided for converting the analog value of the voltage delivered from the semi-fixed variable resistor 67 into a digital signal.

An ink ribbon colour selecting circuit 70, in response to a printing colour designating signal from the external host device or from an operational board (not shown) of the printer body 68, actuates the driving means 61 and controls the relative height of the ink ribbon and the printing head 4. Moreover, the colour selecting circuit 70 is further constructed so that the initial position is altered only by an amount which corresponds to the signal fed to it by the analog-digital converter 69.

In the embodiment illustrated in Figures 11 and 12, when the power switch (not shown) of the printer is turned on, the ink ribbon colour selecting circuit 70 is actuated to rotate the driving means 61 by an amount corresponding to the signal delivered to the ink ribbon colour selecting circuit 70 from the analog-digital converter 69, i.e. by an amount preset by the semi-fixed variable resistor 67, thereby adjusting the initial position of the ink ribbon cartridge 18.

When a printing colour designating signal is outputted from the host device (not shown), the ink ribbon colour selecting circuit 70 actuates the driving means 61 according to the printing colour designating signal to move the printing head side of the ink ribbon cartridge 18 until the section of its ink ribbon having the designated colour faces the printing head 4, the cartridge 18, then being maintained at that position.

When the host device outputs printing data and a timing signal, the carriage 5 moves in the printing direction and the printing head 4 prints the patterns corresponding to the printing data on the paper or other record medium using the selected colour section of the ink ribbon.

If the printed colours become mixed after long-time use or if it is necessary to adjust the position of the ink ribbon cartridge at the time of delivery from the factory, the position is adjusted in the following way. The host device or the operation board of the printer is operated to output a printing colour designating signal. A gauge is applied to the ink ribbon cartridge 18 to detect the relative positioning of the ink ribbon and the printing head 4. The adjusting knob 67a of the semi-fixed resistor 67 is rotated with a screwdriver or other suitable tool. Then the semi-fixed variable resistor 67 outputs from the sliding terminal 67b a voltage which depends upon the angular setting of the adjusting knob 67a. The analog value of this voltage is converted into a digital signal by the analog-digital converter 69 and the digital signal is fed to the ink ribbon colour selecting circuit 70. The ink ribbon colour selecting circuit 70 outputs a signal corresponding to the digital-converted value of the voltage from the converter 69 to actuate the driving means 61 to move the ink ribbon cartridge holder

63. The ink ribbon cartridge 18 then moves vertically with respect to the printing head 4. The adjusting knob 67a of the semi-fixed variable resistor 67 is slowly rotated until the selected colour section of the ink ribbon faces the printing head 4. Then the adjustment is completed and the gauge is removed.

The adjustment effected by rotating the adjusting knob 67a adjusts the effective resistance of the semi-fixed variable resistor 67. The new effective resistance is therefore maintained after the adjustment, and accordingly, is stored regardless of whether the power switch of the printer is turned on or off.

Figure 13 illustrates the operation of the embodiment of Figures 11 and 12. The voltage output from the variable resistor 67 is converted from an analog to a digital value by the analog-digital converter 69 which in turn outputs a digital-converted signal to a register 71. When the register 71 is, for instance, an 8-bit register, the signal from the variable resistor 67 is converted to a value from 0 to 255 and fed into the register 71. The value stored in the register 71 is divided by n and the number of pulses is set within a pulse number setting register 72 corresponding to the quotient. If the signal from the variable resistor 67 is divided by 10, for example, when the value stored in the register 71 is 0 to 19, the corresponding value 1 is set within the register 72, and when the value in the register 71 is 20 to 39, the corresponding value 2 is set within the register 72.

A pulse 73 for driving the driving member (e.g. a stepping motor) 61 is inputted to a counter 74 which counts the number of pulses 73. Every time when a pulse 73 is inputted to the counter 74, the value in the counter 74 and the value in the register 72 are compared and, until the values coincide with each other, a pulse is inputted into the driving member 61 to rotate the driving member 61.

Figure 14 is a flow chart illustrating the operation of setting the number of pulses in the register 72 after the power is turned on.

When the power is turned on (step 1), a voltage corresponding to the resistance set by the variable resistor 67 is fed to the analog-digital converter (step 2) and then the digital value corresponding to this voltage is outputted to the output register 71 (step 3). Thereafter, the value set within the register 71 is divided by n and the desired number of driving pulses is calculated and set in the register 72 (step 4).

Furthermore, by presetting the reference resistance in the analog-digital converter, it is possible to compare the input resistance with the reference resistance and to set the negative number of pulses (that is, the pulses effecting the reverse rotation of the driving member 61) in the register

72.

In this case, first the sign (positive or negative) of the preset value in the register 72 is detected and then, according to the result, the direction of rotation of the driving member 61 is determined.

The printer described above has the following advantages.

(a) a monochromatic printer is easily modified into a multi-colour printer simply by attaching the motor unit 19, 61, which represents a great economy for the user. Moreover, the motor unit 19, 61 can be so attached merely by pushing without the use of any instrument or tool, and so requires no skill.

(b) The printer can be used for both monochromatic printing and multi-colour printing.

