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Datasheet for the decision of 29 September 2008

Case Number: T 0800/06 - 3.4.03

Application Number: 97922076.1

Publication Number: 0844598

IPC: G09G 3/20

Language of the proceedings: EN

Title of invention:
Scroll display method and apparatus

Applicant:
AVIX INC.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

Case Number: T 0800/06 - 3.4.03

D E C I S I O N
of the Technical Board of Appeal 3.4.03
of 29 September 2008

Appellant:	AVIX INC. 1-1, Fukuura 1-chome Kanazawa-ku Yokohama-shi Kanagawa 236 (JP)
Representative:	Charlton, Peter John Elkington and Fife LLP Prospect House 8 Pembroke Road Sevenoaks Kent TN13 1XR (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted 8 December 2005 refusing European application No. 97922076.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman:	R. G. O'Connell
Members:	V. L. P. Frank
	J. Van Moer

Summary of Facts and Submissions

I. This is an appeal from the refusal of application 97 922 076 for the reason that claims 1 to 3 were not clear (Article 84 EPC 1973), had been amended in such a way that they contained subject-matter which extended beyond the content of the application as filed (Article 123(2) EPC 1973) and that their subject-matters did not involve an inventive step (Article 56 EPC 1973) over

D1: EP 0 709 818 A

and

D2: WO 88/07249 A.

II. The claims have been amended in the appeal procedure and now read as follows:

"1. A scrolling display method of bit map image data having a data structure representing an image with a dot matrix on a display area constructed by arranging a plurality of light emitting cell column sets (Si) including a plurality of light emitting cells arranged linearly, characterized by:

each said plurality of light emitting cell column sets (Si) comprising a light emitting cell column (RCi) of a first color wherein m light emitting cells (R) of the first color are arranged linearly with a distance a left therebetween, and a light emitting cell column (GCi) of a second color wherein m light emitting cells (G) of the second color are arranged linearly with the distance a left therebetween, said light emitting cell column (RCi) of the first color and said light emitting cell column (GCi) of the second color being arranged in parallel to each other with a distance b left therebetween which is substantially equal to said distance a;

said plurality of light emitting cell column sets (Si) being arranged spaced apart substantially in parallel at a pitch greater than substantially three times said distance b;

it being assumed that imaginary cell column sets are present in the spaces between the said plurality of light emitting cell column sets (Si), so as to form with said plurality of light emitting cell column sets (Si) an imaginary screen;

said bit map image data to be displayed on said display area comprising a data structure representing an image with a dot matrix, said dot matrix image data including the first color image data (RDi) and the second color image data (GDi) generated by a color separation;

when driving said first color light emitting cell column (RC_X) of a Xth light emitting cell column set (Sx) by the first color image data (RD_Y) of a Yth column in the imaginary screen,

driving said second color light emitting cell column (GC_x) of the Xth light emitting cell column set (Sx) by the second color image data (GD_{Y+1}) of the (Y+l)th column in the imaginary screen and

driving said first color light emitting cell column (RC_{X+1}) of the (X+1)th light emitting cell column set (S_{X+1}) by the first color image data

(RD_{Y+B}) of the (Y+B)th column in the imaginary screen and

driving said second color light emitting cell column (GC_{X+1}) of the (X+1)th light emitting cell column set (S_{x+1}) by the second color image data (GD_{Y+B+1}) of the (Y+B+1)th column in the imaginary screen,

B being a constant integer greater than three proportional to the said pitch of said light emitting cell column sets (Si);

outputting an image of one frame by applying said driving sequence of the light emitting cell columns (RCi, GCi, BCi) over said display area comprising said plurality of light emitting cell column sets (Si); and

repetitively updating the image frame while incrementing the amount of Y by one, wherein

a person observing said display area is able to recognize a scrolling image having an image interpolation of intermediate portions of the light emitting cell column sets (Si) and a color mixing of the first and the second colors by an after-image effect of vision of the observing person."

