the cylinder having a cylindrical outer surface a part of which defines a tactile display area and a cylindrical inner surface, the cylinder having a plurality of openings therethrough between the surfaces, the openings arranged in at least three endless rows, a plurality of pins having first and second ends, each one of the pins mounted in a different one of the openings and movable therein, static actuators at least equal in number to the rows of openings through the cylinder maintained at a station adjacent to the cylinder, the actuators positioned and configured so that the pins are selectively contactable at either of the ends by different ones of the actuators during cylinder rotation in either of the two directions so that the first ends of the pins are selectively positioned relative to the outer surface of the cylinder thereby streaming Braille text across the display area in either forward or backward order depending upon selected direction of cylinder rotation, and user controls allowing control at least of direction of rotation of the cylinder.

[0025] It is yet another object of this invention to provide a method for streaming Braille text in either forward or backward order at a display area including the steps of effecting relative movement in either of two directions between a station and a display surface, selectively activating actuators at the station while effecting the relative movement in a first of the two directions to set pins at selected positions relative to the display surface by contact with the pins, and effecting relative movement in either the first or a second of the two directions to selectively reset the pins at selected positions relative to the display surface by selectively activating the actuators at the station to cause contact with the pins.

[0026] With these and other objects in view, which will become apparent to one skilled in the art as the description proceeds, this invention resides in the novel construction, combination, arrangement of parts and method substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that changes in the precise embodiment of the herein disclosed invention are meant to be included as come within the scope of the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The accompanying drawings illustrate a complete embodiment of the invention according to the best mode so far devised for the practical application of the principles thereof, and in which:

[0028] **FIG. 1** is simplified illustration of an apparatus in accord with this invention;

[0029] **FIG. 2** is simplified illustration of another apparatus in accord with this invention;

[0030] **FIG. 3** is simplified illustration of yet another apparatus in accord with this invention;

[0031] **FIG. 4** is a block diagram of implementation of the tactile display apparatus in accord with this invention;

[0032] **FIG. 5** is a process flow diagram of a preferred embodiment of the tactile display apparatus of this invention;

[0033] **FIG. 6** is a simplified illustration of a preferred embodiment of one display apparatus of this invention, with portions illustrated representationally and/or cut away and/or exaggerated for better illustration of the principles thereof;

[0034] **FIG. 7** is a simplified illustration of an actuator grouping usable in the apparatus of **FIG. 6**;

[0035] **FIG. 8** is a simplified illustration of an actuator embodiment usable in the apparatus of **FIG. 6**;

[0036] **FIG. 9** is a simplified illustration of another actuator embodiment usable in the apparatus of **FIG. 6**;

[0037] **FIG. 10** is a simplified illustration of another actuator embodiment usable in the apparatus of **FIG. 6**;

[0038] **FIG. 11** is a simplified illustration of yet another actuator embodiment usable in the apparatus of **FIG. 6**;

[0039] **FIG. 12** is a simplified illustration of yet another actuator embodiment usable in the apparatus of **FIG. 6**;

[0040] **FIG. 13** is a simplified illustration of a passive default positioning device usable with the apparatus of **FIG. 2**;

[0041] **FIG. 14** is a simplified illustration of a passive default positioning device usable with the apparatus of **FIG. 6**;

[0042] **FIG. 15** is top view of the default positioning device of **FIG. 14**;

[0043] **FIG. 16** is a simplified illustration of a position retaining device usable with the apparatus of this invention;

[0044] **FIG. 17** is partial bottom view of the retaining device of **FIG. 16**;

[0045] **FIG. 18** is a side view of an alternative pin design usable with the apparatus of this invention;

[0046] **FIG. 19** is a simplified illustration of an alternative pin/aperture arrangement usable with the apparatus of this invention;

[0047] **FIG. 20** is a simplified illustration of an actuator grouping implementation usable with the apparatus of **FIG. 6**;

[0048] **FIG. 21** is a simplified illustration of another actuator grouping implementation usable with the apparatus of **FIG. 6**;

[0049] **FIG. 22** is a simplified illustration of a combination actuator/position retention device alternatively usable with the apparatus of **FIG. 6**;

[0050] **FIG. 23** is a simplified illustration of a linear tactile display apparatus in accord with this invention;

[0051] **FIG. 24** is a simplified illustration of a position retaining device used to retain multiple pin elevations in apparatus of this invention;

[0052] **FIG. 25** is a simplified diagrammatic illustration showing a first embodiment of a bi-directional implementation of the apparatus of this invention;

[0053] **FIG. 26** is a simplified diagrammatic illustration showing a second embodiment of a bi-directional implementation of the apparatus of this invention;

[0054] **FIG. 27** is a simplified diagrammatic illustration showing an actuator for an actuator grouping implementation usable with the apparatus of **FIG. 27**; and