(c) The motor unit 19, 61 is mounted on the carriage 5. Therefore, the external dimensions of the printer itself do not need to be increased by comparison with those of a usual monochromatic printer and consequently a small multi-colour printer can be provided.

(d) The two-contact one-circuit leaf switch 47 provided in the ink ribbon cartridge holder 15 detects whether a monochromatic ink ribbon cartridge or a multi-colour ink ribbon cartridge is present and effects home positioning of the cartridge. Accordingly, the detecting portion of the printer is provided at a very low cost. Furthermore, the detecting portion can be made small and the electrical circuit may be simple, which reduces the size of the printer as a whole. Moreover, since the colour home position is electrically detected, the ink ribbon cartridge is accurately positioned.

(e) The semi-fixed variable resistor 67 is provided within the printer body 68 so that the signals therefrom are outputted to the ink ribbon colour selecting circuit 70. As a result of this construction, the electric leads are arranged so that the adjusting knob 67a is mounted in a position where adjustment can be easily effected. This overcomes the problem which has been experienced previously in which an adjusting member is mounted on the carriage and is thus subject to vibration and external shocks with the result that it takes a long time for the ink colour to be accurately selected.

Reference will now be made to Figures 16-20 which illustrate a third embodiment of a printer according to the present invention.

As shown in Figure 16, the said third embodiment comprises a cartridge holder 115 which is mounted on or integral with a carriage 111. The cartridge holder 115 is arranged, as more fully described below, to carry a multi-colour ink ribbon cartridge 113. A spring 114 is interposed between the cartridge 113 and the cartridge holder 115 so

as to bias the cartridge 113 towards a print head 112.

The carriage 111 is provided with fixing pawls 117, 118 for fixing a motor unit 116 in a position in the carriage 111 in which it will be connected to a connector 119 which is itself connected to an electrical circuit (not shown). The motor unit 116 acts as a driving unit and may be introduced into its operative position by pushing it downwardly in the direction of an arrow K from a position above the carriage 111. When the motor unit 116 has been pushed into its operative position, it is supported by the fixing pawls 117 and 118, and at the same time, the motor unit 116 is connected to the connector 119 and is thus connected to the electrical circuit. The motor unit 116 may be freely removed from the printer merely by lifting the motor unit 116 upwardly after manually moving the ends of the fixing pawls 117, 118 away from each other.

The detailed construction of the motor unit 116 may be seen in Figure 17. The motor unit 116 comprises a motor 121 which acts as the drive means for selecting one of a plurality of colours to be printed. The motor unit 116 also comprises a transmission gear 122, a cam 123, and a thrust member 124. The motor 121 has a motor gear 121a which meshes with the transmission gear 122, the latter meshing with the cam 123. Thus the parts 121a, 122, 123, 124, as more fully explained below, constitute drive transmission means for imparting drive to the thrust member 124 so as to alter the relative positions of the print head 112 and cartridge 113.

The multi-colour ink ribbon cartridge 113 holds a multi-colour ribbon 120 as best shown in Figure 20. The ribbon 120 is provided with a plurality of differently coloured bands 120a, 120b, 120c, and 120d. A resilient member 113b having a stub shaft 113a is provided at each of the opposite sides of the multi-colour ribbon cartridge 113 so that the stub shafts 113a are urged outwardly with respect to the cartridge 113. A groove 113c (Figure 16) is provided in the lower surface of the multi-colour ribbon cartridge 113 as a clearance groove for receiving a positioning member 130 for a monochromatic ink ribbon cartridge 129 (Figure 19).

When the multi-colour ink ribbon cartridge 113 is held in the cartridge holder 115, the multi-colour ink ribbon cartridge 113 is supported by the stub shafts 13a which have been manually pressed towards each other and then introduced into holes 126 for receiving the shafts at the sides of the cartridge holder 115. The multi-coloured ink ribbon cartridge 113 is thus held with its multi-colour ribbon disposed adjacent to a platen 125. At the same time, the multi-colour ink ribbon cartridge 113 is urged in the direction of an arrow L by the spring 114 connected to the cartridge holder 115. The

thrust member 124 projects from the motor unit 116 and engages the lower surface of the multi-colour ink ribbon cartridge 113 for positioning the latter, the extent to which the thrust member 124 projects from the motor unit 116 determining which of the coloured bands 120a, 120b, 120c, 120d is disposed centrally of the platen 125 in a printing position. At this time, when the motor 121 is rotated in the direction of an arrow Q (Figure 17), the thrust member 124 is moved along a slope 123b - (Figure 18) of the cam 123 in the direction of an arrow P, whereby the multi-colour ink ribbon cartridge 113 is pivotally rotated in the direction of an arrow M. As a result of this rotation, the multi-colour ink ribbon 120 is moved and stops at a position opposite to the print head 112 so that the desired colour band may be used. The rotation of the motor 21 is then stopped. The print head 112 is then driven so that the desired colour printing is effected on paper or other record medium.

Upon the rotation of the motor 121 in the direction of an arrow R (Figure 17), the thrust member 124 is moved in the direction of an arrow N, whereby the multi-colour ink ribbon cartridge 113 is rotated in the direction of the arrow M.