"2. A scrolling display method of bit map image data having a data structure representing an image with a dot matrix on a display area constructed by arranging a plurality of light emitting cell column sets (Si) including a plurality of light emitting cells arranged linearly, characterized by:

each said plurality of light emitting cell column sets (Si) comprising a light emitting cell column (RCi) of a first color wherein m light emitting cells (R) of the first color are arranged linearly with a distance a left therebetween, a light emitting cell column (GCi) of a second color wherein m light emitting cells (G) of the second color are arranged linearly with the distance a left therebetween, and a light emitting cell column (BCi) of a third color wherein m light emitting cells (B) of the third color are arranged linearly with the distance a left therebetween, said light emitting cell column (RCi) of the first color, said light emitting cell column (GCi) of the second color, and said light emitting cell column (BCi) of the third color being arranged in parallel to each other with a distance b left therebetween which is substantially equal to said distance a;

said plurality of light emitting cell column sets (Si) being arranged spaced apart substantially in parallel at a pitch greater than substantially three times said distance b;

it being assumed that imaginary cell column sets are present in the spaces between the said plurality of light emitting cell column sets (Si), so as to form with said plurality of light emitting cell column sets (Si) an imaginary screen;

said bit map image data to be displayed on said display area comprising a data structure representing an image with a dot matrix, said dot matrix image data including the first color image data (RDi), the second color image data (GDi), and the third color image data (BDi) generated by a color separation;

when driving said first color light emitting cell column (RC_X) of a Xth light emitting cell column set (Sx) by the first color image data (RD_Y) of a Yth column in the imaginary screen,

driving said second color light emitting cell column (GC_X) of the Xth light emitting cell column set (Sx) by the second color image data (GD_{Y+1}) of the (Y+1)th column in the imaginary screen, and

driving said third color light emitting cell column (BC_X) of the Xth light emitting cell column set (Sx) by the third color image data (BD_{Y+1}) of the (Y+2)th column in the imaginary screen, and

driving said first color light emitting cell column (RC_{X+1}) of the (X+1)th light emitting cell column set (S_{X+1}) by the first color image data (RD_{Y+B}) of the (Y+B)th column in the imaginary screen,

driving said second color light emitting cell column (GC_{X+1}) of the (X+1)th light emitting cell column set (S_{X+1}) by the second color image data (GD_{Y+B+1}) of the (Y+B+1)th column in the imaginary screen, and

driving said third color light emitting cell column (BC_{X+1}) of the (X+1)th light emitting cell column set (S_{X+1}) by the third color image data (BD_{Y+B+2}) of the (Y+B+2)th column in the imaginary screen, B being a constant integer greater than three proportional to the said pitch of said light emitting cell column sets (Si);

outputting an image of one frame by applying said driving sequence of the light emitting cell columns (RCi, GCi, BCi) over said display area comprising said plurality of light emitting cell column sets (Si) ; and repetitively updating the image frame while incrementing the amount of Y by one, wherein

a person observing said display area is able to recognize a scrolling image having an image interpolation of intermediate portions of the light emitting cell column sets (Si) and a color mixing of the first and the second colors by an after–image effect of vision of the observing person."

"3. A scroll display apparatus operative to implement the scroll display method as claimed in claim 1 or 2, comprising:

said plurality of light emitting cell column sets (Si);

a memory (2) for storing said bit map image data to be displayed;

a data processor (3) for distributing an image data read out from said memory (2) to each said light emitting cell column (RCi, GCi, BC); and

a driver (DRV, LTC) for latching said distributed data to each said light emitting cell column by said data processor (3) and driving each light emitting cell (R, G, B) of each said light emitting cell column (RCi, GCi, BC)."

III. In the decision under appeal the examining division argued as follows:

– The lack of specification of the number of imaginary column sets present between the light emitting elements rendered claims 1 and 2 unclear (Article 84 EPC 1973), as it appeared impossible to establish which colour data, corresponding to a column in the imaginary screen, should be transferred to a light emitting column set.

- The passage of claims 1 and 2 "corresponding to said pitch of said light emitting cell column sets (Si)" did not allow the relationship between the physical layout of the light emitting column sets and the columns of the "imaginary screen" to be understood and therefore rendered the claim unclear. This feature was also not disclosed in the originally filed application documents and was therefore found not to fulfil the requirements of Article 123(2) EPC 1973.

