ELECTROMECHANICAL BRAILLE CELL

BACKGROUND OF THE INVENTION

The present invention relates in general to electromechanical braille cells and, more particularly, to an improved piezoelectric mechanical braille cell.

DESCRIPTION OF THE PRIOR ART

Heretofore, electromechanical braille cells have utilized six piezoelectric reeds which bend in response to the application of an electric voltage thereacross for urging the tip of sensing rods through an array of six openings in a braille cell reading surface. The protruding tips of the sensing rods are sensed by the finger of the operator to define a braille character. One such prior art arrangement is disclosed in U.S. Pat. No. 4,044,350 issued Aug. 23, 1977. In this arrangement, the piezoelectric reeds are supported at both ends and the center portions deflect in response to the applied voltage for actuating the sensing rods. One of the problems with this arrangement is that the reeds are relatively long and since the reeds project laterally away from the braille cell on both sides, the spacing between adjacent lines of braille cells must be relatively large, i.e. on the order of the length of the individual reeds.

Another problem with this prior art arrangement is that two side-by-side vertical stacks of three reeds are used and relatively complicated coupling means are provided for coupling the individual sensing rods to the respective reed while also allowing passage of the other two sensing rods therethrough.

It is also known from the prior art to provide an array of cantilevered piezoelectric reeds inclined at a substantial angle to a base support. This arrangement provides horizontal separation between the respective free ends of the reeds and thus of the respective sensing rods. However, mounting the piezoelectric reeds in such a manner that the braille sensing rod does not extend at right angles from the reed reduces the amount of travel that a given rod may achieve for a given reed length. This latter arrangement is disclosed in U.S. Pat. No. 3,229,387 issued Jan. 18, 1966.

Other prior art references arrange the stack of piezoelectric reeds in a stair step configuration such that the sensing rod associated with each successively lower reed in the stack passes by the free ends of all of the other reeds positioned above it in the stack. Such an arrangement is disclosed in the final report for the U.S. Department of Health, Education and Welfare Grant No. OEG-08-071112-2995 dated March 1973 (See FIG. 12 page 27).

SUMMARY OF THE PRESENT INVENTION

The principal object of the present invention is the provision of an improved electromechanical braille cell and, more particularly, to such a cell employing a vertical stack of cantilevered piezoelectric reed elements.

In one feature of the present invention, the free ends of a stack of cantilevered piezoelectric reeds are arranged in a stair step fashion with each step of the stair step comprising a pair of reeds with the upper reed of each pair being apertured for passage of the sensing rod therethrough from the lower reed, whereby fabrication of the braille cell is simplified and facilitated.

In another feature of the present invention, the aperture in the upper one of each pair of stair stepped reeds is formed by notching out a corner of the tip of the upper reed in each pair.

In another feature of the present invention, the sensing rods which are driven from the respective piezoelectric reeds are adjustable in length by means of an adjusting member which telescopes in tight frictional engagement within the hollow interior of the main rod portion, such that the telescoping member is retained in position by means of the interference fit between the adjusting member and the main body portion.

Other features and advantages of the present invention will become apparent upon a perusal of the following specification taken in connection with the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view of an electromechanical braille cell incorporating features of the present invention,

FIG. **2** is an enlarged plan view of a portion of the structure of FIG. **1** taken along line **2—2** in the direction of the arrows,

FIG. **3** is an enlarged sectional view of a portion of the structure of FIG. **1** taken along line **3—3** in the direction of the arrows,

FIG. **4** is an enlarged cross sectional view of one of the piezoelectric reeds of FIG. **1** taken along line **4—4** in the direction of the arrows, and schematically depicting the electrical circuitry for applying the operating potential to the respective reed,

FIG. **5** is an enlarged exploded view of one of the sensing rods of FIG. **1**, and

FIG. **6** is a plan view of a plurality of the braille cells of FIG. **1** arranged for display of two lines of braille text.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIGS. **1** and **2** there is shown an electromechanical braille cell **11** incorporating features of the present invention. The braille cell **11** includes a vertical base plate **12** as of ABS plastic material formed by injection molding and having upper and lower horizontal flange portions **13** and **14** with a recessed central web portion **15** extending vertically therebetween. The web portion **15** is notched from the inside edge to provide six generally rectangular openings **16** to receive the root portions of six piezoelectric reeds **17**. The piezoelectric reeds are captured in an interference fit at a restricted neck portion **18** at the entrance to each of the rectangular openings **16**. The neck portions **18** define fulcrum points about which the piezoelectric reeds **17** bend in response to an applied operating voltage. A top plate **19** is secured to the base plate **12** via the intermediary of screws, not shown. The top plate **19** is recessed at **21** and **39** to receive stringers, not shown, for mounting the individual braille cells **11** transversely of the stringers.

A sensing plate portion **22** of the top plate **19** includes an upper sensing surface **23** which is apertured by means of six vertically directed bores **24** which slideably receive therewithin a narrow neck portion **25** of a sensing rod **26**. The upper end of the sensing rod **26** is rounded. That portion of the rod which protrudes above the surface **23** is sensed by the finger of the operator to determine the pattern being displayed on the individual braille cell **11**.