

DEVICE FOR REPRESENTING RELIEF ITEMS

FIELD OF THE INVENTION

The invention relates to a device for representing relief items which includes a perforated plate and at least one pin which is axially movable in one of the perforations in the plate to be detected. Such devices are used in particular as display devices which are detectable in a tactile manner, with the help of which blind persons can detect information. Generally, braille printing is used in which every letter of the alphabet is represented by a matrix of 2×3 or 2×4 dots which are placed or not placed. The placement of a dot occurs in such a way that the pertinent pin is moved out of the corresponding drilling, as a result of which it can be detected with the fingers. However, the invention relates similarly to graphical display devices with which random patterns, images or displays can be reproduced in a manner so as to be detectable in a tactile way. In such displays it is also possible to provide different positions of the pins, so that relief-like representations are possible. The important aspect is that the representation is transient, which means that the display can be changed at will.

STATE OF THE ART

Display devices are known in which the position of each pin is stable, which is effected in such a way for example that this pin is pressed by a spring against a stop. By activating an actuator such as an electromagnet it is possible to bring this pin into its other position, i.e. it can be extended. As long as this pin is extended it is necessary that the actuator exert pressure on the pin to hold it in this position. Such devices have a high power consumption and the occurring thermal problems cause a complex production and arrangement of these devices.

Furthermore, display devices are known which provide a locking device which holds the associated pin in its position which is not stable per se. Such devices are highly complicated from a mechanical viewpoint, complex in production and susceptible to faults.

It is the object of the present invention to avoid such disadvantages and to provide a device of the kind mentioned above which comes with a simple arrangement, provides a low power consumption and nevertheless guarantees sufficient holding forces for each pin, thus allowing detection with the finger without giving rise to the danger that individual pins are thus brought into another position, resulting in a falsification of the represented information.

BRIEF OUTLINE OF THE INVENTION

These objects are achieved by a device wherein each pin is provided with a position in which the tip of the pin is substantially arranged in the plane of the surface of the perforated plate and a further position in which it projects outwardly to such an extent that it is clearly scannable by the finger of the user. If, as mentioned above, a relief-like display is necessary there are additional further positions in which the pin projects to a different extent. The important aspect is that the pin is held in each of the stable positions by magnetic forces of attraction. These can occur between a permanent magnet and a part of soft iron or also between two permanent magnets which are polarised correspondingly.

It has proved to be particularly advantageous to provide axially magnetisable segments in each pin. A pertinent

perforated plate acts as a magnetic yoke in order to bring about a closed magnetic circulation. In this way it can be achieved that the pin is held in its stable positions only by the magnetic forces. Despite the stability of the position it is still provided with a certain resilient mobility in the axial direction. This has proved to be a feature which is particularly appreciated by users and enhances the operating convenience.

In a particularly preferable embodiment of the present invention it is provided that each pin is provided with at least two, preferably three segments which are permanently magnetised in the axial direction and are arranged flush behind one another in the axial direction and are separated from one another by soft iron segments. The magnetised segments are magnetised alternately opposite to one another. A soft magnetic perforated plate is provided which in the zone of each pin is provided with two annular recesses which are arranged in such a way that at least in one stable position of the pin two magnetic segments of the associated pin are substantially arranged in the centre of the two annular recesses. This leads to a particularly strong holding force in the extended position of the pins, so that in this position two permanently magnetised segments form two magnetic circulations. The third permanent magnet is used to receive the forces of the electromagnetic actuator.

The deletion of the entire display is a frequently occurring process in any kind of display device. This process can be simplified and accelerated in such a way that a common actuator is provided which acts upon all pins simultaneously.

A particularly preferable embodiment of the invention consists of the fact that the perforated plate is arranged as the face surface of a cylindrical disc, with the individual pins being arranged on concentric circles. When this disc is rotated about its central point, the characters represented by the pins glide below the stationary hand of the user according to the rotation. This provides a particular convenience in the use of the device.

SHORT DESCRIPTION OF THE DRAWINGS

FIG. 1 schematically shows an axonometric representation of a device in accordance with the invention;

FIG. 2 shows a partial sectional view along a plane according to line II—II in FIG. 1 which is established by the axes of a part of the pins;

FIG. 3 shows a further embodiment of the invention in a sectional view;

FIG. 4 shows a third embodiment of the invention in a sectional view;

FIG. 5 shows a fourth embodiment of the invention in a sectional view;

FIG. 6 shows an altered arrangement of the pins;

FIG. 7 shows a top view of an embodiment of the device in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The device **1** in accordance with the invention as schematically shown in FIG. 1 is connected to a computer **3** by way of a cable **2**. It controls the device **1** as an output unit such as a screen. The computer **3** can represent the control device in this respect.

FIG. 2 shows a first embodiment in a more detailed partial sectional view. The top cover of the device **1** is formed by a perforated plate **4**, through which project the pins **5**, **15** and