As will be appreciated, the multi-colour ink ribbon cartridge 113 may readily be released from the cartridge holder 115 merely by pressing the stub shafts 113a towards each other so as to extract them from the holes 126, after which the cartridge 113 may be lifted out of the cartridge holder 115.

During the setting up of the multi-colour ink ribbon cartridge 113, the home position of the multi-colour ink ribbon cartridge 113 is detected as will now be explained. The cam 123 has the developed shape shown in Figure 18. If the motor 121 is rotated continuously in the direction of the arrow R, the cam 123 will be rotated into a position in which the thrust member 124 engages a positioning member 123a of the cam 123, and the motor 121 then stops. The position where the thrust member 124 engages the positioning member 123a is the multi-colour home position.

That is to say, if the motor 121 is rotated continuously in the direction of the arrow R (Figure 17), the thrust member 124 will contact the positioning member 123a, and the rotation of the motor 121 will be stopped, the motor 121 stepping out. At this time, after detecting the step-out of the motor by the nature of the driving waveform or after driving with more pulses than required for moving the thrust member 124 in the maximum range (a), the motor 121 is stopped and then the thrust member 124 is stopped in the home position (b). Therefore, the thrust member 124 will not always be in contact with the positioning member 123.

Based on the home position, the multi-colour

ink ribbon cartridge 113 is rotated to select the particular coloured band required of the multi-colour ink ribbon 120. Therefore, in the present embodiment, it is possible to position the cartridge 113 in the home position accurately without utilizing any particular electrical detecting device for detecting the multi-colour home position.

Figure 19 illustrates monochromatic printing in which the monochromatic ink ribbon cartridge 129 is mounted in the cartridge holder 115. The monochromatic ink ribbon cartridge 129 is formed in the same way as the multi-colour ink ribbon cartridge 113 except that it does not include the groove 113c of the multi-colour ink ribbon cartridge 113. The monochromatic ink ribbon cartridge 129 is axially supported by its stub shafts which have been inserted in the holes 126 which are provided at the sides of the cartridge holder 115 in the same way as occurs in the case of the multi-colour ink ribbon cartridge 113, the cartridge 129 being urged in the counterclockwise direction by the spring 114. Moreover, the monochromatic ink ribbon cartridge 129 is positioned in the desired position by the positioning member 130 which is mounted on the upper surface of the cartridge holder 115, irrespective of whether the motor unit 116 is present or not. As will be seen from Figure 19, the positioning member is arranged to hold the monochromatic ink ribbon cartridge 129 in a position such that it is always out of contact with the thrust member 124 whatever may be the vertical position of the latter. Consequently at this time, even if the motor unit 116 is in position in the printer and is driven so that a multi-colour ink ribbon cartridge 113 would be rotated in the range 113h - 113l by reason of movement of the thrust member 124 in the range 124h - 124l, there is no problem because the monochromatic ink ribbon cartridge 129 is not engaged by the thrust member 124. On the other hand, the clearance groove 113c on the lower surface of the multi-colour ink ribbon cartridge 113 is such that there will never be engagement between the positioning member 130 and the multi-colour ink ribbon cartridge 113 so that pivotal movement of the multi-colour ink ribbon cartridge 113 is not prevented by the positioning member 130. As a result, in this embodiment, no electrical detecting means are required for detecting whether the cartridge is monochrome or multi-colour.

As will be appreciated, therefore, when the motor unit 116 is removed from the printer, only monochromatic printing can be effected, whereas when the motor unit 116 is installed in the printer, wither multi-coloured or monochromatic printing can be effected as desired.

Figure 21 illustrates a fourth embodiment which employs a bayonet type method of securing a motor unit 116a to the printer. The carriage 111c

has a hole 111a to receive therein an engagement portion 127a formed at the left hand end of a lock pin 127 mounted in the motor unit 116, the lock pin 127 having a manually engageable lock lever 128. Thus when the lock lever 128 mounted on the lock pin 127 is rotated, the motor unit 116 can be fixed to the carriage 111c. In addition, the carriage 111c has sloping portions 111b on opposite sides of the hole 111a so as to assist the smooth rotation of the engagement portion 127a of the lock pin 127 into and out of the locked position.

In Figure 22 there is illustrated an alternative method of effecting the required vertical movement of the thrust member 124.

In the Figure 22 construction a motor unit 116b contains a motor 121b having a motor gear 121c. The motor gear 121c meshes with a gear wheel 122a which is integral with a bevel gear 122b. The bevel gear 122b meshes with a bevel gear 122c fixed to a shaft 122d which is rotatably mounted in the casing of the motor unit 116b. A disc cam 123c is fixedly mounted on the shaft 122d and engages a thrust member 124a. The profile of the disc cam 123c may be the same as that of the cam 123 shown in Figure 18.

As indicated above, the motor unit 116 may be installed merely by pushing it into position in the carriage 111 with the result that the motor unit 116 can be installed at any time and by any one without any tool. Further, since the motor unit 116 is installed in the carriage 111, it is not necessary to provide a larger printer as compared with a monochromatic printer, and therefore it is possible to provide a compact multi-colour printer.