- It was not clear how the passage "repetitively updating the image frame while incrementing an amount of Y by one" of claims 1 and 2 should be understood.

- In claim 3, the meaning of the term "data processor" was unclear and the expression "for distributing an image data" made it difficult to determine the matter for which protection was sought. Moreover, claim 3 did not contain technical features reflecting the special aspects of method claims 1 and/or 2.

- Document D1 was the closest state of the art on file. It disclosed a scrolling display method for a monochrome display. The difference between the method of claims 1 or 2 and that of D1 lied only in the juxtaposition of two or three columns, each column containing cells which emitted light of a different colour. The skilled person working in the field of flat panel display devices knew that besides monochrome displays, colour displays were also known (an example of a colour display was given in document D2). The skilled person knew also that the transfer of the data from the memory area to the display could be done either in a 1:1 or a non 1:1 correspondence. He would use the solution which allowed a smoother rendition of the displayed images, ie the second of these options, and would therefore arrive at the method according to claims 1 or 2 without involving an inventive step.

IV. The appellant applicant argued essentially as follows:

- Claims 1 and 2 had been amended to refer to an "imaginary screen" made up of the plurality of light emitting cell column sets together with imaginary cell column sets in the spaces therebetween. Furthermore, the claims explained that the "Yth" column and the "(Y+l)th" column were "in the imaginary screen". It was thus submitted that the concept of an imaginary screen was clear.

- As described in claims 1 and 2, the Yth column indicated a row-direction position in the colour image data of the imaginary screen in the dot-matrix data structure illustrated for example in figures 2 and 3. Once a certain Yth column was selected in the bit map image data for a red colour column RC1 of the column set S1, the data to the green colour column GC1 and the blue colour column BC1 were supplied from the data of the (Y+1)th column and the (Y+2)th column in the image data, respectively. In the embodiment shown in these figures, each column set had a distance 4b between the adjacent column set, or a pitch of 6b. Thus, constant B could be set at 6. Then, the data of the (Y+6)th column was supplied to the red column RC2 of the next column set S2, and accordingly, the data of the (Y+6+1)th column and the (Y+6+2)th column were supplied to the green colour column GC2 and the blue colour column BC2 of the next column set S2, respectively. When this data distribution process was done for the last column set S10, then Y was incremented by 1 and the same process repeated for the subsequent cycle.

- Document Dl disclosed a scrolling display system wherein column sets (Si) were formed by aligned monochromatic light emitting cells and were separated by an interval B that was greater than the dot spacing A, said interval being a multiple of the dot spacing. A bitmap image data representing an image in a dot matrix was prepared and the column sets Si were provided with the image data so that two contiguous columns C_x and C_{x+1} were fed with image data separated by the predetermined interval. Therefore, what distinguished the present invention from D1 was displaying a multi colour image on the aligned set of light emitting cells.

- On the other hand, D2 taught a multi colour dot matrix display. However, in D2, the red and green light sources, being individually controllable, provided visual information to the viewer relating to the shape, size, position, and red and green colour content of the images being displayed, while the blue light source provided overall colour content information within the area being illuminated.

- If a person skilled in the art tried to provide a full-colour display based on the teachings from D1 and D2, he would distribute RGB data from one Yth column in an imaginary screen to the R, G, and B colour columns in a single column set. However, in the present invention, red colour data from the Yth column, green data from the (Y+l)th column, and blue data from the (Y+2)th column were distributed to the RCi, GCi, and BCi columns of a single column set Si, respectively. The visual recognition principle of the multiple colour display of the present invention was therefore different from that of ordinary multiple colour display panels and was based on the after-image effect of the human eye. The present invention presupposed a scrolling display and realized the colour mixture by lighting different colour cells at different times. Display pixels columns of the three colours which were lighted at different times and positions were in this manner recognized by a person who observed the scrolling display as a single common pixel column in which the three colours were blended together. A displayed character or picture was seen as intended by the after-image effect of the human eye. If the scrolling speed was increased, the colour mixture effect became better, wherein the display pixel columns of the three colours were mixed so that they were seen as a single pixel column.

