the display is erased, the user then queues the print mechanism of the TCM to display the next successive increment of text, or alternatively, the user can scroll forward or backward to display any other increment. Thus, the user can advance or go back through a document in any manner chosen.

The aforementioned objects, features and advantages of the invention will, in part, be pointed out with particularity, and will, in part, become obvious from the following more detailed description of the invention, taken in conjunction with the accompanying drawings, which form an integral part thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1**A is a schematic, top plan view of an 8-pin cell arranged in accordance with the invention and showing the position of a pair of elastomeric cords or strips between adjacent rows of pins;

FIG. **1**B is an enlarged front elevation view of a tactile dot pin member constructed in accordance with the invention;

FIG. **2** is a top plan view of a retention plate constructed in accordance with the invention;

FIG. **3** is a side elevation view, partly in section, showing the arrangement of dot pins in six lines of the TCM and supported by three retention plates, silicone cords and a bottom eraser plate;

FIG. **4**A is a side elevation view, partly in section, of a traveling printhead constructed in accordance with the invention;

FIG. **4**B is a left end view of FIG. **4**A;

FIG. **4**C is a top plan view of FIG. **4**A;

FIG. **4**D is a schematic view showing the alignment of the printhead and Braille display, for clarity, solenoids and plungers are shown for Line **1** only;

FIG. **5**A is a top plan view of an erasing mechanism constructed in accordance with the invention;

FIG. **5**B is a side elevation view of FIG. **5**A;

FIG. **5**C is an end view of FIG. **5**B;

FIG. **6**A is a top plan view of the printhead **300**, of FIGS. **4**A, **4**B and **4**C, that travels bi-directionally along the linear motions undercarriage **602** and **604** in firing alignment with the braille display through the optical reference plate **310**.

FIG. **6**B is an end view of **6**A;

FIG. **6**C is an end view of FIG. **6**A;

FIG. **7**A is a top plan view of an electric drive motor connected to a belt drive which drives the linear motion undercarriage;

FIG. **7**B is a side view of FIG. **7**A;

FIG. **7**C is an end view of FIG. **7**B;

FIG. **8** is a side elevation view, partly in section, of an alternate erasing mechanism using twin cam rods;

FIG. **9**A is a top plan view of another alternate erasing mechanism using a pair of wedge actuators;

FIG. **9**B is a side view of FIG. **9**A; and

FIG. **9**C is an end view of FIG. **9**B.

In the various figures of the drawing, like reference characters designate like or similar parts.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the invention, a tactual paperless Braille computer monitor, "TCM", includes a two dimensional array of dot pins **100**, one of which is shown in detail in FIG. **1**B. The dot pins **100**, which are mechanically forced up and down to respectively display or erase Braille text, are held in place laterally from one another by a set of three perforated retention plates **200** (FIG. **2**). A top plan view of one of the retention plates **200** is shown in FIG. **2** and a side elevation view of three of the retention plates aligned in a vertically spaced series is shown in FIG. **3**.

Although **48** cell pattern perforations are provided in each line, as seen in FIG. **2**, only the middle forty sets or "cells" of dot pins **100** are moved up, four dot pins 100 per line at a time, to display a forty character line of Braille text. As shown in FIGS. **4**A, **4**B, and **4**C and further in FIGS. **6**A and **6**B, printhead **300**, traveling beneath the retention plates **200**, electro-mechanically forces up the dot pins **100** to their raised positions so as to display text. To erase text, all raised dot pins **100** in the display are moved down together, in unison, by the erasing plate **402** of then erasing mechanism **400** shown in FIGS. **3**, **5**A, **5**B and **5**C. Mechanical stops limit the vertical travel of the dot pins **100**.

As seen in section in FIG. **3**, four lengths of small diameter **40** durometer silicone rubber cord **500** are used as detent material to hold the dot pins **100** in the raised position, within each line of Braille display, until they are erased. Once the pins are erased, the cords **500** hold the dot pins in a lowered or retracted position. The four lengths of rubber cord **500** are positioned such that two lengths are situated between the top and middle retention plates **200** and two similar cords **500** are positioned between the bottom and middle plates **200**. As further seen in FIGS. **1**A and **3**, the rubber cord **500** is located between the outer rows of the eight dot pins **100** making up each line of Braille cells, i.e., between row **1** (dots **1** and **4**) and row **2** (dots **2** and **5**) and between row **3** (dots **3** and **6**) and row **4** (dots **7** and **8**). In FIG. **1**A, the two cords **500** illustrate the relative plan view position of the silicone rubber cords **500** relative to the dot pins **100**.

FIG. **3** helps to illustrate the position of the silicone detent material of cords **500** relative to the set of three retention plates **200** and to the dot pins **100** for a six line TCM. The rubber detent material of each cord **500** makes resilient physical contact with the dot pins **100** and the retention plates **200**. Four spacers **202** are positioned between the plates **200** for vertical separation of the retention plates. The upper rubber cords **500** act as resilient pin alignment members to help to keep the dot pins **100** in vertical alignment. The lower rubber cords **500** act as resilient pin retention members to hold the pins **100** in their raised position.

As seen in FIGS. **6**A, **6**B, **7**A, **7**B and **7**C, integrated with the above described assembly are a linear motion undercarriage **600**, an electric drive motor **700**, a belt power transmission system **800**, and a support structure **900**. Not shown are a computer interface, an outer casing, a computer and an electronic control package of generally known arrangement.

In a preferred embodiment as shown in FIG. **1**B, a 0.375" long dot pin **100** is machined on a Swiss screw machine from 1/16" diameter 2011 T3 aluminum wire stock. Pin **100** has a 0.010" long, 45 degree chamfered surface **102** at the top end (the end felt by a blind person when the pins **100** are raised or displayed). Pin **100** further includes a top section **104** of uniform 0.050" diameter, a double hour glass section with curves of revolution **106**, **108**, and **110**, a lower uniform diameter section **112**, which is slightly longer than the top section **104** but of the same diameter, and a bottom uniform 1/16" diameter section **114**, forming a square abutment shoulder **116** at the abutment or intersection with the lower cylindrical section **112**.