

of the text appears on the reading table by lines. This offers the capability, especially in reproducing texts in Braille print, of reading the lines written before the whole table is written. In turn, clearing roller 134 situated under the under side of the belt 102 serves for clearing the character elements 104.

While the picture information of the viewing screen unit is being loaded character-for-character and line-for-line in the page memory 22 (see FIG. 7) the transfer to the reading tables according to FIGS. 10 and 11 is done in such a way that the knob columns and knob lines are set one after another. This will be explained in the example of reading table according to FIG. 10. The character generator 24 outputs the dot screen code for the first column of knobs on the left side of the reading table 2 and loads it in a shift register 38. Each of the 144 positions, for example, in the shift register 38 corresponds to a piston 27 (as was explained before, the reading table 2 shows 24 character field lines with 6 knob lines each). After the shift register 38 is loaded, the operating pistons 27 are driven by way of amplifiers 40 in accordance with the dot screen code of this first column of knobs. Then a column counter located in the character generator is advanced by one step and the second column is set in accordance with its dot screen code, etc., until the whole reading table 2 is written.

A control keyboard 42 is connected to the micro-processor 18. With this keyboard control commands can be output such as:

- new picture;
- suppress all characters of one color (for better readability of color graphics with colors interlaced with one another);
- enlarged display of one part of a picture; etc.

Not only can video and viewing screen text be displayed on the reading table but also information such as maps, city plans, etc. The reading table is also suitable for instruction purposes. Thus, for example, print characters can be depicted as two-dimensional tactile representations of the black-and-white characters beside the equivalent Braille characters.

I claim:

1. Apparatus for producing tactile-readable representations of graphics and alphanumeric characters comprising:

- a reading board having a surface containing a dense two-dimensional array of uniformly spaced character elements therein;
- each of said elements being susceptible of both raised and lower dispositions relative to said surface;
- said array being dividable two-dimensionally into an integral number of multi element sub-array separated from one another by borderlines of said elements;
- actuator means arranged adjacent to said board for setting the dispositions of all of said elements in said array;
- input means for receiving data representing graphics and character arrays;
- encoder means connecting said input means to said actuator means responsive to graphics for potentially actuating all of the elements in said array but responsive to character inputs for excluding from actuation the elements in said borderlines of elements whereby only the elements of said sub-arrays are actuatable in response to character inputs;
- and means for clearing said board by disposing all of said elements in the lowered disposition.

2. Apparatus as set forth in claim 1 wherein the reading board is a relatively thick elastic material and the character elements are areas of thin elastic material capable of assuming stable dome-like convex and con-

cave conditions and being physically switched between said conditions.

3. Unit as claimed in claim 1, characterized in that the reading surface (2) exhibits a number and arrangement of partial matrices (8,8a) corresponding to the number and arrangement of characters on one viewing screen page.

4. Unit as claimed in claim 1 characterized in that the sub-arrays (8,8a) are composed of 4x6 character elements (4) and the character field (6) are formed as Braille forms with eight character elements (4).

5. Unit as claimed in claim 1 characterized in that the actuator means include an electrical operating drive (27,127) and a control unit (17) for driving the operating drive.

6. Unit as claimed in claim 5, characterized in that the control unit (17) includes a memory unit (22) connectable to the viewing screen unit for storing at least the input signals forming one page of the viewing screen and a character generator (24) for converting these information signals into a character pattern corresponding to the page of the viewing screen and displayable on the reading board (2) as well as for driving the character elements (4) corresponding to this character pattern.

7. Unit as claimed in claim 6 characterized in that the control unit (17) includes means for suppressing the inversion commands for the display of reverse-brightness characters on the viewing screen unit.

8. Unit as claimed in claim 6 characterized in that the control unit (17) includes means for suppressing characters of one or a plurality of particular colors displayed on the viewing screen.

9. Unit as claimed in claim 6 characterized in that the control unit (17) includes means for the selective display of characters arranged at the boundaries of certain color fields of the viewing screen page as well as for suppressing the characters arranged inside these color fields.

10. Unit as claimed in claim 6 characterized in that the control unit (17) includes means for the selective representation of either only the graphic or the alphanumeric characters of one page of the viewing screen containing both types of characters.

11. Unit as claimed in claim 6 characterized in that the control unit (17) includes means for the enlarged display of sectors of a viewing screen page on the reading table.

12. Unit as claimed in claim 1 characterized in that the character elements (4) in their set or cleared position, respectively assume inherently stable positions and the actuator means comprises pistons (27,127) as means for the setting of the character elements.

13. Unit as claimed in claim 12, characterized in that a plurality of character elements (4) can be driven one after another by at least one piston (27,127) which can move relative to these in the plane of the reading board.

14. Unit as claimed in claim 13, characterized in that a row of pistons (27,127) is provided arranged corresponding to one line or one column and in that the reading table (2,102) and the row of pistons are respectively movable relative to each other in the column direction or in the line direction.

15. Unit as claimed in claim 14 characterized in that the reading board (2,102) is arranged as an endless belt movable in the line direction or in the column direction and in that the pistons (27,127) are respectively arranged stationary.

16. Unit as claimed in claim 12 characterized in that the character elements (4,104) are formed as projecting cap-like knobs of an elastic material projecting out of the reading board (2,102) in their set position.

* * * * *