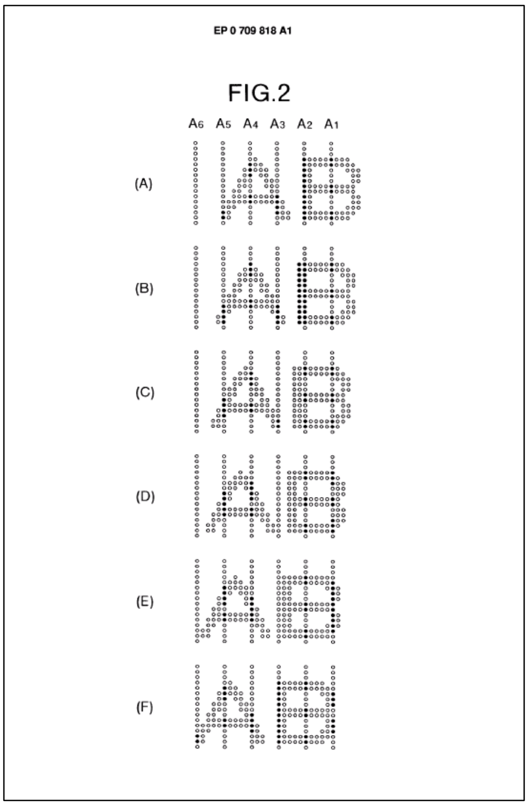
V. The appellant applicant requests that the decision under appeal be set aside and that a patent be granted on the basis of the amended claims and description sent May 2008.

Reasons for the Decision

1. The appeal is admissible.

2. *Document D1*

Document D1 is the closest prior art on file. It discloses a monochromatic scrolling display system formed by a plurality of light emitting cell columns (A1,…, A6) which are spaced apart at a pitch greater than the dot interval within the columns (Fig. 2). The aim of D1 is to provide a scrolling display that is larger in size without requiring more light emitting elements (column 2, lines 1 to 4). To this effect an "imaginary screen" is formed by the physical cell columns (A1,…, A6) and an arbitrary number of "imaginary columns" interposed between them. In the embodiment disclosed in D1 the physical cell columns are separated by four "imaginary columns" and the bit map data of the displayed image is shown only on the corresponding

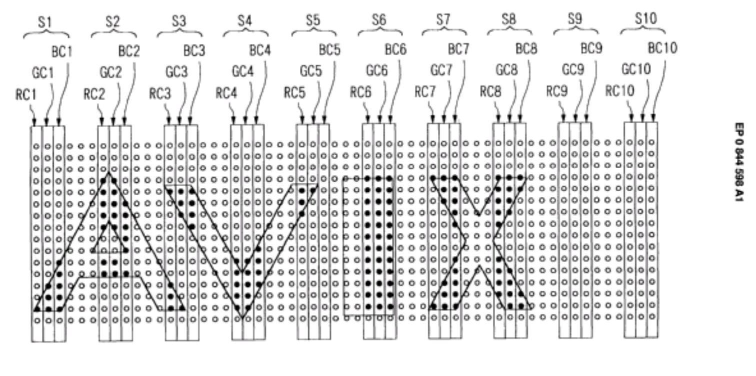


physical cell columns, ie in a first frame only the data corresponding to the 1^{st}, 5^{th}, 10^{th}, … bit map data columns are displayed on the screen (Fig. 2A), in the next frame the 2^{nd}, 6^{th}, 11^{th}, … bit map data columns are displayed (Fig. 2B), etc. When the image to be displayed is scrolled at a speed higher or equal than a predetermined scroll speed, the image can be clearly recognized by a viewer due to an after-effect of the human eye (column 8, line 16 to column 9, line 24).

3. *The present patent application*

3.1 The aim of the present patent application is to provide a multicolour scrolling display having, as in D1, a larger size without increasing the number of light emitting cells (column 2, lines 20 to 38). To this effect, again as in D1, an "imaginary screen" is formed by

FIG. 3



interposing between the physical light emitting cell columns an arbitrary number of "imaginary columns". Each physical column is formed by monochromatic light emitting cell elements emitting either red (R), green (G) or blue (B) light and two or three physical columns of different light emitting cells are grouped into a light emitting cell column set (Si) (Figure 3). Although the following discussion will be made with reference to three colours (corresponding to the method of claim 2), the two colour situation (corresponding to the method of claim 1) is straightforward.

