

[54] **MULTICOLOR INK RIBBON CONTROL
FOR HIGH SPEED LINE PRINTERS**[75] Inventor: **Rentaro Sasaki**, Takasaki, Japan[73] Assignee: **Oki Electric Industry Co., Ltd.**,
Tokyo, Japan[22] Filed: **May 14, 1973**[21] Appl. No.: **359,904**[30] **Foreign Application Priority Data**May 22, 1972 Japan..... 47-49846
Sept. 19, 1972 Japan..... 47-93272[52] U.S. Cl..... **101/336**, 197/151, 197/172[51] Int. Cl..... **B41f 31/16**[58] Field of Search 197/151, 157, 158, 159,
197/160, 161, 162, 163, 164, 165, 172, 173,
174; 101/336, 96, 96 RC, 100, 102, 107[56] **References Cited****UNITED STATES PATENTS**349,026 9/1886 Anderson..... 197/172
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[57]

ABSTRACT

A high speed multicolor printing machine using an ink ribbon having on its surface colored stripes or bands of two or more different colors, whereby for printing a certain line in a color different from the other lines, the particular ribbon color in which to print is selected out and the stripes of said particular colors are accurately positioned in alignment with the printing types to print in the particular color.

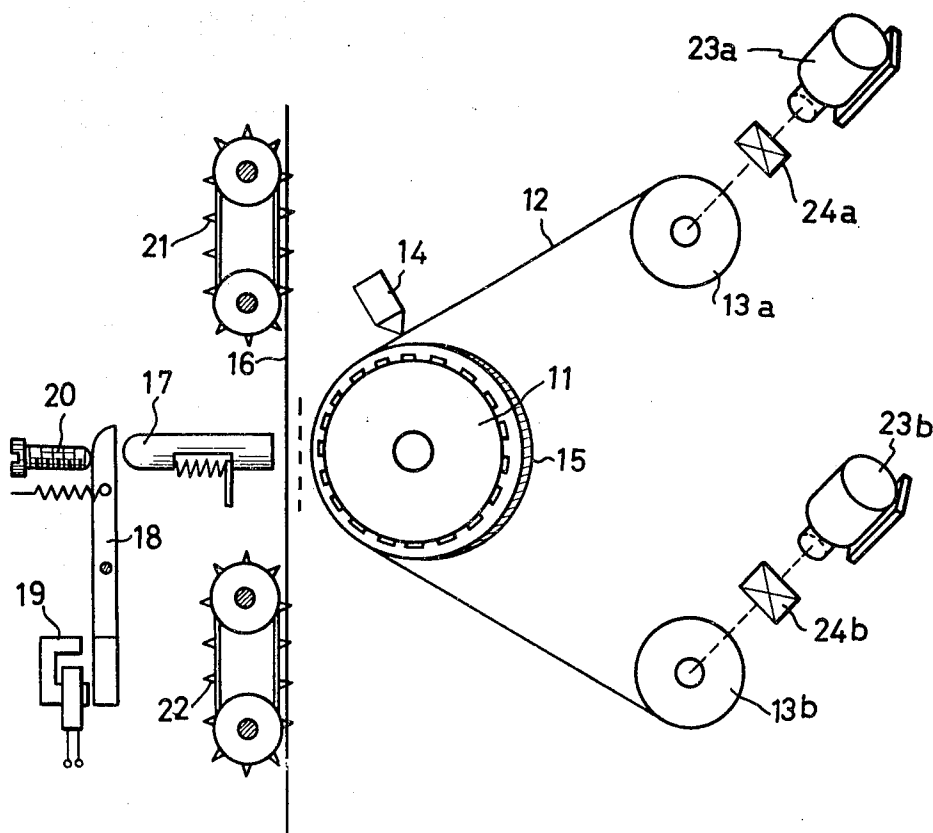
9 Claims, 5 Drawing Figures

FIG. 1

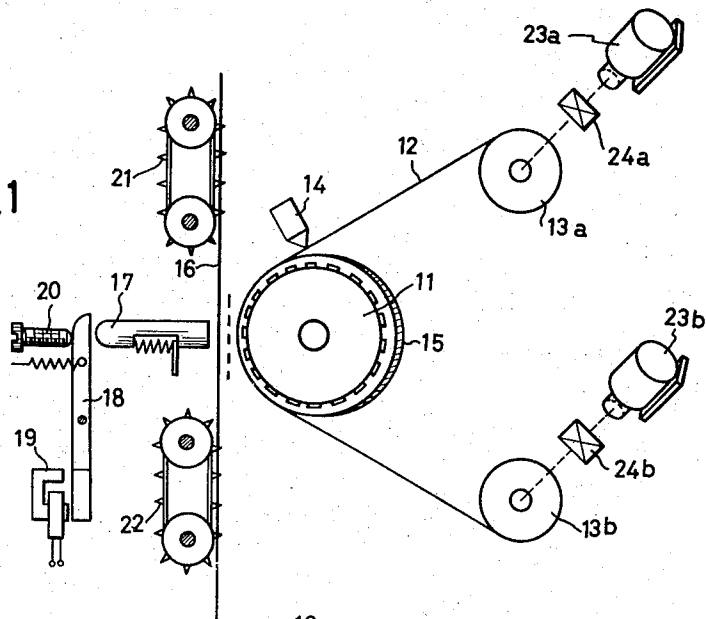
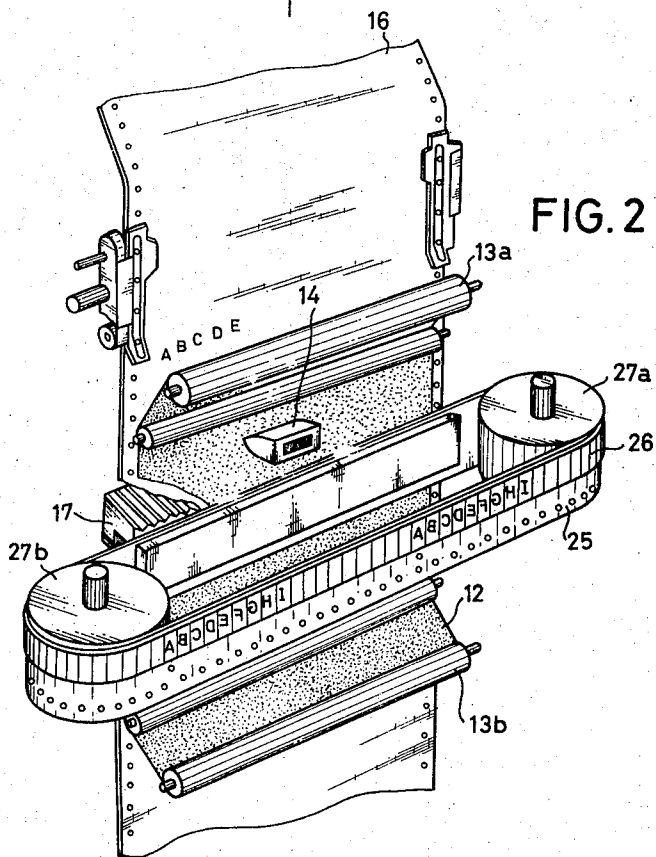


FIG. 2



MULTICOLOR INK RIBBON CONTROL FOR HIGH SPEED LINE PRINTERS

BACKGROUND OF THE INVENTION:

In a high speed printing machine, such as a line printer whereby the typing of one full line can be performed at one time, there is used usually a wide ink ribbon. A narrow ink ribbon can provide sufficient ink supply in a low or middle speed printing machine, but it is found difficult with such narrow ribbons to realize satisfactory speed-up of the ribbon