

When the embodiment having such arrangement as described above is reset so that no braille character is displayed, when a DC voltage having such a polarity as that bends the free ends *2b* of the piezoelectric element reeds *2* downward in FIG. 1 is applied to the piezoelectric element reeds *2*. When DC voltage of this polarity is added to the piezoelectric element reeds *2*, their free ends *2b* are displaced downward so that the tactile pins can be dropped downward by their own weight to keep their tactile tips *6a* retreated downward from the surface *7a* of the tactile section *5*.

When DC voltage having a polarity reverse to that of said DC voltage applied to bring the braille cell into a reset state is applied to the piezoelectric element reeds *2* needed to display braille characters, the piezoelectric element reeds *2* to which this DC voltage is applied curve their free ends *2b* upward to project the tactile tips *6a* of their corresponding touch pins *6* from the surface *7a* of the tactile section *5*. It is defined by the upper pin stopper *5e* at the tactile section *5* against which the collars *6c* of the tactile pins *6* are struck how for the tactile tips *6a* of the tactile pins *6* are projected from the surface *7a* of the tactile section *5*.

When the braille cell is under reset state, the collars *6c* of the tactile pins *6* are struck against the lower pin stopper *5f* at the tactile section *5*. The extent to which each of the tactile tips *6a* of the tactile pins *6* is retreated from the surface *7a* of the tactile section *5* can be thus defined however the piezoelectric element reeds *2* may be curved downward.

FIG. 6 is a perspective view showing the braille cell according to a second embodiment of the present invention.

In the case of this second embodiment, the tactile section *5* has an engaging claw *5i* made of elastic material and directed downward, and an engaged groove *1m* and a claw stopper (not shown) are formed at the front end portion of the bottom *1b* of the base body *1* to correspond to the engaging claw *5i*. In addition, an engaged projection *1n* with which a step *5j* of the tactile section *5* is engaged is formed at the top *1a* of the base body *1*.

The tactile section *5* of this second embodiment is fitted with the opening section formed with the front ends of the top *1a* and the bottom *1b* of the base body *1* (shown in the left hand portion of FIG. 6) in a vertical direction as shown by an arrow in FIG. 6.

Operations of the piezoelectric element reeds *2* and the tactile pins *6* in this second embodiment are same as those in the first embodiment.

FIG. 7 is a perspective view showing the braille cell according to a third embodiment of the present invention. As shown in FIG. 7, the tactile section *5* of this embodiment having same structure as that described in the case of the first embodiment of the present invention is detachably attached to the base body *1*.

As shown in the enlarged sectional view in FIG. 3B, the tactile pins *6* are inserted from below into the tactile section *5*. The tactile section is provided with through-holes *5c* through which the tips *6a* of the tactile pins *6* are projected outside from the surface *5b* of the tactile section *5*. In addition, each of the tactile pins *6* is provided with a step *6d*, which is struck against the upper pin stopper *5e*.

When the tactile section *5* is detachably attached to the base body *1* in the case of the braille cell according to the third embodiment of the present invention, while keeping the bottom *1b* of the base body *1* upside, the

tactile pins *6* can be prevented from coming out of the tactile section *5*.

FIG. 8 is a perspective view showing the braille cell according to a fourth embodiment of the present invention. The structure for attaching the tactile section *5* to the base body *1* is same as that in the second embodiment and the method of holding the tactile pins is same as that in the third embodiment of the present invention. Other components in this fourth embodiment are same as those in the first through third embodiments and description on these components will be omitted accordingly.

It should be understood that the present invention is not limited to the above-described embodiments and that various changes and modifications can be made without departing from the spirit and scope of the present invention.

When the braille cell is designed as described above, the tactile section can be more easily attached to and detached from the base body by the engaging means formed at the tactile section. In addition the tactile pins can be more easily exchanged with new ones and no specific care is needed to maintain the tactile pins in the tactile section. Further, the tactile section and the tactile pins can be washed as a unit without dismantling the tactile pins from the tactile section.

The position of each of the piezoelectric element reeds can be defined left and right the base body by the detachable fixing plates, so that the housing and assembling of the piezoelectric element reeds relative to the base body can be made easier.

When the means is provided to support and fix the base body and the print circuit board detachable from each other, the exchanging of the piezoelectric element reeds and the print circuit board can be made easier.

The stoppers provided at the free ends of the piezoelectric element reeds, not only prevents breakage during transportation, but also reduces chattering of the piezoelectric element reeds during operation.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details, and representative devices shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

What is claimed is:

1. A braille cell comprising:

- a plurality of piezoelectric element reeds, each one of said piezoelectric element reeds being bendable at an elongated end portion thereof when a DC voltage is applied thereto;
- a base body;
- each of said plurality of piezoelectric element reeds having a base end portion which is fixed to said base body;
- a printed circuit board mounted on said base body for supporting said plurality of piezoelectric element reeds in a plurality of groups, said plurality of groups being formed into a plurality of steps positioned at given intervals in said base body;
- a plurality of tactile pins corresponding in number to a plurality of free end portions of said piezoelectric element reeds;
- a tactile section for holding said plurality of tactile pins near said free end portions of said plurality of piezoelectric element reeds;