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(71) Applicant: **AVIX INC.**
Yokohama-shi, Kanagawa (JP)

(72) Inventor: **TOKIMOTO, Toyotaro**
Yokohama-shi, Kanagawa (JP)

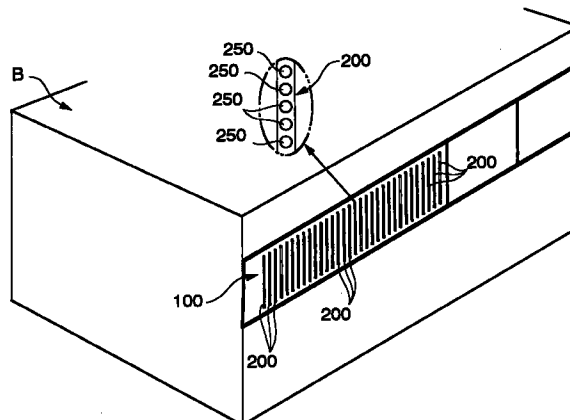
(74) Representative:
Charlton, Peter John
Elkington and Fife
Prospect House
8 Pembroke Road
Sevenoaks, Kent TN13 1XR (GB)

(54) **Method for presenting a large scrolling display along a window of a building and an apparatus therefor**

(57) A method and an apparatus for presenting a large scrolling display from an inside of a building through a window opening portion of the building is disclosed.

Thirty two (32) sets of display units 200, each of which including sixty four (64) pieces of LEDs 250 arranged in alignment at fine intervals are disposed along an inner periphery of at least one window 100 of a building B at substantially constant intervals greater than the above fine interval. The display units 200 are arranged so that lights of the LEDs 250 thereof are perceived clearly from a predetermined area in the outside of the building B. The above arranged display units 200 form a strip form display region along the window 100 and are driven according to a bitmap image data. The bitmap image data represents an image consisting of m dots in a column direction and w dots in a row direction, where w is an integer greater than the number multiple of n, i.e., 342. The image is scrolled along the strip form display region from one end thereof to the other end. At every moment, (64 x 32) pieces of the LEDs 250 are activated by providing a bitmap data of (64 x 32) dots depicted every ten columns from among the bitmap image data of (64 x 342) dots on the strip form display region.

FIG. 2



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Description

The present invention relates to a method and an apparatus for presenting a large scrolling display from an inside of a building through a window thereof toward persons outside the building, for example, passersby beside the building, and it specifically relates to a technique for displaying character strings and/or graphic images while scrolling.

Today numerous types of display apparatus can be seen along city streets and buildings, and are utilized for various advertisement of goods and services or for delivering news. It would be undoubted that as a display screen becomes larger, advertising effect achieved by the display screen increases. Taking this relationship into consideration, it would be sufficient to equip a large sign-board with lamps for delivering unchanging information such as a picture or photograph with characters. However, for communicating variable and changing information, such a display should be used as a dot matrix CRT display which is capable of displaying changing characters and moving images.

A very large sized dot matrix display installed on a roof or a wall surface of a building is extremely expensive. Besides the display itself, it costs very much to prepare a structure for supporting the display and an installation work therefor. Due to these problems, such large sized dot matrix display is not one generally employed. It would be specifically impossible to apply such a display to advertising activity during a limited time period.

As is well known, banners are often used for large media displays in such a situation that an advertisement as big as possible is temporarily displayed on a building wall surface with least expense. For example, a banner is arranged along a wall surface of a building, on which a large character string like "Spring Sale" is printed. This advertising method, which would cost relatively little apparently, involves the disadvantage of incapability for providing changing information. In case that the above banner is disposed along a wall surface of a building having a number of windows, some of the windows are closed by the cloth and so the atmosphere of the rooms with the windows closed by the cloth is degraded. Specifically, it is not accepted to blind windows of a building by the cloths, where facilities such as restaurants are characterised by openness derived from light through the windows or the views out of the windows. Furthermore, it is not allowed either to cover a beautiful facade of buildings such as hotels and museums by unattractive banners since those buildings are appreciated for their appearance.

One object of the present invention is to provide a method and apparatus for presenting a large scrolling display from an inside of a building through a window opening portion thereof, in which any attachment on a wall surface of a building is not required, and thus the function of windows at the wall surface is not degraded.

Another object of the present invention is to provide a method and apparatus for presenting a large scrolling display from an inside of a building through a window opening portion thereof, for enabling display of various characters and/or graphic images and providing advanced visual effects.

Further object of the present invention is to provide a method and apparatus for presenting a large scrolling display from an inside of a building through a window opening portion thereof, for enabling the above display at relatively low cost.

To accomplish these and other objects of the invention, according to one aspect of the present invention, a method for presenting a large scrolling display from an inside of a building through a window opening portion thereof, comprises the following steps:

(a) A plurality of light emitting cell array segments having a plurality of light emitting cells arranged at fine intervals therein are provided. The array segments are disposed along an inner periphery of at least one window opening portion of a building at greater intervals than the above fine interval.

(b) Each of the light emitting cell array segments are arranged in such a manner that lights emitted from the light emitting cells thereof are to be perceived clearly from a predetermined area in the outside of the window opening portion of the building.

(c) The light emitting cell array segments are disposed so as to form a strip form display region along the window opening portion of the building. A plurality of the light emitting cells arranged in the strip form display region are driven according to a bitmap image data in order that an image represented by the above bitmap image data is scrolled along the strip form display region from one end to the other end thereof.

(d) The bitmap image data is prepared as representing an image consisting of m dots in a column direction and w dots in a row direction, where n sets of the array segments having m pieces of the light emitting cells form the strip form display region with the light emitting cells including m pieces in a column direction and n pieces in a row direction, and w is an integer greater than the number multiple of n by several times.

(e) At every moment, the light emitting cells of $(m \times n)$ pieces are activated at one moment by providing a bitmap data of $(m \times n)$ dots depicted discretely from among the bitmap image data of $(m \times w)$ dots on the strip form display region considered as a virtual display region consisting of $(m \times w)$ dots.

According to another aspect of the present invention, an apparatus for presenting a large scrolling display from an inside of a building through a window opening portion thereof, comprises a plurality of light emitting cell array segments having a plurality of light

emitting cells arranged at fine intervals therein, and a control unit for providing control signals with the respective light emitting cell array segments in order to determine driving sequence of the light emitting cells in the respective array segments. The array segments are disposed along an inner periphery of at least one window opening portion of a building at greater intervals than the fine interval so as to form a strip form display region. Each of the light emitting cell array segments are arranged in such a manner that lights emitted from the light emitting cells thereof are to be perceived clearly from a predetermined area in the outside of the window opening portion of the building. A plurality of the light emitting cells are driven according to a bitmap image data in order that an image representative of the image data is scrolled along the strip form display region from one end to the other end thereof. The control unit stores the image data as an image consisting of m dots in a column direction and w dots in a row direction, where n sets of the array segments having m pieces of the light emitting cells form the strip form display region with the light emitting cells including m pieces in a column direction and n pieces in a row direction, and w is an integer greater than the number multiple of n by several times. The light emitting cells of $(m \times n)$ pieces are activated by providing an image data of $(m \times n)$ dots depicted from among the image data at intervals in scrolling direction at one moment on the strip form display region nominally regarded as a virtual display region consisting of $(m \times w)$ dots.