Furthermore, since the driving means constituted by the motor 121 and the transmission means 121a, 122, 123, 124 for selecting the required colour are held within one unit, namely the motor unit 116, it is possible to employ a smaller carriage than that normally used in a monochromatic printer, so that it is possible to move the carriage at a high speed and to position the ink ribbon cartridge with high accuracy.

Claims

1. A printer comprising a printing head (4); a cartridge holder (15) for releasably holding a multi-colour ink ribbon cartridge (18) containing ink ribbon material (17) different parts (17a, 17b, 17c, 17d) of which are differently coloured; and drive means (19) for adjusting, by way of drive transmission means (13,14), the relative positions of the printing head (4) and of a multi-colour ink ribbon cartridge (18) held in the cartridge holder (15) to enable a selected said part (17a, 17b, 17c, 17d) of the ink ribbon material (17) and the printing head (4) to be

brought into alignment for printing characterised in that the cartridge holder (15) is also adapted releasably to hold a cartridge containing a monochromatic ink ribbon, the drive means (19) being freely removable from the printer, the arrangement being such that, when the drive means (19) is removed from the printer, only monochromatic printing can be effected and, when the drive means (19) is installed on the printer, either multi-coloured or monochromatic printing can be effected as desired.

2. A printer as claimed in claim 1 characterised in that the cartridge holder (15) is arranged to be pivotally rotated by the drive transmission means (13,14) so as to bring a selected said part (17a, 17b, 17c, 17d) into alignment with the printing head (4).
3. A printer as claimed in claim 2 characterised in that the cartridge holder (15) is pivotally mounted in a carriage (5) which carries the printing head (4) and the drive transmission means (13,14).
4. A printer as claimed in claim 3 characterised in that the drive transmission means (13,14) comprises a transmission gear (13) which is rotatably mounted in the carriage (5) and meshes with a gear (20) of the drive means (19) when the latter is also mounted in the carriage (5), rotation of the transmission gear (13) effecting pivotal movement of the cartridge holder (15) by way of an oscillatable lever (14).
5. A printer as claimed in any preceding claim characterised in that there are means (49, 51, 53) for indicating whether a monochromatic or a multi-colour ink ribbon has been loaded into the cartridge holder (15).
6. A printer as claimed in claim 5 characterised in that the last-mentioned means (49,51,53) comprise a pair of contacts (49,51) whose open or closed state is arranged to be altered by a projection (53) on a multi-coloured ink ribbon cartridge (18).
7. A printer as claimed in any preceding claim characterised in that there are means (9,48,50) for detecting a home position of the cartridge holder (15).
8. A printer as claimed in claim 7 when dependent on claim 3 characterised in that the last-mentioned means (9,48,50) comprise a pair of



has a hole 111a to receive therein an engagement portion 127a formed at the left hand end of a lock pin 127 mounted in the motor unit 116, the lock pin 127 having a manually engageable lock lever 128. Thus when the lock lever 128 mounted on the lock pin 127 is rotated, the motor unit 116 can be fixed to the carriage 111c. In addition, the carriage 111c has sloping portions 111b on opposite sides of the hole 111a so as to assist the smooth rotation of the engagement portion 127a of the lock pin 127 into and out of the locked position.

In Figure 22 there is illustrated an alternative method of effecting the required vertical movement of the thrust member 124.

In the Figure 22 construction a motor unit 116b contains a motor 121b having a motor gear 121c. The motor gear 121c meshes with a gear wheel 122a which is integral with a bevel gear 122b. The bevel gear 122b meshes with a bevel gear 122c fixed to a shaft 122d which is rotatably mounted in the casing of the motor unit 116b. A disc cam 123c is fixedly mounted on the shaft 122d and engages a thrust member 124a. The profile of the disc cam 123c may be the same as that of the cam 123 shown in Figure 18.

As indicated above, the motor unit 116 may be installed merely by pushing it into position in the carriage 111 with the result that the motor unit 116 can be installed at any time and by any one without any tool. Further, since the motor unit 116 is installed in the carriage 111, it is not necessary to provide a larger printer as compared with a monochromatic printer, and therefore it is possible to provide a compact multi-colour printer.

Furthermore, since the driving means constituted by the motor 121 and the transmission means 121a, 122, 123, 124 for selecting the required colour are held within one unit, namely the motor unit 116, it is possible to employ a smaller carriage than that normally used in a monochromatic printer, so that it is possible to move the carriage at a high speed and to position the ink ribbon cartridge with high accuracy.