3.2 The image to be displayed is converted to a colour separated dot matrix, so that the red (RD_i), green (GD_i), and blue (BD_i) colour data for each pixel of the image are obtained. These data are mapped onto the "imaginary screen" shown in Figure 3, so that for each cell element the corresponding colour data is available (column 7, lines 44 to 49).

3.3 Two indices, X and Y, are used in claims 1 and 2 to indicate (a) one of the physical light emitting cell column sets and (b) one column of the "imaginary screen", respectively.

When driving the scrolling display the image to be displayed is formed as follows:

- the red light emitting cell column (RC1) of the first column set (S1) displays the image of the red colour data (RD_1) of the first column in the imaginary screen, ie X=1 and Y=1;

- the green light emitting cell column (GC1) of the first column set (S1) displays the image of the green colour data (GD_2) of the second column in the imaginary screen, ie X=1 and Y=1+1=2; and

- the blue light emitting cell column (BC1) of the first column set (S1) displays the image of the blue colour data (BD_3) of the third column in the imaginary screen, ie X=1 and Y=1+2=3;

assuming that there are three imaginary cell columns interposed between the physical light emitting columns results in an offset B=6, ie three physical cell columns and three imaginary columns;

- the red light emitting cell column (RC2) of the second column set (S2) displays the image of the red colour data (RD_7) of the seventh column in the imaginary screen, ie X=2 and Y=1+B=7;

- the green light emitting cell column (GC2) of the second column set (S2) displays the image of the green colour data (GD_8) of the eight column in the imaginary screen, ie X=2 and Y=1+B+1=8; and

- the blue light emitting cell column (BC2) of the second column set (S2) displays the image of the blue colour data (BD_9) of the ninth column in the imaginary screen, ie X=2 and Y=1+B+2=9;

and continuing so for all the light emitting column sets Si of the display.

3.4 For the next frame the index X is reset to one, the index Y is incremented by one and the above process is reiterated, so that a scrolling image is displayed.

3.5 The image's scrolling speed is defined by reference to a person observing the display, so that, due to an after-image effect of the human vision, it is able to recognize the image and to mix the colour information.

4. *Inventive step*

4.1 It follows from the above analysis that the scrolling display of claims 1 or 2 differ from the one disclosed in document D1 in that the former is a multicolour display while the latter is a monochrome display. The technical problem of the invention can therefore be formulated as to develop a multicolour scrolling display while maintaining the advantages of the scrolling display known from D1, ie a larger display area with the same number of light emitting elements (column 2, lines 24 to 31).

4.2 The examining division referred to document D2 to show that multicolour displays were known in the art. Although D2 makes reference to additive colour mixing, ie "the process by which the human eye perceives a broad spectrum of colours from a smaller number of coloured sources by adding the colours together and perceiving an intermediate or different colour", and to "beta superimposed arrangements, where travelling or moving images are displayed on a matrix of pixels of differing colours and are perceived in a multiplicity of colours with a resolution not less than the number of individual light sources" (page 1, lines 10 to 13 and 24 to 27) it does not disclose any details on how such a beta superimposed arrangement is to be achieved.

4.3 The specific issue addressed in D2 is the disadvantageous use of blue/purple LEDs in RGB LED displays, which makes such displays too expensive to be commercially viable (page 2, lines 2 to 9). It is therefore suggested that individually controlled light sources be used for the red and green components and overall light sources of blue and/or purple controlled in areas termed "general blue illumination areas" (ibid, lines 21 to 25). D2 discloses a display panel for providing a plurality of imaging pixels, each of said pixels being composed by one or more primary light sources (ie the red and green components) arranged in a matrix of rows and columns and secondary light sources (ie the blue components) associated with said pixels, providing an overall illumination (ibid, lines 26 to 36).

