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(54) An improved information display apparatus.

(57) An improved information display apparatus is described comprising a frame unit (1) including a wire matrix (2) forming a plurality of adjacent rectangular apertures (3). Mounted on adjacent vertical wires (4) of the matrix are rectangular elements (5) having a corresponding shape to the apertures (3). Each element (4) is made of a soft magnetic material of low remanence and has two contrasting surfaces which may be of a fluorescent sheet material.

A plurality of control lines (13) extend along the rear of the movable elements (5) to retain them in their selected position. A traversable carriage having rollers is provided to remove and return the control lines to the rear surfaces of the movable (5) elements to enable an array of activating means to actuate the movable elements.

EP 0 316 095 A1

AN IMPROVED INFORMATION DISPLAY APPARATUS

This invention relates to an improved information display apparatus, more particularly but not exclusively to visual information display apparatus.

Various types of information display apparatus are known in which images are formed by selectively displaying an appropriate face of one or more character forming elements. The elements are actuated to change their image by electromagnetic means. One such apparatus is described in the Applicants British Patent Application Number 2189067A.

In the prior art apparatus, the image forming elements are mounted to rotate in a framework to display coloured elements against a contrasting background. However, these apparatus have the disadvantage that the elements are so arranged such that an inadequate contrast ratio is obtainable between the coloured elements and the contrasting background of the frame which limits the clarity of the resulting character image. A further disadvantage of this arrangement is that the character frame limits the generation of pictorial image information and creates difficulties when multi-lined or a mixture of large and small characters is required.

An aim of the present invention is to provide an improved information display apparatus which overcomes the disadvantages of the prior art constructions and enables the rapid formation of accurately formed images and individual characters.

According to the present invention, there is provided an information display apparatus comprising a frame in which are mounted a plurality of movable elements having at least two display areas, and an array of activating means, the frame of elements and the array of activating means being movable relative to one another such that on selective energisation of the activating means, one or more of the plurality of movable elements are moved to create a changeable display of information, wherein the frame is a matrix of rectangular apertures in which are rotatably mounted correspondingly shaped rectangular elements which are positioned closely adjacent one another.

Conveniently, the frame is a wire matrix, the rectangular shaped elements being rotatably mounted on adjacent vertical wires of the matrix.

In an alternative arrangement the frame is made as a moulded plastics construction.

Preferably, the array of activating means is mounted in a carriage including a framework of roller elements to guide a plurality of linear elements away from and return them into engagement with the rear surfaces of the rectangular elements to maintain the elements in a selected aligned formation.

An embodiment of the improved display apparatus, according to the invention, will now be described with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic elevation of a frame unit carrying a matrix of elements;

Figure 2 is a diagrammatic side elevation of the frame unit of Figure 1 and the array of activating means and;

Figure 3 is a diagrammatic plan view of the frame unit and array shown in Figure 2.

The improved display apparatus comprises a frame unit generally indicated at 1 including a wire matrix 2 forming a plurality of adjacent rectangular apertures 3. Pivotably mounted on adjacent vertical wires 4 separated by horizontal wires 4a of the matrix are rectrangular elements 5 having a corresponding shape to the apertures 3. Each element 5 is made from a soft magnetic material having a low remanence and has two contrasting surfaces which may be of a fluorescent sheet material or coated with another suitable material e.g. paint.

The wire frame units are mounted in a display area such that the elements are rotatable about their vertical axis by the passage of a carriage carrying the array of activating means illustrated in Figure 3. The carriage comprises a bank of seven solenoids 6 arranged vertically, one above the other with their respective armatures 7 positioned directly behind a rotatable element 5. Mounted on the front of the bank of solenoids are two brushes 8 and 9. According to the direction of the activating means, the leading brush straightens the element if it is out of position, prior to energisation of the element and the trailing brush gently pushes the energised element from 90 degrees to 180 degrees to reverse its position.

A printed circuit board 10 connected by electrical wires 11 to the bank of solenoids is mounted on the carriage and carries a reflective sensor 12 at its forward end. The sensor acts to determine the position of each element 5 as the carriage passes along the frame of the element.