Claims

1. A printer comprising a printing head (4); a cartridge holder (15) for releasably holding a multi-colour ink ribbon cartridge (18) containing ink ribbon material (17) different parts (17a, 17b, 17c, 17d) of which are differently coloured; and drive means (19) for adjusting, by way of drive transmission means (13,14), the relative positions of the printing head (4) and of a multi-colour ink ribbon cartridge (18) held in the cartridge holder (15) to enable a selected said part (17a, 17b, 17c, 17d) of the ink ribbon material (17) and the printing head (4) to be brought into alignment for printing characterised in that the cartridge holder (15) is also adapted releasably to hold a cartridge containing a monochromatic ink ribbon, the drive means (19) being freely removable from the printer, the arrangement being such that, when the drive means (19) is removed from the printer, only monochromatic printing can be effected and, when the drive means (19) is installed on the printer, either multi-coloured or monochromatic printing can be effected as desired.
2. A printer as claimed in claim 1 characterised in that the cartridge holder (15) is arranged to be pivotally rotated by the drive transmission means (13,14) so as to bring a selected said part (17a, 17b, 17c, 17d) into alignment with the printing head (4).
3. A printer as claimed in claim 2 characterised in that the cartridge holder (15) is pivotally mounted in a carriage (5) which carries the printing head (4) and the drive transmission means (13,14).
4. A printer as claimed in claim 3 characterised in that the drive transmission means (13,14) comprises a transmission gear (13) which is rotatably mounted in the carriage (5) and meshes with a gear (20) of the drive means (19) when the latter is also mounted in the carriage (5), rotation of the transmission gear (13) effecting pivotal movement of the cartridge holder (15) by way of an oscillatable lever (14).
5. A printer as claimed in any preceding claim characterised in that there are means (49, 51, 53) for indicating whether a monochromatic or a multi-colour ink ribbon has been loaded into the cartridge holder (15).
6. A printer as claimed in claim 5 characterised in that the last-mentioned means (49,51,53) comprise a pair of contacts (49,51) whose open or closed state is arranged to be altered by a projection (53) on a multi-coloured ink ribbon cartridge (18).
7. A printer as claimed in any preceding claim characterised in that there are means (9,48,50) for detecting a home position of the cartridge holder (15).
8. A printer as claimed in claim 7 when dependent on claim 3 characterised in that the last-mentioned means (9,48,50) comprise a pair of

contacts (48,50) whose open or closed state is arranged to be altered by a projection (9) on the carriage (5).

9. A printer as claimed in any preceding claim characterised in that the drive means (61) is controlled by a control circuit (70) which is adjustable by means of a variable resistor (67).

10. A printer as claimed in claim 1 characterised in that the cartridge holder (15) is provided with means (126) for providing the multi-colour ink ribbon cartridge (18) with a pivotal mounting, the drive transmission means (121a, 122, 123, 124) comprising a thrust member (124) which is moved by the drive means (121) and is engageable with the multi-colour ink ribbon cartridge (18) so as to effect pivotal movement of the latter.

11. A printer as claimed in claim 10 characterised in that the drive transmission means (121a, 122, 123, 124) comprises a cam (123) having a profile which engages the thrust member (124).

12. A printer as claimed in any preceding claim characterised in that the drive means (121) and the drive transmission means (121a, 122, 123, 124) are mounted in a common unit (116).

13. A printer as claimed in claim 12 characterised in that bayonet fixing means (111a, 111b, 127, 127a, 128) are provided for securing the said common unit (116) to a carriage (111c) of the printer.

14. A printer comprising:

a freely removable and attachable driving means (19) for selecting colour;

an ink ribbon cartridge holder (15) for holding a colour ink ribbon cartridge (18) or a monochromatic ink ribbon cartridge, said ink ribbon cartridge (18) being freely removable and attachable; and

a power transmitting means (13,14) responsive to the power supplied by said driving means (19) for moving said ink ribbon cartridge holder (15);

said printer being constructed so that, without said driving means (19), said monochromatic ink ribbon cartridge is selected to provide a monochromatic print and that, with said driving means (19), one of said monochromatic ink ribbon cartridge and said colour ink ribbon cartridge (18) is selected to provide a monochromatic print or a colour print.

15. A printer adaptable for printing in monochromatic or multi-colour ink, the printer comprising:

ink ribbon cartridge holder means on which a print head means is supported; ink ribbon cartridge means for slidably supporting a monochromatic or a multi-colour ink ribbon cartridge;

a driving unit including transmission means adapted to be detachably coupled to the ink ribbon cartridge holder means and slidably moving the colour ribbon cartridge means by transmitting driving means and the output thereof, the transmission means positioning the cartridge holder means for monochromatic printing when the driving means is not present, and when the driving means is present, for one of either monochromatic and color printing.

16. A printer adaptable for printing in either monochromatic or multi-colour ink, the printer comprising a carriage (16) on which a printing head (4) is supported; an ink ribbon cartridge holder (15) for supporting a monochromatic or a multi-colour ink ribbon cartridge (18); drive means (19) including transmission means (13,14) adapted to be detachably coupled to the ink ribbon cartridge holder (15) so as to move the multi-colour ribbon cartridge (18) by transmitting drive from the drive means (19), the transmission means (13,14) positioning the ink ribbon cartridge holder (15) for monochromatic printing when the drive means (19) is not present, and the transmission means (13,14) permitting either monochromatic or colour printing when the drive means (19) is present.