4.4 Applying the illumination technique disclosed in document D2 to the display disclosed in D1 would result, disregarding the teaching of the overall blue illumination, in a multicolour display in which two or three light sources would be provided for each pixel of the display. This would result in a display similar to the one disclosed in document D1 in which a red, green and blue light emitting element would be provided for each one of the cell elements, ie a column would be formed by multicoloured cells displaying the colour of the image corresponding to this cell (ie RC_X <- RD_Y; GC_X <- RD_Y; BC_X <- BD_Y). In contrast to this, the display of the invention combines the colour and the image's shape together (ie RC_X <- RD_Y; GC_X <- RD_{Y+1}; BC_X <- BD_{Y+2}) (published application, column 16, line 14 to column 17, line 26). In the judgement of the board, the scrolling display method of the application is neither derivable without hindsight from the direct combination of documents D1 and D2 nor – as argued by the examining division - from D1 and the common general knowledge in the art of LED panel colour displays, as evidenced by D2. The methods specified in claims 1 and 2 provide a nonobvious way of combining the color and shape information of the image to be displayed together.

4.5 Claim 3 is directed to a scroll display element operative to implement the method of claims 1 or 2. The method is therefore implemented in the display.

4.6 The board judges for these reasons that the subject-matters of claims 1 to 3 involve an inventive step within the meaning of Article 56 EPC 1973.

5. *Clarity (Article 84 EPC 1973) and added subject-matter (Article 123(2) EPC 1973)*

5.1 The examining division objected that the lack of specification of the number of imaginary column sets present between the physical columns made it impossible to establish which colour data in the imaginary screen should be transferred to the light emitting column set.

5.2 It also objected that the expression "corresponding to said pitch of said light emitting cell column sets (Si)" was unclear and added subject-matter to the application.

5.3 The board does not agree. The number of imaginary columns is taken into account by the offset B which is proportional to the pitch of the physical light emitting cell column sets (published application, section "Manner of selection at intervals and distribution of image data" starting in column 11). A large number of imaginary columns leads to an increased pitch and consequently to a larger offset in the imaginary screen, ie integer B.

5.4 The board does not see a lack of clarity in the expression used in claims 1 and 2 of "repetitively updating the image frame while incrementing the amount of Y by one", since, as explained above, Y is an index for a column in the imaginary screen and the scrolling of the image is achieved by increasing this index by one for each image frame.

5.5 The term "data processor" used in claim 3 and objected to by the examining division is now clear since the apparatus is now specified as being operative to implement the scroll display method of claim 1 or 2. This term is a commonly used *terminus technicus* - nowadays usually meaning a microprocessor - which in the present context distributes the data read out from memory to the light emitting cell columns in accordance with the method specified in claim 1 or 2.

6. The board judges, for the above reasons, that the patent application fulfils the requirements of the EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

   Claims:
   1 to 3 sent 9 May 2008.

   Description pages:
   1 to 9 sent 9 May 2008:
   10 deleted;
   11 to 35 as originally filed.

   Drawings: sheets 1 to 7 as originally filed.

Registrar Chair

S. Sánchez Chiquero R. G. O'Connell

Case Number: T 0800/06 - 3.4.03

D E C I S I O N
of 12 March 2009 correcting errors in the decision of Technical Board of Appeal 3.4.03 of 29 September 2008

Appellant: AVIX INC.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 8 December 2005 refusing European application No. 97922076.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: R. G. O'Connell
Members: V. L. P. Frank
J. Van Moer

Pursuant to Rule 89 EPC 1973, obvious mistakes in point 2 of the order of the decision dated 29 September 2008 in appeal case T 0800/06 are hereby corrected as follows:

The case is remitted to the department of first instance with the order to grant a patent in the following version:

Claims:

1 to 3 filed with letter of 9 May 2008.

Description pages:

4 to 9 filed with letter of 9 May 2008;
10 deleted;
3 and 3a filed with the letter of 29 July 2002;
1, 2 and 11 to 35 as originally filed.

Drawings: sheets 1 to 7 as originally filed.

Registrar | for the Chair

S. Sánchez Chiquero | J. Van Moer