In order for the sensor position and activating means position to be known relative to the movement of the activating means, timing markers 16 are conveniently positioned along the track of the activating means, which, by means of a slotted opto electronic device 17, generate timing pulses. These timing pulses control the point at which the sensor reads the position of the element and the activating means on/off time. In the drawings, the elements 16 and 17 are shown moved through 90° to the vertical for ease of reference.

Passing horizontally along the centre of each row of elements 5 is a control line 13 which is tensioned at the ends of the display area to hold the elements firmly in their selected position. These control lines 13 pass around four vertical guide rollers, two 14 at the front of the carriage and two 15 at the back. The control lines are automatically guided around the back of the carriage as it traverses the display in the direction of arrow 'A' allowing the array of activating means to alter the elements passing between the two front rollers 14 and return the control line to the back suface of the arrangement of element 5 of the changed display.

The improved display apparatus provides an accurately shaped character, e.g. the letter 'A' in Figure 1, which can be read easily from a close and a far distance.

Various modifications may be made to the display apparatus of the invention, for example, the frame may be of a moulded plastics construction instead of a wire matrix. The movable elements may be manufactured from extruded soft magnetic material, an extruded material with an integral soft magnetic material or from extruded material to which soft magnetic material is subsequently assembled.

Claims

1. An information display apparatus comprising a frame (1) in which are mounted a plurality of movable elements (5) having at least two contrasting display areas, and an array of activating means (6) (7), the frame of elements and the array of activating means (6) (7) being movable relative to one another such that on selective energisation of the activating means (6) (7), one or more of the plurality of movable elements (5) are moved to create a changeable display of information, wherein the frame (1) is a matrix of apertures (3) in which are rotatably mounted correspondingly shaped elements (5) which are positioned closely adjacent one another.

2. An information display apparatus as claimed in Claim 1, wherein the frame (1) is a wire matrix (2), the shaped elements (5) being rectangular and rotatably mounted on adjacent vertical wires of the matrix (2).

3. An information display apparatus as claimed in Claim 1, wherein the frame (1) is of a moulded plastics construction.

4. An information display apparatus as claimed in any preceding Claim wherein control lines (13) pass alcng the rear surface of each row of movable elements (5) to hold them in a selected position.

5. An information display apparatus as claimed in Claim 4, wherein the control lines (13) pass around rollers (14) mounted on a carriage which carries the array of activating means (6) (7), to remove and return the control lines from engagement with the rear surface of the activating means (6) (7) to enable the array to traverse and activate the elements (5).

6. An information display apparatus as claimed in any preceding Claim wherein the activating means (6) (7) comprises an array of electromagnets (6) which are selectively energised.

7. An information display apparatus as claimed in any preceding Claim wherein the movable elements (5) are extruded from a soft magnetic material.

8. An information display apparatus as claimed in any of Claims 1 to 6, wherein the movable elements (5) are manufactured from an extruded material with an integral soft magnetic material.

9. An information display apparatus as claimed in any of Claims 1 to 6, wherein the movable elements (5) are manufactured from extruded material to which soft magnetic material is subsequently assembled.

10. An information display apparatus as claimed in any proceding Claim wherein leading (8) and trailing (9) brushes are provided on the array of activating means (6) (7) to assist in the alignment of the movable elements (5), to prevent the leading brush (8) air flow disturbing said alignment.

11. An information display apparatus as claimed in any preceding claim, wherein the activating means (6) (7) are microprocessor controlled to display changeable characters or images.

12. An information display apparatus as claimed in any proeceding Claim, wherein an array of sensing elements (12) corresponding to the actuating means (6) (7) are able to detect the state of the display elements (5) in advance of actuation to correct errors arising in the display.