Revendications

1. Imprimante comprenant une tête d'impression (4), un support (15) de cartouche destiné à supporter de façon amovible une cartouche (18) de ruban encreur en couleurs contenant une matière de ruban encreur (117) dont des parties différentes (17a, 17b, 17c, 17d) ont des couleurs différentes, et un dispositif d'entraînement (19) destiné à ajuster, à l'aide d'un dispositif (13, 14) de transmission d'entraînement, les positions relatives de la tête d'impression (4) et d'une cartouche (18) de ruban encreur en couleurs supportée dans le support (15) de cartouche afin qu'une partie choisie (17a, 17b, 17c, 17d) de la matière du ruban encreur (17) et la tête d'impression (4) puissent être mises en position d'alignement d'impression, caractérisée en ce que le support (15) de cartouche



- est aussi destiné à supporter temporairement une cartouche contenant un ruban encreur monochrome, le dispositif d'entraînement (19) pouvant être retiré librement de l'imprimante, la disposition étant telle que, lorsque le dispositif d'entraînement (19) est retiré de l'imprimante, seule l'impression monochrome peut être réalisée et, lorsque le dispositif d'entraînement (19) est placé sur l'imprimante, une impression monochrome ou en couleurs peut être réalisée à volonté.
2. Imprimante selon la revendication 1, caractérisée en ce que le support (15) de cartouche est disposé afin qu'il tourne sous la commande du dispositif (13, 14) de transmission d'entraînement afin qu'une partie choisie (17a, 17b, 17c, 17d) puisse être alignée sur la tête d'impression (4).
 3. Imprimante selon la revendication 2, caractérisée en ce que le support (15) de la cartouche est monté sous forme articulée dans un chariot (5) qui porte la tête d'impression (4) et le dispositif (13, 14) de transmission d'entraînement.
 4. Imprimante selon la revendication 3, caractérisée en ce que le dispositif (13, 14) de transmission d'entraînement comporte un pignon (13) de transmission qui est monté dans le chariot (5) afin qu'il puisse tourner et qui est en prise avec un pignon (20) du dispositif d'entraînement (19) lorsque ce dernier est aussi monté dans le chariot (5), la rotation du pignon (13) de transmission assurant le mouvement de pivotement du support (15) de cartouche à l'aide d'un levier oscillant (14).
 5. Imprimante selon l'une quelconque des revendications précédentes, caractérisée en ce qu'elle comporte un dispositif (49, 51, 53) destiné à indiquer si le ruban chargé dans le support (15) de cartouche est monochrome ou en couleurs.
 6. Imprimante selon la revendication 5, caractérisée en ce que le dernier dispositif précité (49, 51, 53) est une paire de contacts (49, 51) dont l'état d'ouverture ou de fermeture est destiné à être modifié par une saillie (53) placée sur une cartouche (18) de ruban encreur en couleurs.
 7. Imprimante selon l'une quelconque des revendications précédentes, caractérisée en ce qu'elle comporte un dispositif (9, 48, 50) destiné à détecter une position de repos du support (15) de cartouche.
 8. Imprimante selon la revendication 7 lorsqu'elle dépend de la revendication 3, caractérisée en ce que le dernier dispositif précité (9, 48, 50) est une paire de contacts (48, 50) dont l'état d'ouverture ou de fermeture est destiné à être modifié par une saillie (9) portée par le chariot (5).
 9. Imprimante selon l'une quelconque des revendications précédentes, caractérisée en ce que le dispositif d'entraînement (61) est commandé par un circuit de commande (70) qui est ajustable à l'aide d'une résistance variable (67).
 10. Imprimante selon la revendication 1, caractérisée en ce que le support (15) de cartouche a un dispositif (126) destiné à assurer le montage pivotant de la cartouche (18) de ruban encreur en couleurs, le dispositif (121a, 122, 123, 124) de transmission d'entraînement comprenant un organe de poussée (124) qui est déplacé par le dispositif d'entraînement (121) et qui peut coopérer avec la cartouche (18) de ruban encreur en couleurs afin que le mouvement de pivotement de cette dernière soit assuré.
 11. Imprimante selon la revendication 10, caractérisée en ce que le dispositif (121a, 122, 123, 124) de transmission d'entraînement comporte une came (123) ayant un profil qui est au contact de l'organe de poussée (124).
 12. Imprimante selon l'une quelconque des revendications précédentes, caractérisée en ce que le dispositif d'entraînement (121) et le dispositif (121a, 122, 123, 124) de transmission d'entraînement sont montés dans un ensemble commun (116).
 13. Imprimante selon la revendication 12, caractérisée en ce qu'un dispositif de fixation à baïonnette (111a, 111b, 127, 127a, 128) est destiné à fixer l'ensemble commun (116) à un chariot (111c) de l'imprimante.
 14. Imprimante comprenant
 - un dispositif (19) d'entraînement qui peut être retiré et fixé sélectivement et qui est destiné à la sélection d'une couleur,
 - un support (15) de cartouche de ruban encreur destiné à supporter une cartouche (18) de ruban encreur en couleurs ou une cartouche de ruban encreur monochrome, la cartouche (18) de ruban encreur pouvant être librement retirée et mise en position, et
 - un dispositif (13, 14) de transmission d'énergie commandé par l'énergie transmise



par le dispositif (19) d'entraînement et destiné à déplacer le support (15) de cartouche de ce ruban encreur,

l'imprimante étant construite de manière que, en l'absence du dispositif d'entraînement (19), la cartouche de ruban encreur monochrome soit sélectionnée pour une impression monochrome et que, en présence du dispositif d'entraînement (19), une cartouche de ruban encreur monochrome ou une cartouche (18) de ruban encreur en couleurs soit sélectionnée et donne une impression monochrome ou une impression en couleurs.