feeding mechanism in a high speed printing machine, and also such narrow ribbon proves unstable in its ribbon color switch-over behavior. In particular in a flying type high speed printing machine, there is usually provided only a very limited spacing between the set of types and the printing hammer assembly, and the printing paper and ribbon are passed through this narrow space, thus creating a situation in which problems attendant the above-said apparatus are accentuated. A wide ink ribbon proves advantageous in these respects and hence is widely used for high speed printing.

Such wide ink ribbon is formed on its printing surface with strips or bands colored with inks of different colors, and for effecting correct switchover of printing color, the widths and arrangement of such strips must be accurate and also means for detecting the stripes of a desired color during travel of the ribbon is required.

OBJECTS OF THE INVENTION:

An object of the present invention is to provide a high speed printing machine using a wide ink ribbon having stripes or bands colored with inks of two or more different colors, whereby the stripes of a desired color on said ribbon can be correctly positioned in alignment with the printing types to print the letters (characters, etc.) in the desired color.

Another object of the present invention is to provide a high speed printing machine of the type described, wherein a light from a light source is applied to the ink ribbon having belts or stripes of different colors so as to detect the ribbon color located at the typing or printing position, such that the stripes or belts of a desired color on the ribbon will be positioned in alignment with the types to allow printing in the desired color.