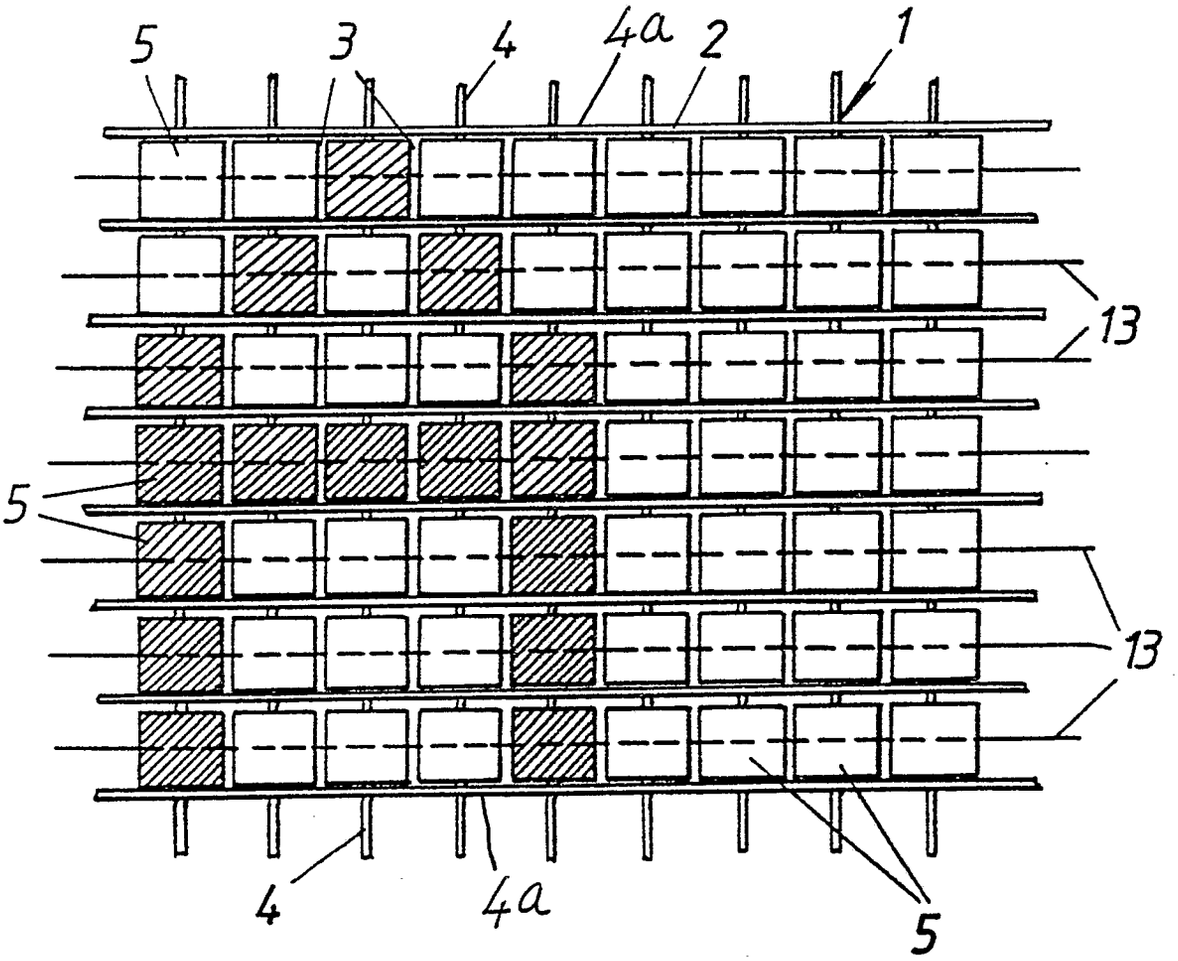

FIG.1.