15. Imprimante destinée à une impression monochrome ou en couleurs, l'imprimante comprenant

un dispositif de support de chariot de ruban encreur sur lequel une tête d'impression est supportée,

un dispositif à cartouche de ruban encreur destiné à supporter une cartouche de ruban encreur monochrome ou en couleurs afin qu'elle puisse coulisser, et

un dispositif d'entraînement comprenant un dispositif de transmission destiné à être couplé temporairement au dispositif de support de cartouche de ruban encreur et à déplacer par coulisement la cartouche de ruban en couleurs à l'aide du dispositif d'entraînement et de son signal de sortie, le dispositif de transmission positionnant le dispositif de support de cartouche pour l'impression monochrome lorsque le dispositif d'entraînement n'est pas présent alors que, lorsque le dispositif d'entraînement est présent, il permet l'impression monochrome ou en couleurs.

16. Imprimante destinée à l'impression avec une encre monochrome ou en couleurs, l'imprimante comprenant un chariot (16) sur lequel est supportée une tête d'impression (4), un support (15) de cartouche de ruban encreur destiné à supporter une cartouche (18) de ruban encreur monochrome ou en couleurs, un dispositif (19) d'entraînement comprenant un dispositif (13, 14) de transmission destiné à être couplé temporairement au support (15) de cartouche de ruban encreur afin que la cartouche (18) de ruban en couleurs soit déplacée par l'énergie de transmission du dispositif d'entraînement (19), le dispositif de transmission (13, 14) positionnant le support (15) de cartouche de ruban encreur pour l'impression monochrome lorsque le dispositif d'entraînement (19) n'est pas présent, et le dispositif (13, 14) de transmission permettant une impression monochrome ou en couleurs lorsque le dispo-

sitif d'entraînement (19) est présent.

Patentansprüche

1. Drucker mit einem Druckkopf (4), einem Kassettenträger (15) zur lösbaren Halterung einer Mehrfarb-Farbbandkassette (18), die ein Farbbandmaterial (17) mit unterschiedlich gefärbten Farbbandteilen (17a, 17b, 17c, 17d) enthält, und mit einer die Positionen einer in dem Kassettenträger (15) gehaltenen Mehrfarb-Farbbandkassette (18) und des Druckkopfes (4) mittels einer Antriebsübertragungseinrichtung (13, 14) relativ zueinander einstellenden Antriebseinrichtung (19) zur Ausrichtung eines ausgewählten Farbbandteils (17a, 17b, 17c, 17d) des Farbbandmaterials (17) und des Druckkopfes (4) zueinander zum Drucken, dadurch gekennzeichnet, daß der Kassettenträger (15) auch zur lösbaren Halterung einer ein Monochrom-Farbband enthaltenden Kassette eingerichtet ist und daß die Antriebseinrichtung (19) aus dem Drucker frei entfernbar ist, wobei nur monochromes Drucken ermöglicht ist, wenn die Antriebseinrichtung (19) aus dem Drucker entfernt ist, und wahlweise entweder mehrfarbiges oder monochromes Drucken ermöglicht ist, wenn die Antriebseinrichtung (19) in dem Drucker installiert ist.
2. Drucker nach Anspruch 1, dadurch gekennzeichnet, daß der Kassettenträger (15) mittels der Antriebsübertragungseinrichtung (13, 14) verschwenkbar ist, um einen ausgewählten Farbbandteil (17a, 17b, 17c, 17d) zu dem Druckkopf (4) auszurichten.
3. Drucker nach Anspruch 2, dadurch gekennzeichnet, daß der Kassettenträger (15) an einem den Druckkopf (4) und die Antriebsübertragungseinrichtung (13, 14) tragenden Schlitten (5) schwenkbar gelagert ist.
4. Drucker nach Anspruch 3, dadurch gekennzeichnet, daß die Antriebsübertragungseinrichtung (13, 14) ein in dem Schlitten (5) drehbar gelagertes Übertragungszahnrad (13) aufweist, welches mit einem Zahnrad (20) der Antriebseinrichtung (19) in Eingriff steht, wenn letztere ebenfalls in dem Schlitten (5) montiert ist, wobei die Drehung des Übertragungszahnrades (13) eine Schwenkbewegung des Kassettenträgers (15) mittels eines hin- und herbewegbaren Hebels (14) bewirkt.