Still another object of the present invention is to provide a mechanism in which magnetic powder is impregnated in or magnetic stripes are pasted to part of the ink ribbon and such part is so located with respect to the magnetic head to magnetically detect the ribbon color, thereby positioning the desired color belts on the ribbon in alignment with the printing types.

A further object of the present invention is to obtain an ink ribbon in which magnetic powder is impregnated or magnetic stripes are pasted to part or the entirety of the ribbon to thereby allow detection of the respective colored belts on the ink ribbon.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic side elevation of a high speed printing mechanism embodying the present invention;

FIG. 2 is a schematic perspective view showing another embodiment of the present invention;

FIG. 3 is a schematic side elevation showing still another embodiment of the present invention;

FIG. 4 is a schematic perspective view of yet another embodiment of the present invention; and

FIG. 5 is a detail plan of an ink ribbon according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION:

Referring first to FIG. 1 of the drawing, there is shown schematically in side elevation a high speed printing machine embodying the present invention. In the drawing, reference numeral 11 refers to a type drum, and 12 an ink ribbon having its surface sectioned into belts or zones of different colors as the detail of ribbon 12 shown in FIG. 5. In the illustrated embodiment, the ribbon surface is sectioned into the black-colored zones 12a and red-colored zones 12b, and signal means representing the different colors are on the ribbon 12, the signal means for instance being magnetic powder impregnated in the entirety of said zones 12a and 12b or at part of a detection area. Also in the drawing, 13a and 13b indicate ribbon rolls, 14 a detection means such as a magnetic head disposed oppositely to a part of the ink ribbon 12, 15 a ribbon guide, 16 a printing sheet, 17 a printing hammer assembly, 18 an actuator, 19 an actuator magnet, 20 a stopper, 21 and 22 sprocket belts, 23a and 23b ribbon roll driving motors, 24a and 24b clutches operable to rotate the ribbon rolls 13a and 13b by the driving force of the respective motors 23a and 23b, 25 an endless belt for driving the printing types 26 carried thereon, and 27a and 27b a pair of rotary drums around which said endless belt 25 is passed.

Now, the operation of the above-described mechanism is described by way of some illustrative examples.

To accomplish black-color printing, first the black-colored zones 12a on the ink ribbon 12 must be shifted to the positions aligned with the respective printing types 26. This shifting may be accomplished in the following way. The black-colored zones 12a and the red-colored zones 12b are arranged such that their directions of magnetization will be opposite to each other or that they will have different magnetization levels, and such magnetization direction or level is detected by the magnetic head 14 to discern the color of the ribbon 12 at the position aligned with the types 26. In order that the zones 12a and 12b of a desired color will be positioned coinciding with the type position, the clutch 24a is energized by a conventional driving circuit to rotate the ribbon roll 13a to let the ribbon 12 start moving. When any black-colored zone 12a is detected by the magnetic head 14, the clutch 24a is deenergized by the driving circuit to stop the ribbon movement.

When it is desired to practice printing with the red-colored ribbon zones 12b, the ribbon roll 13a or 13b is rotated to move the ink ribbon 12 until the magnetic head 14 detects the magnetization direction contrary to that of the black-colored zones 12b.

FIG. 2 is a schematic side elevation of a line printer in which the described embodiment of the present invention is adapted to be used. Since the operating principles thereof are substantially the same as those of the embodiment shown in FIG. 1, no further explanation on its mechanism is given.

Although in the foregoing embodiment the ink ribbon colors are described to be black and red, any other desired colors may be used in the present invention where ribbon color detection is performed magnetically. Also, although the ink ribbon 12 described above is impregnated with magnetic powder, it is possible to use a ribbon to which magnetic stripes are pasted.

Further, according to the present invention, magnetic powder may be impregnated in the entirety of the ribbon 12 and the magnetic head 14 may be disposed not at the ribbon end but at a position near the location where the heaviest ribbon damage caused by the moving types 26 would take place, so as to detect falling-off, decrease or degradation of the magnetic powder caused by hitting of the types 26 to thereby provide means to automatically sense the condition of the ribbon 12 by sensing the change in magnetic signal as a result of the degradation of the magnetic powder.