According to the above-mentioned method and apparatus of the present invention, the following advantages are obtained:

- (a) It becomes practical to prepare a large sized strip form display region by disposing a plurality of the light emitting cells array segments along the inner periphery of a window opening portion of a building;
- (b) Various information can be displayed while scrolled on the large display region at very low cost, since the images impressively representing the information are easily generated with a personal computer or a word processor as an image data containing character strings and/or graphic images;
- (c) Appearance of a building would not be deteriorated since hardly any device or equipment is required to be arranged outside the building;
- (d) Essential function of a window of introducing light into a room or a view from a window is not substantially spoiled since the array segments are disposed at certain intervals inside the window opening portion. For this reason, the scrolling display apparatus of the present invention can be applied to such facilities as hotels, restaurants, and museums without making significant alteration in the room;
- (e) Each of the display units is a light and small

device, thus it is very easy to install or remove the light emitting cell array segments inside the window opening portion. The array segments can be arranged in a building in short time when necessary, and removed immediately after the period of use. The array segments and other devices or components are repeatedly used. These features lead to utility and economy in implementation of the present scrolling display apparatus; and

- (f) The cell array segments and other devices are installed inside the window opening portion of the building, thus it is not necessary to make the devices waterproof or corrosion-resistant.

Still other objects and advantages of the present invention will become readily apparent to those skilled in this art from the following detailed description, wherein only the preferred embodiment of the invention is shown and described, simply by way of illustration of the best mode contemplated of carrying out the invention. As will be realized, the invention is capable of other and different embodiments, and its several details are capable of modifications in various obvious respects, all without departing from the invention. Accordingly, the drawing and description are to be regarded as illustrative in nature, and not as restrictive.

In the drawings:

- Fig. 1 is a vertical plan view of a display unit according to one embodiment of the present invention;
- Fig. 2 is a perspective schematic view of an apparatus according to one embodiment of the present invention, installed in a window of a building;
- Fig. 3 shows an apparatus in Fig. 2 displaying a character string;
- Fig. 4 is a schematic block diagram of a display control circuit employed in the embodiment shown in Figs. 1 to 3;
- Fig. 5 is a flow chart showing steps of display control procedure for the display control circuit in Fig. 4; and
- Fig. 6 is a schematic diagram describing a display sequence according to a discrete scrolling display method of the present invention.

As shown in Fig. 1, a scrolling display apparatus according to a typical configuration of the present embodiment includes a display unit 200, a display control unit 300 and a power supply unit 400. The display unit 200 corresponding to the light emitting cell array segment, has a column body 200a, containing sixty four (64) LEDs 250 in alignment and a driving circuit unit DS, as will be described in detail below referring to Fig. 5. The number of the LEDs 250 may vary according to required dot numbers vertically. An interval between the adjacent LEDs 250 is set at approximately three (3) cm in this embodiment. An optical component may be interposed in front of the array of LEDs 250 for widening a

viewing angle thereof. The LEDs 250 and the driving circuit unit DS are arranged in an upper casing 202 and a lower casing 204, respectively. The upper and lower casings 202, 204 are securely fastened to each other with a joiner 206 to construct the above column body 200a. At each end portion of the column body 200a is secured an end cover member 210 having a mounting device attached thereto. The mounting device for installing the display unit 200, comprises a base member 214, an adjusting screw 212 and a suction cup 218. The upper and lower base members 214 are able to be urged toward a ceiling and a window sill or a floor, respectively, in order to firmly support the column body 200a against the building structure by tightening the respective adjusting screws 212. After installation of the display unit 200, each of the adjusting screws 212 is concealed by a sheath member 216 of a tube shaped synthetic resin sheet. A pair of suction cups 218 are secured to each of the end cover member 210. Each of the suction cups 218 is fixed to an inner surface of a window glass by being pressed there-against. Consequently, the column body 202a of the display unit 200 is securely supported by the base members 214 and the suction cups 218 against the building structure and the window glass, respectively.

A partitioning plate 208 is attached to each of side peripheral portions of the column body 200a so as to be arranged in parallel relationship with the alignment of the LEDs 250. The partitioning plate 208 prevents lights emitted by the LEDs 250 from reaching the adjacent display units 200 and degrading clarity of displayed scrolling image.

A personal computer is employed for a display control unit 300 for providing display control signals with the display unit 200 via control signal cables 350 and control signal connectors 220a, 220b according to an image data stored in the unit. It is obvious that other specified control units other than personal computers are employable as the display control unit of the present embodiment. A power supply unit 400 is a device for converting AC power, e.g., AC100V, 50/60Hz, into driving current of the LEDs 250 and supplying thereto via a power cable 450 and a power connector 222.

Thirty two (32) sets of the display units 200 may be daisy-chained to the display control unit 300. In the meanwhile, instead of communication of the control signal via the cables 350, a radio communicating unit (not shown) may be equipped with the display control unit 300 and each of the display units 200 in order to enable radio communication of the display control signals between the display control unit 300 and the display units 200. In such a configuration, each of the display unit 200 is supplied with power via a respective individual power cable 450.

Referring to Fig. 2, a scrolling display apparatus according to one embodiment of the present invention is installed along a window 100 provided with a side wall of a building B. More particularly, the scrolling display

apparatus comprises thirty two (32) sets of the display units 200 as the light emitting cell array segment, arranged along an inner periphery of the window 100 at predetermined intervals. In other words, every display unit 200 is disposed vertically at the proximity of an inner surface of a glass fit in the window 100. The above interval between the adjacent display units 200 in this embodiment is approximately one (1) meter. It is not necessary to set the above interval to the exact constant value. Difference is allowed among the intervals to some extent since installation condition may depend on situation of the inner space where the display unit 200 is disposed. In case that the display units 200 are arranged along a plurality of windows 100 which are separated by pillars and/or walls, the display unit 200 cannot be disposed at those pillars or walls. As a result, some part of the series of display unit 200 may become blank. However, this lack of display unit 200 would not affect essentially to the function of the apparatus. The display units 200 may be arranged in the proximity of the inner surface of the window glass so that at least a part of the display units 200 are disposed radially or in a triangular wave fashion along the window glass.

