

5

Braille reading devices provide a refreshable tactile display. Such a display includes a large number of tactile pins arranged in a regular pattern relative to a reference surface. The reference surface is normally horizontal and the pins are mounted vertically. The tactile pins are selectively moved between a “down” or retracted position, and an “up” or extended position. In the retracted position, the pins do not protrude above the reference surface, whereas in the extended position the pins protrude above the reference surface in accordance with an industry standard height. Use of a refreshable tactile display for Braille text and graphics for the blind is a common practice.

Typically these displays involve the use of an array of tactile pins set in appropriate combinations of extended and retracted states by way of an actuating mechanism to produce the desired Braille text and graphics. However, because of the relatively small dimensions of the operational components comprising a tactile display, the mechanism required to move the pins between states is not robust. Therefore, this mechanism must be protected from damage by forces delivered to the tactile pins from above. Such a force may be, for instance, due to a heavy object inadvertently placed on top of the tactile display while it is in use. Regardless, the pins must reliably change state while in contact with a user’s finger or other part of the hand.

Additionally, as the user’s fingers are in contact with the heads of the tactile pins, and the pins are moving up and down during refresh cycles, it is inevitable that small pieces of debris will find their way into the chambers housing the tactile pins. Over time this debris may build up to the point that one or more of the pins is no longer able to move reliably between its extended and retracted states. This in turn leads to “bad Braille” with the only recourse currently available being to return the device to the manufacturer for service, which comes at a significant cost and leaves the user without his or her reader for an extended period.

The presently described apparatus provides a solution to these difficulties. The Braille pins utilized in the present invention are compressible; not by the normal forces of the user’s fingers during use of the apparatus, but by greater forces that inadvertently may be directed to the pins when they are extended. Such forces, able to compress the pins, are not so great as to damage pin actuation mechanisms. Such a Braille display or reader may also provide open channels that allow for easy cleaning of the Braille pin apertures and the chambers that connect them.

A primary objective inherent in the above described apparatus and method of use is to provide advantages not taught by the prior art.

Another objective is to provide a Braille reader apparatus with pins that are compressible, thus enabling the pins to absorb opposing force while maintaining an “up” or extended state without transferring that potentially damaging force to the actuating device.

A further objective is to provide a Braille reader apparatus with a plurality of open channels to allow for easy cleaning of debris buildup within the pin chambers and apertures.

An even further objective is to provide a Braille reader apparatus with the ability to produce multiple lines of text and graphics at one time.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the presently described apparatus and method of its use.

6

## BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Illustrated in the accompanying drawing(s) is at least one of the best mode embodiments of the present invention. In such drawing(s):

FIG. 1 is a perspective view of the presently described apparatus;

FIG. 2 is a cross-sectional view thereof taken from section line 2-2 in FIG. 1;

FIG. 3 is an exploded view of a single Braille tactile pin of the apparatus; and

FIG. 4 is a schematic diagram illustrating a preferred actuation scheme of the invention.

## DETAILED DESCRIPTION OF THE INVENTION

The above described drawing figures illustrate the described apparatus and its method of use in at least one of its preferred, best mode embodiment, which is further defined in detail in the following description. Those having ordinary skill in the art may be able to make alterations and modifications to what is described herein without departing from its spirit and scope. Therefore, it must be understood that what is illustrated is set forth only for the purposes of example and that it should not be taken as a limitation in the scope of the present apparatus and method of use.

Described now in detail, and illustrated in a generic manner in FIG. 1, is a refreshable tactile reader apparatus for Braille text and graphics. The apparatus utilizes a plurality of compressible Braille pins as shown in exemplary FIG. 2. The apparatus has an upper deck 10 providing a plurality of first apertures 12 therethrough, and a lower deck 20 providing a plurality of second apertures 22 therethrough. The decks 10 and 20 are rectangular plates with hollowed-out portions. The apertures 12 and 22 are arranged in corresponding coaxial pairs on vertical axes. A plurality of Braille pins 30 are each axially engaged with one pair of the apertures 12, 22 for translation therein. Each pin 30 is positionable into an upwardly extended state, as demonstrated by the center pin 30 in FIG. 2, so that an upper portion 31 of the pin 30 partially protrudes above a reference surface 14 of the upper deck 10. Each pin 30 is alternately positionable into a downwardly retracted state, as demonstrated by the left pin 30 in FIG. 2, wherein the upper portion 31 of the pin 30 is concealed below the reference surface 14. A compressible element 40 joins the upper 31 and lower 32 portions of each of the pins 30.

The upper deck 10 and lower deck 20 are formed from molded plastic or other structural materials and are preferably impermanently joined together by standard hardware. A plurality of chambers 16 (the hollowed-out portions) are established between the decks 10 and 20 as shown in FIG. 2. Each chamber 16 is capable of housing a plurality of the pairs of the tactile pins 30, the number of pins 30 being equal to the number of sets of apertures 12, 22 in the upper 10 and lower 20 decks. The pins 30 are spaced apart and positioned in accordance with Braille pin spacing standards; thereby enabling the production of Braille text and graphical patterns. The apertures 12, 22 have diameters of such size as to allow free translation of pins 30 between the extended and retracted states. A typical embodiment of the present invention would incorporate sixty pins 30 in ten columns and six rows, as required for a multi-line display of 2x5 6-dot Braille characters. However, the present invention can provide for any number and arrangement of Braille pins 30 to suit a desired purpose.