METHOD AND DEVICE FOR DISPLAYING GRAPHIC INFORMATION, IN PARTICULAR FOR BRAILLE READING

FIELD OF THE INVENTION

The invention relates to a method and a device intended primarily for displaying graphic information such that at least tactile perception is possible during arbitrary periods of time. Though not exclusively, the invention aims above all to provide such information display for the blind.

BACKGROUND OF THE INVENTION

Embossed printing or braille makes texts of all sorts accessible to the blind, mainly by way of very expensive books. However, it is difficult to convey to them reading matter that is neither typed nor printed nor even tied down to letters, books, etc. As a rule, short texts such as news, summaries or the like will reach the blind by auditory means.

Apparatuses have been developed recently for setting a line which may be sensed for braille reading. An example is disclosed by DE-OS No. 30 33 078 comprising a perforated drum and electromagnetically actuatable pins extending therethrough to form single lines which may be sensed tactually. Such devices are, however, quite expensive and hardly or not at all suitable for continuous reading in the manner almost exclusively practised by the seeing.

In U.S. Pat. No. 3,622,759, a device has been described that is intended as a part of a print-reading machine for the blind. It includes a perforated endless belt which receives pellets of cubical, spherical or other shape from a code-feeding unit and which is moved to an output unit then. There, each pellet may be engaged by a punch to lift movable members, presumably character-bearing pads to be sensed. The setting operation is tedious and prone to troubles since a rather complex mechanism must be operated in a series of steps.

In the prior art, there is thus a lack of reading means for the blind in the manner of news in brief, short information or the like, whereas wall news-sheets, bulletin boards, etc. are something unheededly normal to the remaining population.

OBJECTS OF THE INVENTION

It is an important object of the invention to provide remedy and to enable the blind to get access to such graphic information or text displays which usually are not duplicated.

Another object of the invention is to provide an uncomplicated and economical reading display for the blind in view of their social situation that often is quite critical.

A further object of the invention consists of creating an efficient method and device for fast set-up of patterns for tactile sensing.

Yet another object of the invention is the design of a simple and sturdy device capable to be operated with little effort over long periods of time.

SUMMARY OF THE INVENTION

In accordance with the invention, all the symbols required are first set at a writing place onto a support that is subsequently moved to a reading place, in a manner known per se. This procedure is much less awkward than other conventional methods which require more complicated equipment. According to the prior art, the dots of each braille symbol used for the individual words or lines were formed by elevated pins. Overcoming this technique, the invention employs small balls arranged in a desired pattern on a support such that they partly project therefrom. This patterning is effected very rapidly and reliably. The patterned support is then moved to a reading plane where the ball pattern may be directly sensed. This is an important distinction over U.S. Pat. No. 3,622,759 wherein the pellets are purely intermediate members in an elevating punch mechanism.

The symbols may be of standard size, e.g. with a distance between adjacent dots of 2.5 mm, and the number of symbols per line as well as the number of lines can, within limits, be freely selected. For example, a full text page may comprise 24 lines of 20 symbols each. Using balls with a diameter of 1.6 mm or below, the set dots of the symbols may be embossed by 0.5 mm relative to the reading plane. The symbol dots are spherically curved and are displayed even while fingers rest on them. It is impossible to press the dots down so as to make them disappear. Likewise, the equipment cannot be damaged by using it. In operation, the device is almost noiseless and vibration-free. The working position may be horizontal or inclined towards the user, e.g. by about 30 degrees.

SPECIALIZATIONS OF THE INVENTION

An important embodiment of the invention consists of setting the information to be displayed by distributing from a lower feeding station balls into all receiving perforations or indentations provided in the support which is preferably an endless belt band and is enclosed by a thin foil preventing the balls from falling out. The balls not required for the desired display are then removed in an upper removal station. As the embossed printing is formed of a uniform matrix, e.g. a 2.5 mm$\times$2.5 mm dot screen, it is possible to display arbitrary graphic information such as mathematical curves, maps, type scripts, etc. including uncoded text. If re-setting a whole page is required for changing the information displayed, this will take only about 1 second; calculation for 24 lines yields 0.7 s. During this short period, the information cannot be read; however, it is subsequently available without limitation, even during power failures.

Preferably, the selective ball distribution is effected with the use of magnetic force. From collecting and sorting means such as a bin and a chute, magnetizable balls are advanced to a feeding station due to the action of a permanent filler magnet. The feeding station consists of immovable components and is located at the underside of the device frame, underneath an upper removal station. The latter provides for electromagnetic sucking-off of the balls not required, under electronic control. The invention also contemplates moving the patterned support only during the set-up operation and up to arrival in the reading area, in timed relation with the actuation of the electromagnets. A tensioning or tightener means may be provided for the endless belt band that is, in particular, enclosed by a thin foil flexibly engaging the ball pattern for tactile sensing therethrough while preventing the balls from falling out.