The scrolling display apparatus according to the present embodiment is, as shown in Fig. 3, specifically designed to deliver displayed information to passersby 550 walking along a walkway 500 across the street 510. Therefore, sixty four (64) pieces of the LEDs 250 arranged in each of the display unit 200 are provided with same orientation so as to be observed clearly by the above passersby 550 across the street 510. In the meantime, thirty two (32) sets of the respective display units 200 are also oriented so that optical axes of the LEDs 250 arranged therein are directed to the walkway 500 across the street 510. In this embodiment, a character string of "Spring Sale" is displayed in the scrolling direction along a series of the display units 200 as indicated in Fig. 3.

[Configuration of Scrolling Display Apparatus according to One Embodiment]

A display control circuit according to one embodiment of the present invention is shown in a schematic block diagram of Fig. 4. As described above, each of the display units 200 has a light emitting cell array A_i including sixty four (64) pieces of the LEDs 250 aligned therein at predetermined fine intervals, and a 64-bit drive circuit DS_i for driving the LED array A_i , where i is an integer representative of arrangement order of the display unit 200, thus $i=1, 2, 3, \dots, 32$. The drive circuit DS_i includes a 64-bit shift register 260, a 64-bit latch circuit 270, and a 64-bit driver 280. 64-bit display data corresponding to one display unit 200 is transmitted to the shift register 260. The display data is then moved to and held in the latch circuit 270. The driver 280 turns on sixty four (64) pieces of the LEDs 250 according to the above display data.

Thirty two (32) sets of the display units 200 are connected to each other in series. In the meantime, the respective display units 200 are connected with the display control unit 300. More specifically, thirty two (32) sets of the 64-bit shift registers 260 included in the drive circuit DSi are connected to each other in series so as to form a (64 x 32)-bit shift register as a whole as shown in Fig. 4. The (64 x 32)-bit shift register is connected to the display control unit 300.

The display control unit 300 comprises a processor 310, an image memory 320, and a shift register 330. In the image memory 320 is stored a bitmap image data 64 bits high. Width of the data may be determined arbitrarily. 64 bits data of every column in an image data is hereinafter referred to as a column data. Every column data is so numbered orderly that the series of column data read D1, D2, D3 and so on. Thus, any of the column data is generally described as Dj. The image memory 320 is configured so that 64 bits correspond to one word, and the column data Dj is stored at address j.

The processor 310 of the display control unit 300 reads the image memory 320 as follows. The column data Dj read out as a 64 bits parallel data from the image memory 320 is converted into a serial data through the shift register 330, which is used for converting parallel data into serial data. The converted serial data is, as mentioned above, input to the (64 x 32) bit shift register consisting of thirty two (32) 64-bit shift registers 260 connected in series. When thirty two (32) column data are serially loaded in the (64 x 32) bit shift register from the display control unit 300, every 64-bit shift register 260 is provided with 64-bit column data. At this time, a latch signal is supplied to the respective drive circuits DSi from the display control unit 300 to move the data stored in the shift register 260 to the latch circuit 270 and hold in it. Sixty four (64) pieces of the LEDs 250 in the respective display unit 200 are driven by the latched data. In the meantime, the data in each of the shift registers 260 is updated.

[Display Control Procedure in the Present Embodiment]

A flow chart in Fig. 5 shows a reading procedure of an image data from the image memory 320 by the processor 310 in the display control unit 300. In step 601, a start pointer P is set to zero. In step 602, the value of the start pointer P is transferred to an address pointer j. Thus, in this step, both j and P are equal to zero. In step 603, a column counter C is set to zero.

In the next step 604, an address j indicated by the address pointer j in the image memory 320 is accessed and a column data Dj read out at the address j is transmitted serially. In step 605, the address pointer j is increased by ten (10). This step of "increment by ten (10) in the address pointer j" is one of typical features of the present display control procedure.

In step 606, the column counter C is increased by

one (1). In step 607, the column counter C is checked to see if the value of the column counter C reached the terminal value, i.e., $n=32$. If the value is determined less than 32, the process is returned to step 604 and the image memory 320 is read according to the address pointer j which has been updated in step 605. If the value of the counter C is equal to thirty two (32), it is determined that the column data have been loaded into thirty two (32) sets of the respective shift registers 260. In this case, a latch signal is generated in step 608 as mentioned above.

In the next step 609, the start pointer P is increased by one (1) to prepare advancement of the image to be displayed by one dot in a scrolling direction. In step 610, the start pointer P is checked to see if the value of the pointer P has reached a value MAX representative of an end portion of the image. While the value of the pointer P is less than MAX, the process is returned to step 602 to continue scrolling the image. The value of the pointer P reaches MAX, then the process is returned to step 601 to restart scrolling the image from the beginning portion of it.

The image data itself stored in the image memory 320 consists of a sequence of the column data such as Dj, D(j+1), D(j+2), D(j+3), D(j+4), D(j+5), D(j+6), and so on. However, the column data C is depicted from the stored image data every ten (10) columns in the scrolling display method according to the present invention. Accordingly, with reference to Fig. 4, a series of column data Dj, D(j+10), D(j+20), D(j+30), D(j+40) are transmitted to the drive circuits DS32, DS31, DS30, DS29, DS28 in the adjacent display units 200, respectively.

[Example 1]

One example of the present scrolling display method will be described as follows referring to Fig. 3.

(a) A strip form display region m dots high by n dots wide is defined along the window 100 of the building B. The strip form display region consists of thirty two (32) sets of the display units 200, each having sixty four (64) pieces of the LEDs 250. That is, m and n are set to be sixty four (64) and thirty two (32), respectively, in this embodiment. On the other hand, the bitmap image data stored in the image memory 320 is prepared with regarding the strip form display region as a virtual display region m dots high by w dots wide. In the present embodiment, m is set equal to sixty four (64) dots, and w is equal to $(11 \times n) - 10 = 342$ dots.

(b) On the strip form display region regarded as a virtual display region of (64 x 342) dots, (64 x 32) dots data depicted from the image data of (64 x 342) dots every 10 columns is displayed at one moment. In other words, (64 x 32) pieces of the LEDs 250 are driven momentarily by the (64 x 32) dots data selected among the stored image data.

[Example 2]

Referring to Fig. 6, another example of image according to the scrolling display method of the present invention is schematically described hereinbelow. The exemplary display region consists of six (6) sets of display units 200, each including sixteen (16) pieces of light emitting cells 250. A bitmap image data representative of a character string "ｱｲﾙ", whereas both of the characters ｱ and ｲ are *kana* characters in Japanese language, is displayed on the strip form display region of six (6) sets of the light emitting cell array segment A1 to A6. Each of the characters is derived from a 16- by 16-dot matrix. Filled-in circles in Fig. 6 correspond to positions where the dots constituting a character and the light emitting cells in the array segments Ai overlap one another. Thus, the light emitting cells 250 corresponding to the filled-in circles are driven momentarily. As shown in Figs. 6 (a) to 6 (f), the dot data depicted from the 16- by 16-dot matrix data are supplied to the cell array segments A1 to A6. The column data is sequentially scrolled dot by dot for each of the cell array segments A1 to A6. Accordingly, only fractions of the characters are displayed on the strip form display region at every moment. However, for example, in case that the image data representative of the characters is scrolled at four (4) characters per second, the displayed image is able to be recognized as a 16- by 16-dot matrix character.

