

sturdily built and is at the same time inexpensive and relatively easy to fabricate.

More particularly, the invention relates to an apparatus for converting electric signals that represent data into a group of raised dots that constitute the image of the data. This apparatus has a magnetic recording medium provided with a surface that is capable of being magnetized locally at quasi point-shaped sites disposed in rows and columns. A recording unit is placed near the surface and set up in response to the reception of the electrical signals, to selectively magnetize elementary sites of the medium. Drive means is operatively connected and energized to bring about a relative displacement between the recording medium and the recording unit, according to preset direction of movement, so as to enable the elementary sites to be selectively magnetized in the course of their movement past the recording unit. An applicator means is fitted downstream of the recording unit in relation to the direction of movement, in order to deposit on the recording medium particles that are capable of being attracted magnetically. The invention is characterized by the fact that the magnetic recording medium has cells which are each locally established in each of the elementary sites, and by the fact that the particles are spherically shaped. Each of the cells is established in such a manner that the particles which, deposited by the applicator means, subsist in the cells that have been magnetized and jut out on the surface of said recording medium.

The device of the invention is all the more advantageous when used for composing Braille characters. It permits at one and the same time the composition of a large number of lines of characters, while offering the possibility of easily reading, or even printing, the lines on a sheet of paper. Furthermore, the compound lines can easily be erased in order to permit the composition of other lines.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and advantages of the invention will appear more fully from the following description made in connection with the accompanying drawings, in which:

FIG. 1 is a schematic and perspective view, with parts broken away, showing a form of construction of an apparatus for converting electrical signals embodying the principles of the invention;

FIG. 2 is a view of a detail of the drum forming part of the conversion mean shown in FIG. 1;

FIG. 3 is a schematic view intended to show in section and on a large scale the main constituent parts of the conversion apparatus of FIG. 1;

FIG. 4 is a cross-sectional and perspective view of the drum shown in FIG. 2;

FIG. 5 is a schematic view, in section, showing another form of construction of a conversion means according to the invention;

FIG. 6, comprising FIGS. 6A, 6B, 6C, shows, after assembly of FIGS. 6A, 6B and 6C, a detailed logic diagram of the circuits employed for controlling the operation of the apparatus of FIG. 5;

FIG. 7 is an embodiment in which each of the cells of the drum of FIG. 2 can be shown;

FIG. 8 is a second embodiment in which each of the cells of the drum of FIG. 2 can be shown;

FIG. 9 is a third embodiment in which each of the cells of the drum of FIG. 2 can be shown; and

FIG. 10 is a fourth embodiment in which each of the cells of the drum of FIG. 2 can be shown.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The apparatus for converting electric signals illustrated in FIG. 1 is a terminal unit whose main constituent elements are enclosed within a case or housing 17. In response to the reception of electric signals that represent characters and emitted by a signal generator (not shown), this apparatus is designed to generate groups of raised dots, each group having an arrangement which is characteristic of a corresponding character.

In the example being described it will be assumed that the characters shown in the form of raised dots are those of the well-known Braille system in which each letter or each sign consists of one or more raised dots distributed within a 6-position grid, said positions of dots being arranged three by three in two columns. However, the invention is not limited to the generation of Braille characters, and in another embodiment, these raised dots may be arranged to form patterns, graphic curves, geometric figures, etc.

In the embodiment shown in FIGS. 1 and 2, the apparatus for the conversion of electric signals comprises a magnetic recording medium consisting in the example being described of a magnetic drum 10 that can be rotated by an electric motor 11 in the direction illustrated by arrow F. This magnetic drum 10 has on its surface a number of cells 12 made up of dots arranged in groups of six, each of said groups constituting a Braille cell which, as will be seen further below, is used for the formation of a Braille character. The character may represent a letter, a numeral, a punctuation mark or a mathematical symbol.

As can be seen in FIG. 2, the different groups of six cells are arranged such that lines of a character N1, N2, N3, etc... correspond to the different lines of a text to be represented in the Braille code. Each of said lines, correspond to the rows of cells, three being illustrated for each character, such as L1, L2, L3, and each line being parallel to the axis of rotation 13 of the drum 10. In each of these lines, the six cells of each group are, in turn, arranged in two columns, such as K1 and K2, the columns being perpendicular to the direction of the rows and thus forming a matrix of cells. In each group of cells, the spacing e between the cells of a group of cells corresponding to a character, both according to the direction of the rows and according to the direction of the columns, is in the example being described approximately 2 millimeters. The spacing d between the various groups of cells of the same line is substantially equal to 3.75 millimeters. The spacing h between the various lines is approximately 5 millimeters. It is assumed that in the example being described, the magnetic drum 10 has 31 lines numbered consecutively N1, N2, N3. It will be noted, however, that in the interest of clarity of the drawing, the spacings between the various lines, rows and columns illustrated in FIG. 2 have been deliberately exaggerated and are thus not to scale.

Referring to FIG. 4, it will be seen that each of the cells 12 is defined, on the level of the surface of the drum 10, by a circular contour C. In the case of the embodiment illustrated in FIG. 4, each of these cells is shown in the form of a cylindrical cavity whose axis is perpendicular to the drum surface, the bottom of said cylindrical cavity being, preferably, semicylindrical as shown in greater detail in FIG. 10. However, this form