BRAILLE DISPLAY DEVICE USING ELECTRORHEOLOGICAL FLUID AND MANUFACTURING METHOD THEREOF

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 2006-123921, filed Dec. 7, 2006, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] 1. Field of the Invention

[0003] The present invention relates to a braille display device for blind people and a method for manufacturing the same, and more particularly, to a braille display device in which braille pins are vertically moved by an electric field using an electrorheological fluid phenomenon, so that visible information is expressed in the form of raised dots which blind people can feel with their tactile senses, and a method for manufacturing the same.

[0004] The present invention has been produced from the work supported by the IT R&D program of MIC (Ministry of Information and Communication)/IITA (Institute for Information Technology Advancement) [2005-S070-02, Flexible Display] in Korea.

[0005] 2. Discussion of Related Art

[0006] A typical braille display device is disclosed in Korean Patent Publication No. 2000-38125. Hereinafter, a conventional braille display device is described in detail with reference to the attached drawings.

[0007] FIG. **1** is a perspective view of a conventional braille display device, and FIG. **2** is an exploded cross-sectional view of the conventional braille display device of FIG. **1**. Referring to FIGS. **1** and **2**, the conventional braille display device **100** comprises a base body **110**, a plurality of braille pins **120**, a plurality of electromagnets **130**, a coil **135**, and a cover **140**.

[0008] A plurality of reception grooves **112** are formed in an upper portion of the base body **110** with a predetermined arrangement, and the braille pins **120** are installed in the reception grooves **112** and move vertically in the reception grooves **112**. The electromagnet **130** wound by the coil **135** for pushing an upper portion of the braille pin **120** using a magnetic force is installed in the upper portion of each reception groove **112**. The coil **135** winding the electromagnet **130** is supplied with an electric current through a power supply control portion **150**. The cover **140** is installed on a surface of the base body **110** so that the upper portion of the braille pin **120** can protrude.

[0009] In the configuration of the conventional braille display device, the braille pin **120** is installed in the reception groove **112** of the base body **110** to move upward and downward, the electromagnet **130** wound by the coil **135** is installed in the upper portion of the reception groove **112** to be connected to the power supply control portion **150**, and the base body **110** is covered with the cover **140**. The braille pins **120** move upward or downward due to a magnetic force generated by the electromagnet **130** to thereby express various information in the form of raised dots which can be recognized by blind people.

[0010] However, the conventional braille display device is complicated in configuration since the electromagnet **130** wound by the coil **135** is installed in the upper portion of the reception groove **112**, and thus it is not easy to manufacture and install, leading to low productivity. Also, due to noise occurring between the adjacent electromagnets **130** when the electromagnets **130** operate by an electrical signal of the power supply control portion **150**, the braille pins **120** may operate abnormally.

SUMMARY OF THE INVENTION

[0011] The present invention is directed to a braille display device in which braille pins are selectively protruded using an electrorheological fluid phenomenon.

[0012] The present invention is also directed to a method for manufacturing a braille display device in which braille pins are selectively protruded using an electrorheological fluid phenomenon.

[0013] An aspect of the present invention provides a braille display device using an electrorheological fluid, comprising: a base body in which a plurality of insulating reception grooves are formed; a first electrode arranged below the base body; an electrorheological fluid received in the reception groove; a microcapsule having an electrophoresis particle which is dispersed in the electrorheological fluid; a second electrode arranged above the microcapsule; a braille pin installed above the second electrode; and a braille pin protection film arranged above the braille pin.

[0014] The braille display device may further comprise an upper body which is formed above the base body and has a reception groove which communicates with the insulating reception groove formed in the base body. The first and second electrodes may be disposed in a pixel form on areas corresponding to the reception grooves. The braille display device may further comprise a first electrode protection film which is formed between the first electrode and the insulating reception groove to protect the first electrode, and a second electrode protection film which is formed between the second electrode and the insulating reception groove to protect the second electrode. The electrophoresis particle and a dielectric fluid may be included in the microcapsule together. The electrophoresis particle and the dielectric fluid may be made of materials having the same specific gravity.

[0015] Another aspect of the present invention provides a method for manufacturing a braille display device using an electrorheological fluid, comprising the steps of: preparing a base body having a plurality of insulating reception grooves formed therein; installing a first electrode having a first electrode protection film formed thereon below the base body; injecting an electrorheological fluid in which a plurality of microcapsules are dispersed into each of the reception grooves; installing a second electrode having a second electrode protection film formed thereon and contacting the electrorheological fluid in the reception groove having the electrorheological fluid injected therein; forming a braille pin above the second electrode in the reception groove; and forming a braille pin protection film above the braille pin.

[0016] A volume weight of the microcapsule may range from about 10 to about 50 volume percent of the total volume weight of the electrorheological fluid. A volume weight of an insulating dielectric fluid which constitutes the electrorheological fluid having the microcapsules dispersed therein may range from about 50 to about 90 volume percent of the total volume weight of the electrorheological fluid. A thickness of a polymer film which surrounds the microcapsule may range from about 0.1 to about 0.3 μm. The microcapsule may con-