The above recognition is enabled by "*persistence of vision*" which complements blank portions between the discretely displayed column data according to the function of retina and visual center of an observing person. In the preferred embodiment shown in Figs. 1 to 5, intervals between the adjacent display units 200 are set at relatively longer value of one (1) meter. For this longer intervals between the display units 200, it is possible to obtain a scrolling image by increasing dots constituting one character. In the present embodiment, number of dots constituting one character is eleven (11) times as many as that of the column data displayed at one moment within a unit length. At the same time, it is required to set a scrolling velocity at relatively high value so that a predetermined image can be perceived by an observer.

In another embodiment of the present invention, a plurality of the display units 200 are arranged horizontally and disposed in a vertical direction at relatively larger intervals. For example, a plurality of the display unit 200 may be disposed from upper stories down to lower stories of a high-rise building, each of the display units 200 being arranged horizontally in its longitudinal direction in the proximity of the inner surface of the windows of each story. A strip form display region is defined by tens of the display units 200 at intervals of fifty (50) to one hundred (100) cm, corresponding to disposing three (3) to six (6) sets of the display units 200 for each story. The same function as described in the preceding embodiment shown in Figs. 2 and 3, enables scrolling

display of an image in a vertical direction along the side wall of a building in this embodiment.

In the display control system in Figs. 4 and 5, an animated image may be displayed while scrolling by varying images read from the image memory 320 with time according to an additional processing system. Furthermore, in the preceding embodiment in Figs. 4 and 5, the column data of the image are read from the image memory 320 discretely by the processor 310 to be transferred to the respective display units 200 in series. However, the present invention may employ another processing such that each of the display units 200 picks up the column data separately while the image data is output continuously in series from the image memory 320 and delayed at the respective display units 200.

Claims

1. Method for presenting a large scrolling display from an inside of a building through a window opening portion thereof, said method comprising the steps of:

providing a plurality of light emitting cell array segments having a plurality of light emitting cells arranged at fine intervals therein, said array segments disposed along an inner periphery of at least one window opening portion of a building at greater intervals than said fine interval;

arranging each said light emitting cell array segment in such a manner that lights emitted from said light emitting cells thereof are to be perceived clearly from a predetermined area in the outside of the window opening portion of the building;

disposing said light emitting cell array segments so as to form a strip form display region along said window opening portion of the building, a plurality of said light emitting cells arranged in said strip form display region being driven according to a bitmap image data in order that an image represented by said bitmap image data is scrolled along said strip form display region from one end to the other end thereof;

preparing said bitmap image data as representing an image consisting of m dots in a column direction and w dots in a row direction, where n sets of said array segments having m pieces of said light emitting cells form said strip form display region with the light emitting cells including m pieces in a column direction and n pieces in a row direction, and w is an integer greater than the number multiple of n by several times; and

at every moment, activating said light emitting cells of (m x n) pieces at one moment by pro-

viding a bitmap data of (m x n) dots depicted discretely from among said bitmap image data of (m x w) dots on the strip form display region considered as a virtual display region consisting of (m x w) dots.

2. A scrolling display method as set forth in claim 1, wherein said light emitting cell array segments are arranged in substantially parallel relationship at substantially constant intervals.

3. A scrolling display method as set forth in claim 1, wherein said light emitting cell array segments are arranged in substantially parallel relationship at given intervals different at different positions in said strip form display region.

4. A scrolling display method as set forth in claim 3, wherein a time period required from driving a first light emitting cell array segment with m dot column data which is a fraction of said bitmap image data and corresponding to pixels to be displayed by one light emitting cell array segment, to driving an adjacent second light emitting cell array segment with the same m dot column data, is controlled to be proportional to the interval between said first and second light emitting cell array segments.

5. A scrolling display method as set forth in claim 1, wherein at least a part of said light emitting cell array segments are arranged radially along a substantially common surface.

6. A scrolling display method as set forth in claim 1, wherein at least a part of said light emitting cell array segments are arranged in a triangular wave fashion.

7. A scrolling display method as set forth in claim 1, wherein data extraction operation is performed upon reading out said bitmap image data stored in a memory for driving (m x n) pieces of said light emitting cells, said extraction operation being carried out in such a manner that:

said bitmap image data is virtually developed on said virtual display region regarded to have (m x w) dot pixel construction;

the developed image data is virtually overlapped with said light emitting cell array segments; and

data for m dots overlapping to the positions of m pieces of said light emitting cells in each said light emitting cell array segment are extracted;

wherein said data extraction operation is repeated with slightly shifting the position of said image data to be developed on said virtual display region in the scrolling direction.

8. A scrolling display method as set forth in claim 1, wherein said bitmap image data includes dynamic image factor varying in time sequence.

9. A method for presenting a large scrolling display from an inside of a building through a window opening portion thereof, said method comprising the steps of:

forming a light emitting cell array segment by arranging a plurality of light emitting cells in a spaced apart with a first interval and aligned relationship;

arranging a plurality of said light emitting cell array segments in spaced apart relationship with a second interval greater than said first interval to form a display plane along an inner periphery of the window opening portion of the building;

storing an image data representative of an image to be displayed on said display plane;

reading out data fractions of said image data, each said data fraction corresponding to an image fraction to be displayed on one individual light emitting cell array segment, with thinning data fractions corresponding to the image fractions to be displayed in a space corresponding to the second intervals; and

shifting the position of said image on said display plane in a predetermined magnitude per every display cycle for scrolling display of said image at a scroll speed determined depending upon said second interval.

10. A scrolling display method as set forth in claim 9, wherein said light emitting cell array segments are arranged in parallel relationship on a common plane at substantially constant intervals.

11. A scrolling display method as set forth in claim 9, wherein said light emitting cell array segments are arranged in parallel relationship on a common plane with different intervals at different positions on said display screen.

12. A scrolling display method as set forth in claim 9, wherein said scroll speed is set proportional to said second interval.

13. A scrolling display method as set forth in claim 9, wherein said image data is established with respect to said display plane virtually including vertical dots existing at the intervals of said light emitting cell array segments.

14. A scrolling display method as set forth in claim 13, wherein said image data is read out per a given bit of fraction data whose number of bits correspond to

number of light emitting cells included in the individual light emitting cell array segment.