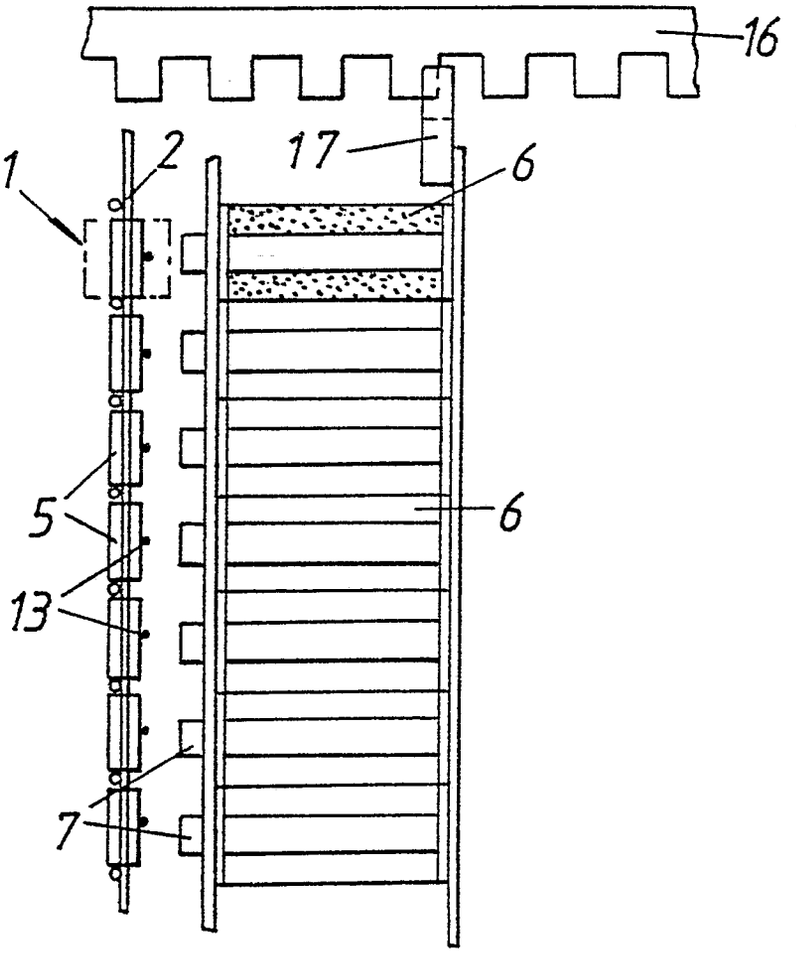

FIG. 2.

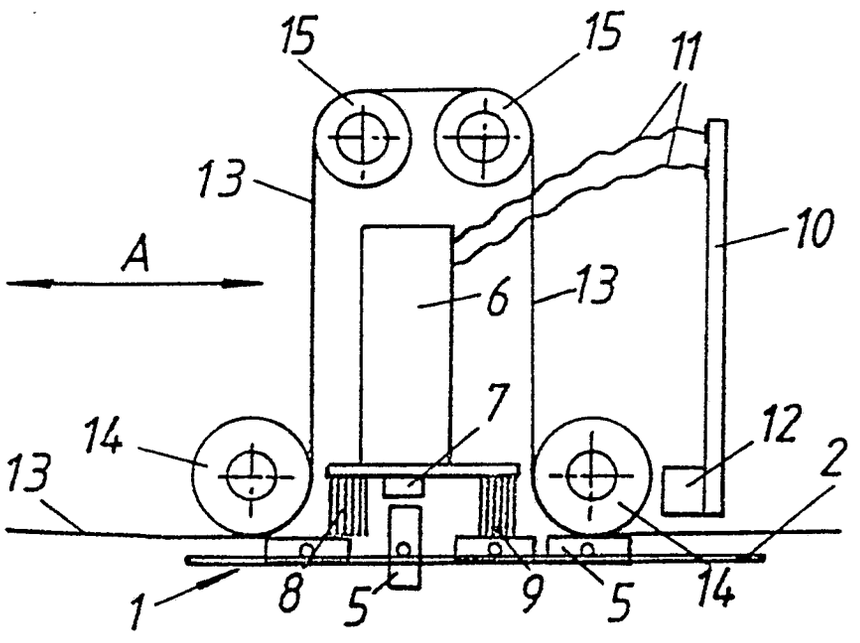

FIG. 3.

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EUROPEAN SEARCH REPORT

Application Number

EP 88 31 0132

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US-A-3 267 595 (M.M. LEVY et al.) * Column 2, line 38 - column 4, line 7; column 10, lines 31-46; figures 1-4,26-27 *	1	G 09 F 9/37
Y		2	
A		4,5,6	
D,Y	EP-A-0 241 241 (HARVEY-JENKINS DEVELOPMENTS LTD) * Claims 1-3,7-8,10,15-17; column 3, line 40 - column 4, line 51; figures 8-9 *	1-3	
A		6,8,10-12	
Y	GB-A- 934 001 (FERRANTI LTD) * Claims 1-3; page 3, lines 6-65; figures 1,7,8 *	1-3	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

G 09 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15-02-1989	FRANSEN L.J.L.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
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