Referring now to FIGS. 3 to 5, there is shown another embodiment of the present invention. In the figures, reference numeral 11 indicates a type drum, 12 an ink ribbon which, as shown in detail in FIG. 5, is sectioned in its surface into zones or bands of different colors (black-color zones 12a and red-color zones 12b in the shown embodiment), 13a and 13b ribbon rolls, 28 a light source such as a bulb, 29a a black color filter, 29b a red color filter, 30a a light receiving element adapted to receive light which has passed through said black color filter, 29a, 30b a light receiving element adapted to receive light which has passed through said red color filter 29b, 15 a ribbon guide, 16 a printing paper sheet, 17 a printing hammer assembly, 18 an actuator, 19 an actuator magnet, 20 a stopper, 21 and 22 sprocket belts, 23a and 23b ribbon roll driving motors, and 24a and 24b clutches.

In operation, when it is desired to print in black, the ink ribbon 12 is shifted such that the black-colored zones 12a will be positioned in alignment with the type position (indicated by dotted line in the drawing). The desired shifting can be effected in the following manner. First, the light from the light source 28 is applied to the ink ribbon 12 such that the reflected light will pass through the respective color filters 29a and 29b and enter the respective light receiving elements 30a and 30b to allow detection of the color of the zones 12a and 12b then positioned in alignment with the printing types 26. Then the clutch 24a is energized by a conventional driving circuit (not shown) to rotate the ribbon roll 13a so that the ink ribbon surface zones 12a or 12b of the desired color will always be in a type or print position coinciding with the printing types 26. Thus, to provide black color printing, the ink ribbon 12 is shifted until the light receiving element 30a receives reflected light from the next black color zone 12a.

Switching from black color printing to red color printing can be accomplished by shifting the ink ribbon 12 until the light receiving element 30a receives reflected light from a red-color zone 12b. FIG. 4 shows adaptation of this embodiment of the invention to a line printer. As the operating principles thereof are substantially the same as those of the embodiment of FIG. 2, they are not discussed here.

Although in the foregoing, only black and red are used as printing colors, it is of course possible to employ other colors as desired.

Also, although the shown embodiment is arranged such that the reflected light from the ink ribbon 12 is once passed through a filter 29a or 29b before irradiating the light receiving element 30a or 30b, respectively, it is possible to dispense with such filter 29a or 29b by

using a specific type of light receiving element 30a, 30b which is actuated only when exposed to a certain specific color. In case where the output levels in the respective light receiving elements such as 30a and 30b are different as in the case of black and red, it is possible to discern the color from the level in one light receiving element 30a, 30b. It is also possible to use transmitted light instead of reflected light to accomplish the detection function.

As described above, according to the present invention, high speed printing can be carried out selectively in any desired color and also switchover from one color to the other can be accomplished with ease and high reliability.

What is claimed is:

1. A high speed printing machine using printing types and a wide ink ribbon having a surface sectioned into bands of different colors, characterized in that said ribbon includes signal means, said signal means representing different colors respectively, a detection means disposed opposite said signal means to detect the color of the band positioned in a print position with respect to the printing types so as to correctly position the ribbon surface band of the desired color in alignment with selected ones of said printing types.

2. A high speed printing machine as set forth in claim 1, wherein said signal means comprises magnetic signal means and said detection means comprises a magnetic detection means.

3. A high speed printing machine as set forth in claim 2, wherein said magnetic signal means comprises magnetic powder impregnated in said ribbon.

4. A high speed printing machine as set forth in claim 3, wherein said magnetic powder is impregnated over the entire surface of said ribbon.

5. A high speed printing machine as set forth in claim 2, wherein said magnetic signal means comprises magnetic strips placed on the surface of said ribbon.

6. A high speed printing machine as set forth in claim 4, wherein said detection means comprises a magnetic head, said magnetic head being positioned opposite said ribbon, wherein said magnetic powder becomes degraded as said ribbon is used for printing, the magnitude of the sensed magnetic signal providing a representation of the condition of said ribbon.

7. A high speed printing machine as set forth in claim 1, wherein said signal means comprises optical signal means and said detection means comprises optical detection means.

8. A high speed printing machine as set forth in claim 7, wherein said optical signal means comprises a light source arranged to transmit light to the surface of said ribbon, the light of said light source irradiating the surface of the ribbon being affected differently in accordance with the colored band illuminated, said optical detection means responsive to the optical signal to detect the color of the band irradiated.

9. A high speed printing machine as set forth in claim 8, wherein the light of said light source irradiating said ribbon is reflected in accordance with the color band irradiated, filter means responsive to the optical signal to detect the color of the band irradiated.

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