5. Drucker nach wenigstens einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
daß Mittel (49, 51, 53) vorgesehen sind, die indizieren, ob ein Monochrom-Farbband oder ein Mehrfarb-Farbband in den Kassettenhalter (15) eingebracht ist. 5
6. Drucker nach Anspruch 5,
dadurch gekennzeichnet,
daß die letztgenannten Mittel (49, 51, 53) ein Paar von Kontakten (49, 51) umfassen, die bezüglich ihres geöffneten oder geschlossenen Zustandes mittels eines Vorsprungs (53) an einer Mehrfarb-Farbbandkassette (18) umschaltbar sind. 10 15
7. Drucker nach wenigstens einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
daß Mittel (9, 48, 50) zur Erfassung einer Ausgangsstellung des Kassettenhalters (15) vorgesehen sind. 20
8. Drucker nach Anspruch 7, rückbezogen auf Anspruch 3,
dadurch gekennzeichnet,
daß die letztgenannten Mittel (9, 48, 50) ein Paar von Kontakten (48, 50) umfassen, die bezüglich ihres geöffneten oder geschlossenen Zustandes mittels eines Vorsprungs (9) an dem Schlitten (5) umschaltbar sind. 25 30
9. Drucker nach wenigstens einem der vorhergehenden Ansprüche,
gekennzeichnet durch eine die Antriebseinrichtung (61) steuernde Steuerschaltung (70), die mittels eines verstellbaren Widerstandes (67) einstellbar ist. 35
10. Drucker nach Anspruch 1,
dadurch gekennzeichnet,
daß der Kassettenhalter (15) Mittel (126) zur schwenkbaren Halterung der Mehrfarb-Farbbandkassette (18) aufweist und daß die Antriebsübertragungseinrichtung (121a, 122, 123, 124) ein von der Antriebseinrichtung (121) bewegtes Schubteil (124) umfaßt, welches an die Mehrfarb-Farbbandkassette (18) angreift, um diese zu verschwenken. 40 45 50
11. Drucker nach Anspruch 10,
dadurch gekennzeichnet,
daß die Antriebsübertragungseinrichtung (121a, 122, 123, 124) einen Nocken (123) mit einem an dem Schubteil (124) angreifenden Nockenprofil umfaßt. 55
12. Drucker nach wenigstens einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
daß die Antriebseinrichtung (121) und die Antriebsübertragungseinrichtung (121a, 122, 123, 124) in einer gemeinsamen Einheit (116) montiert sind.
13. Drucker nach Anspruch 12,
dadurch gekennzeichnet,
daß Bajonettbefestigungsmittel (111a, 111b, 127, 127a, 128) zur Fixierung der gemeinsamen Einheit (116) an einen Schlitten (111c) des Druckers vorgesehen sind.
14. Drucker, umfassend
eine frei anbringbare und entfernbare Antriebseinrichtung (19) zur Farbauswahl,
einen Farbbandkassettenhalter (15) zur Halterung einer frei entfernbaren und einsetzbaren Mehrfarb-Farbbandkassette (18) oder Monochrom-Farbbandkassette, und
eine die von der Antriebseinrichtung (19) gelieferte Kraft übertragende Kraftübertragungseinrichtung (13, 14) zur Bewegung des Farbbandkassettenhalters (15),
wobei der Drucker so aufgebaut ist, daß bei fehlender Antriebseinrichtung (19) die Monochrom-Farbbandkassette für monochromes Drucken ausgewählt wird, und daß bei vorhandener Antriebseinrichtung (19) entweder die Monochrom-Farbbandkassette oder die Mehrfarb-Farbbandkassette (18) für monochromes oder mehrfarbiges Drucken ausgewählt wird.
15. Drucker, der zum mehrfarbigen Drucken oder zum monochromen Drucken verwendbar ist, umfassend
eine Farbbandschlittenhalterungseinrichtung, an der eine Druckkopfeinrichtung gehalten ist,
eine Farbbandkassetteneinrichtung zur verschiebbaren Halterung einer Monochrom-Farbbandkassette oder einer Mehrfarb-Farbbandkassette, eine Antriebseinheit mit einer Übertragungseinrichtung zur lösbaren Kopplung mit der Farbbandkassettenhalterungseinrichtung und zur Verschiebung der Farbbandkassetteneinrichtung mittels antriebsübertragender Mittel und deren Ausgabe, wobei die Übertragungseinrichtung die Kassettenhalterungseinrichtung zum monochromen Drucken positioniert, wenn die Antriebseinrichtung nicht vorhanden ist, und die Kassettenhalterungseinrichtung zum monochromen Drucken oder zum mehrfarbigen Drucken positioniert, wenn die Antriebseinrichtung vorhanden ist.



16. Drucker, der entweder zum mehrfarbigen Drucken oder zum monochromen Drucken verwendbar ist, umfassend einen Schlitten (16), an dem ein Druckkopf (4) gehalten ist, einen Farbbandkassettenhalter (15) zur Halterung einer Monochrom-Farbbandkassette oder einer Mehrfarb-Farbbandkassette (18), eine Antriebseinrichtung (19) mit einer Übertragungseinrichtung (13, 14) zur lösbaren Kopplung mit dem Farbbandkassettenhalter (15), um die Mehrfarb-Farbbandkassette (18) durch Übertragung des Antriebs der Antriebseinrichtung (19) zu bewegen, wobei die Übertragungseinrichtung (13, 14) den Farbbandkassettenhalter (15) zum monochromen Drucken positioniert, wenn die Antriebseinrichtung (19) nicht vorhanden ist, und die Übertragungseinrichtung (13, 14) entweder monochromes oder farbiges Drucken ermöglicht, wenn die Antriebseinrichtung (19) vorhanden ist.

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