15. An apparatus for presenting a large scrolling display from an inside of a building through a window opening portion thereof, said apparatus comprising:

a plurality of light emitting cell array segments having a plurality of light emitting cells arranged at fine intervals therein, said array segments disposed along an inner periphery of at least one window opening portion of a building at greater intervals than said fine interval so as to form a strip form display region, each said light emitting cell array segment being arranged in such a manner that lights emitted from said light emitting cells thereof are to be perceived clearly from a predetermined area in the outside of the window opening portion of the building, a plurality of said light emitting cells being driven according to a bitmap image data in order that an image representative of said image data is scrolled along said strip form display region from one end to the other end thereof; and

a control unit for providing control signals with the respective light emitting cell array segments in order to determine driving sequence of the light emitting cells in the respective array segments, wherein

said control unit storing said image data as an image consisting of m dots in a column direction and w dots in a row direction, where n sets of said array segments having m pieces of said light emitting cells form said strip form display region with the light emitting cells including m pieces in a column direction and n pieces in a row direction, and w is an integer greater than the number multiple of n by several times, and said light emitting cells of $(m \times n)$ pieces being activated by providing an image data of $(m \times n)$ dots depicted from among said image data at intervals in scrolling direction at one moment on the strip form display region nominally regarded as a virtual display region consisting of $(m \times w)$ dots.

16. An apparatus for presenting a large scrolling display from an inside of a building through a window opening portion thereof, said apparatus comprising:

a plurality of light emitting cell array segments, each being formed with m pieces of light emitting cells arranged in alignment with fine intervals, said light emitting cell array segments forming

a strip form physical region consisting of n sets of said light emitting cell array segments in spaced apart relationship to each other;

n sets of said light emitting cell array segments forming said strip form physical region being spaced from adjacent segments with an interval which is much greater than said interval between said light emitting cells;

said light emitting cell array segments being arranged substantially along an inner periphery of said window opening portion of the building; $(m \times n)$ pieces of said light emitting cells included in said strip form physical region being driven according to a bitmap image data with scrolling the display image from one end of said strip form physical region to the other end; said bitmap image data being prepared with respect to a virtual display region of which pixels are arranged in m dots in a column direction and w dots in a row direction, where w being an integer multiple of n ; and

at every moment, $(m \times n)$ pieces of light emitting cells being driven by $(m \times n)$ dots of data in said strip form physical region nominally regarded as said virtual display region.

17. A scrolling display apparatus as set forth in claim 15 or 16, wherein each said light emitting cell array segment further comprises at least one set of attachment device for fixing in the proximity of the window opening portion.

18. A scrolling display apparatus as set forth in claim 17, wherein said attachment device further comprises a plurality of suction cups.

19. A scrolling display apparatus as set forth in claim 15 or 16, wherein each said light emitting cell array segment further comprises a pair of partition members arranged along both side ends thereof in order to prevent scattering of lights emitted by the light emitting cells.

20. A scrolling display apparatus as set forth in claim 15 or 16, wherein said light emitting cell array segments are connected with said control unit via communication cables in a daisy-chain for transmitting image data and control signals.

21. A scrolling display apparatus as set forth in claim 15 or 16, wherein said light emitting cell array segments are communicated with said control unit via wireless transmission for transmitting image data and control signals.

22. A scrolling display apparatus as set forth in claim 15 or 16, wherein each said light emitting cell array segment is supplied with electric power via respec-

tive power cables connected to the respective array segments.

23. An apparatus for presenting a large scrolling display from an inside of a building through a window glass thereof, said apparatus comprising: 5

a plurality of display units, each said display unit further including at least one set of attachment device for fixing the unit in the proximity of the inner surface of the window glass, n sets of said display units being spaced from adjacent display units with an interval which is much greater than said interval between said LEDs, said display units being arranged in substantially parallel relationship with each other along an inner periphery of said window glass of the building; 10 15

m pieces of LEDs arranged in each said display unit in alignment with fine intervals; 20

a strip form display region consisting of n sets of said display units in spaced apart relationship to each other;

a control unit communicating with said display units via communication cables, for providing control signals with the respective display units in order to determine driving sequence of the LEDs in the display units; 25

a power supply unit connected to said display units via power cables, for supplying driving current to the LEDs in each said display unit, wherein 30

(m x n) pieces of said LEDs included in said strip form display region are driven according to a bitmap image data with scrolling the display image from one end of said strip form display region to the other end, 35

said bitmap image data stored in said control unit, are prepared with respect to a virtual display region of which pixels are arranged in m dots in a column direction and w dots in a row direction, where w being an integer multiple of n, and 40

at every moment, (m x n) pieces of LEDs are driven by (m x n) dots of data in said strip form display region nominally regarded as said virtual display region. 45

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FIG.1

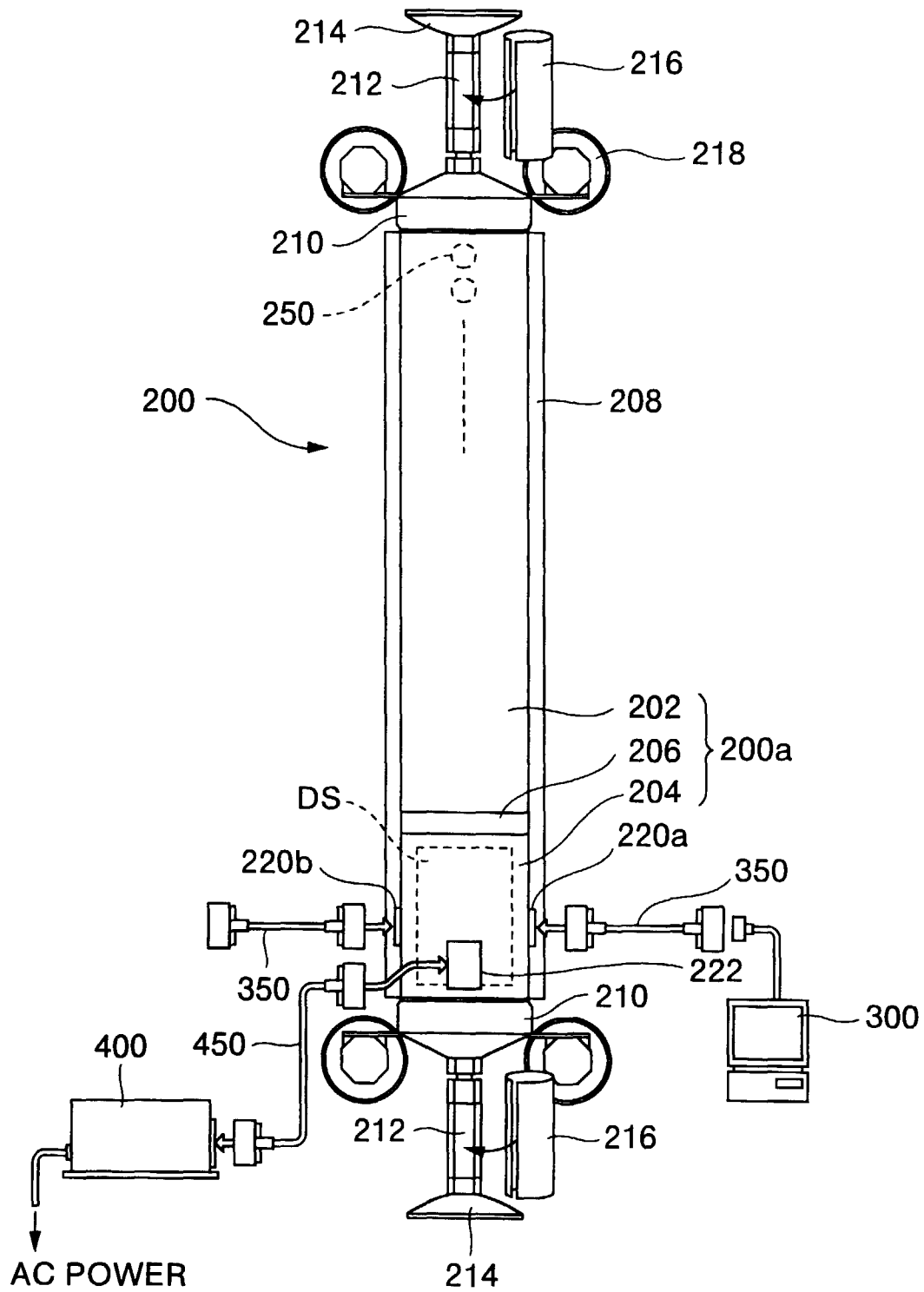


FIG. 2

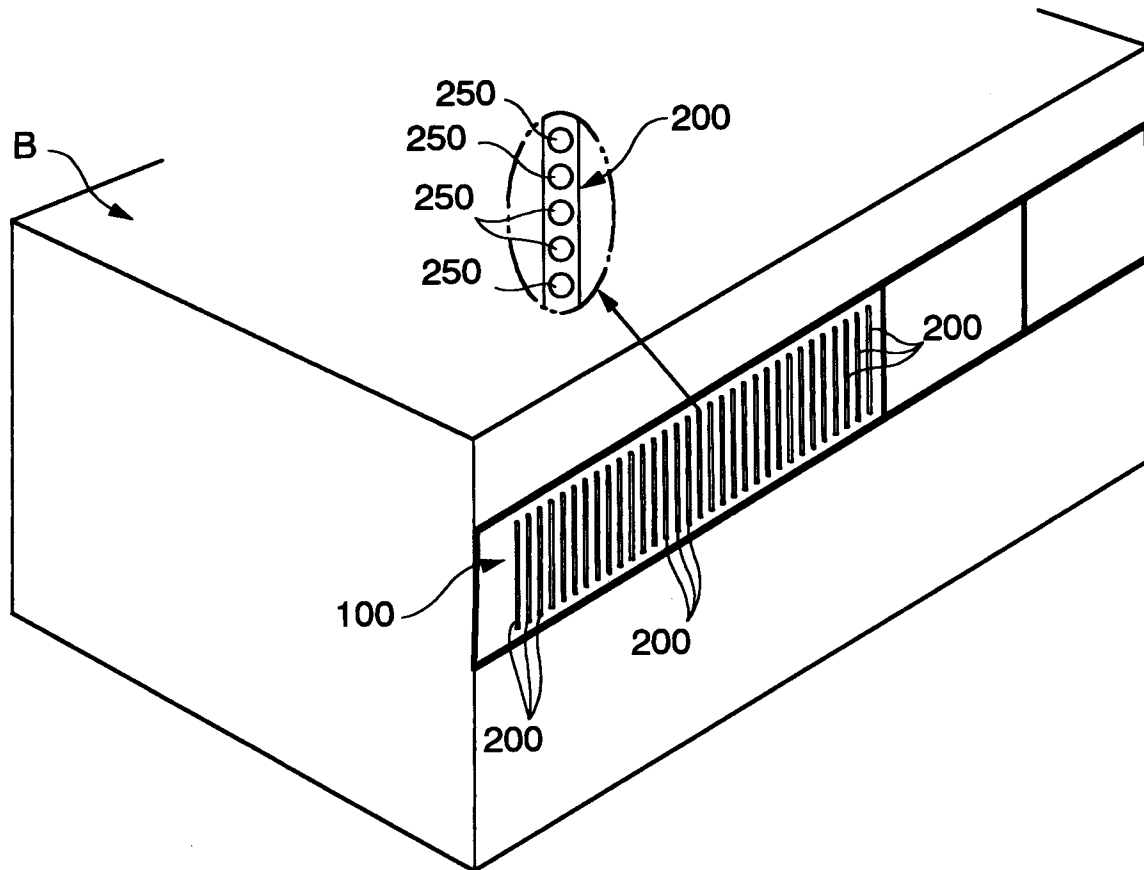


FIG. 3

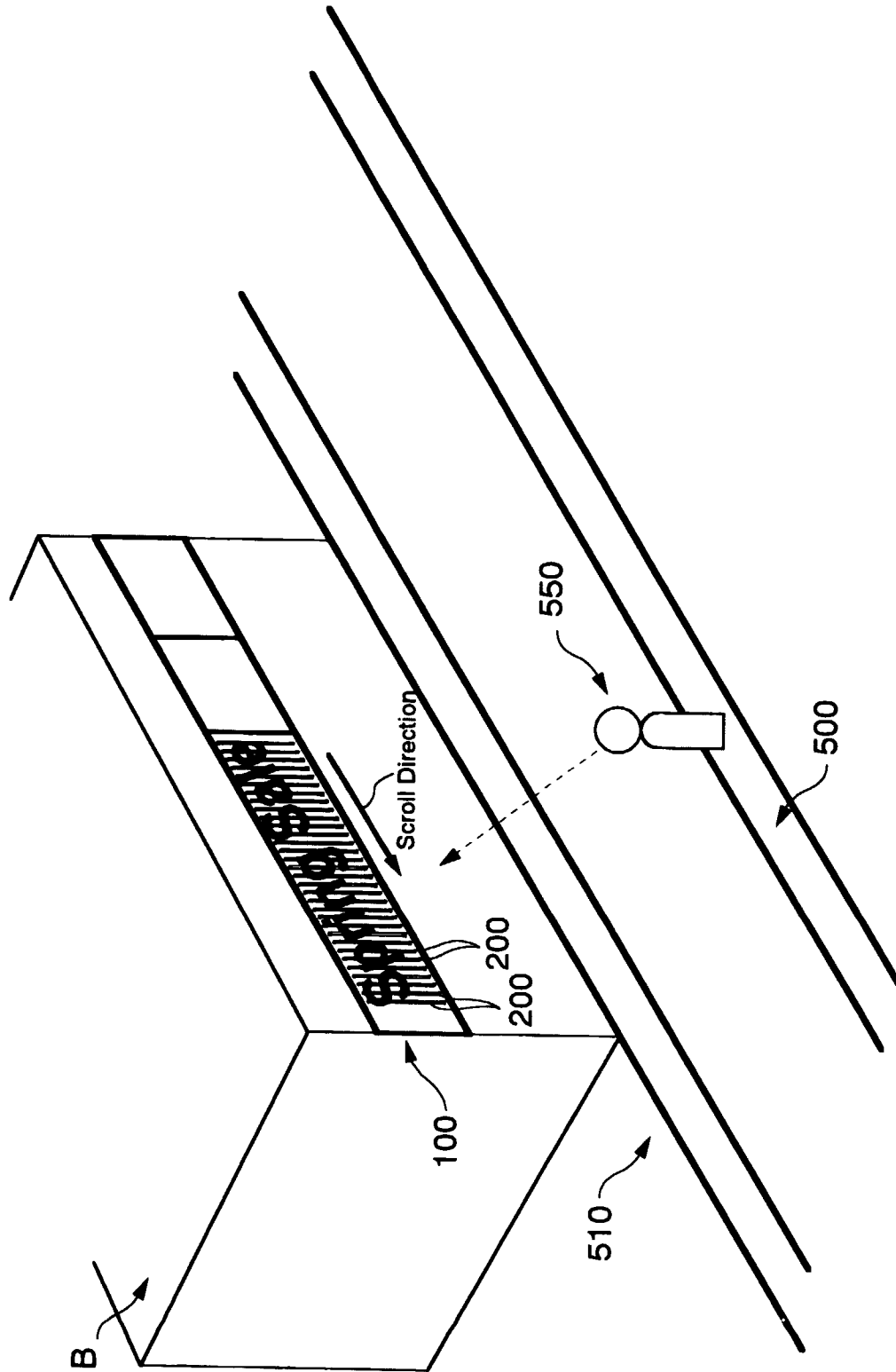


FIG. 4

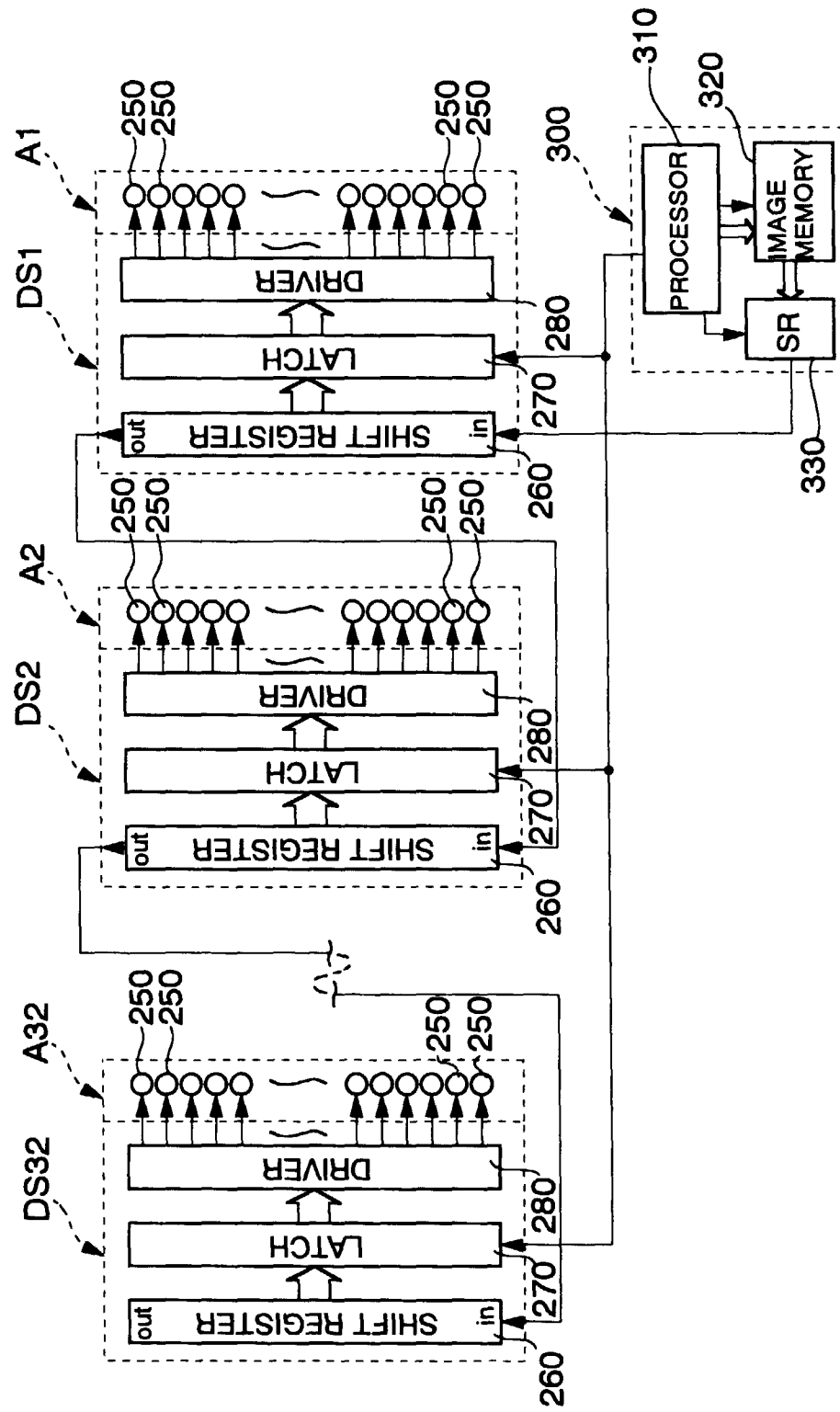
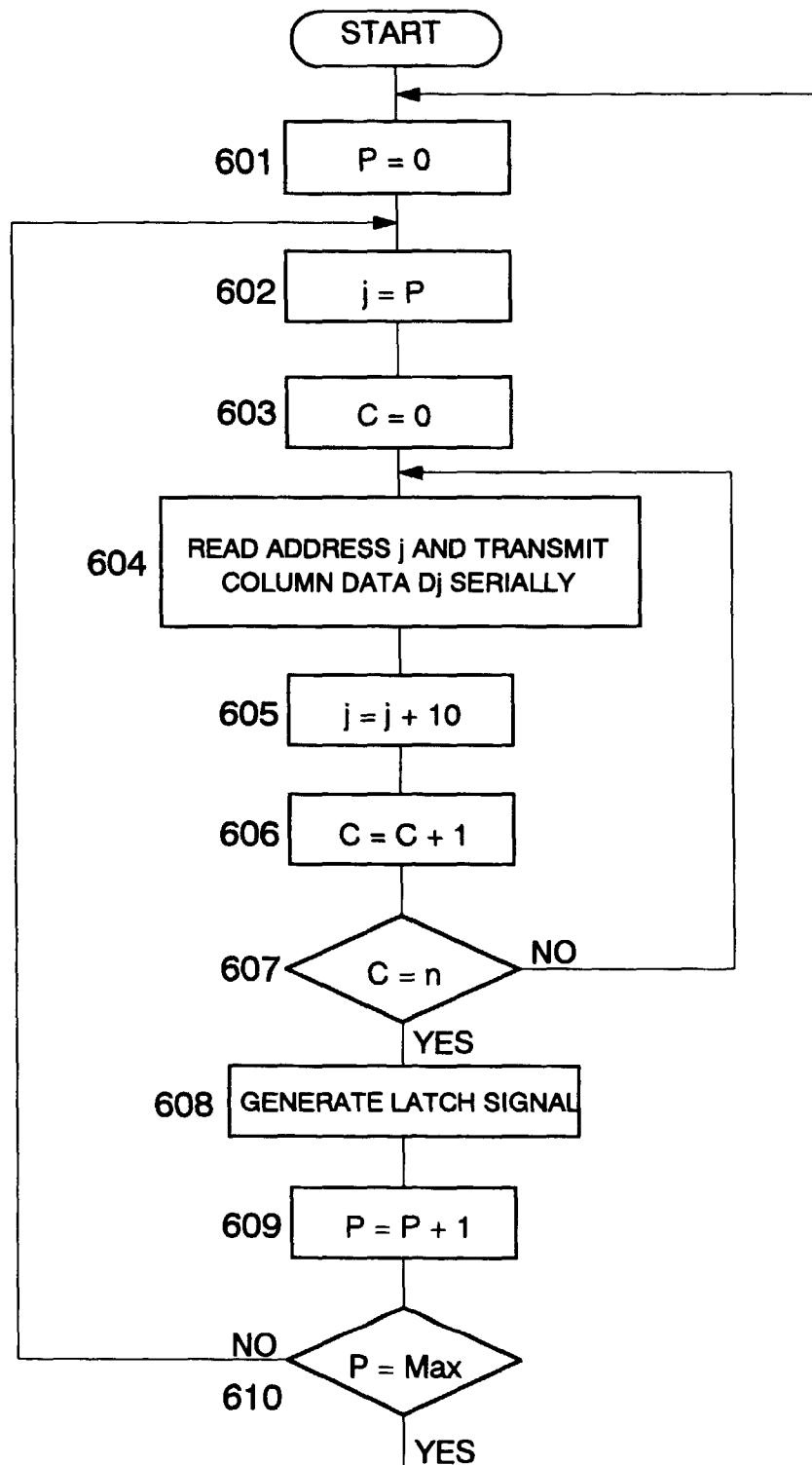
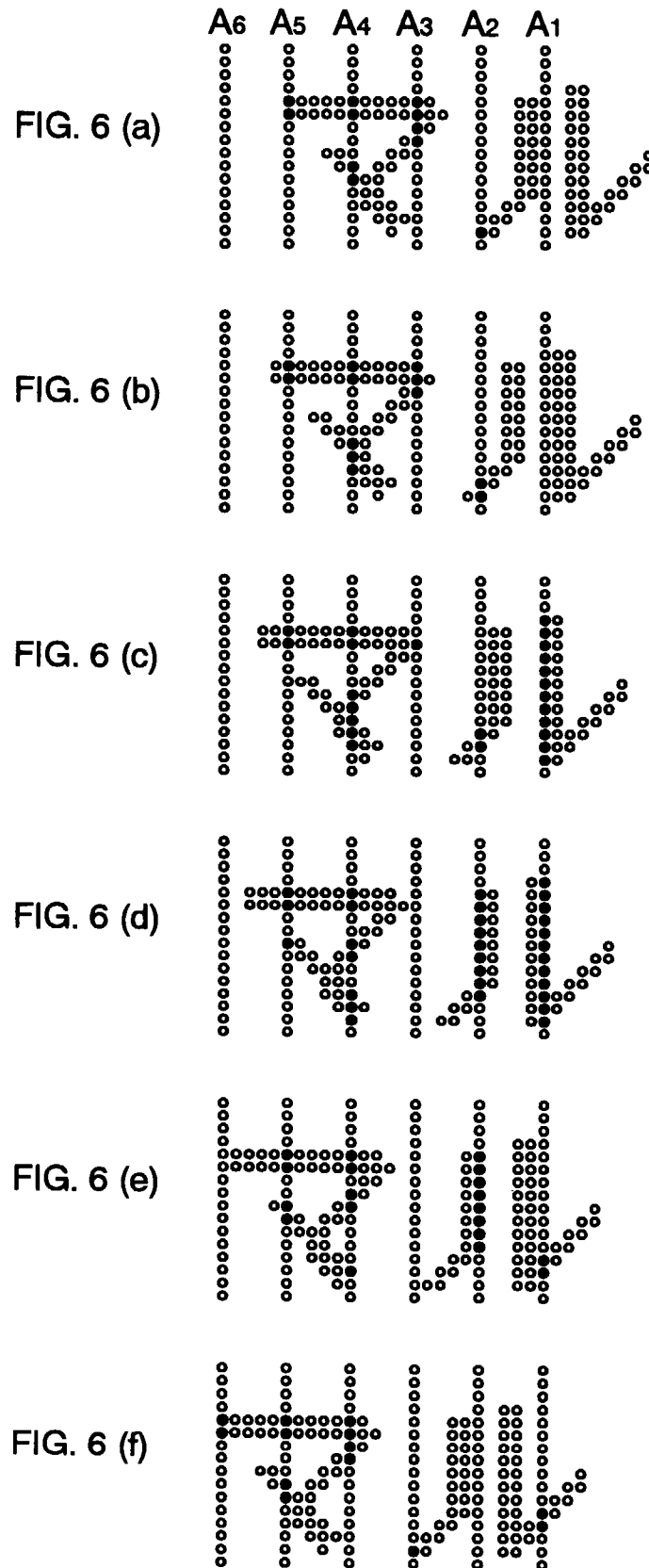


FIG. 5

Image data readout routine







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 3197

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.6)
Y	EP 0 709 818 A (AVIX INC) 1 May 1996 * column 6, line 37 - column 9, line 24; claim 8; figure 2 *	1-23	G09F9/33
Y	US 5 191 748 A (BAUGHMAN DANIEL G) 9 March 1993 * column 3, line 38 - line 64 *	1-23	
A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 089 (P-1320), 4 March 1992 & JP 03 271794 A (KOKUSAI ELECTRIC CO LTD), 3 December 1991, * abstract *	1-23	
E	JP 09 134 143 A (ABITSUKUSU KK) 20 May 1997 * abstract *	1-23	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G09F G09G
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 10 November 1997	Examiner Daintith, N
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