

(19)



(11)

EP 1 918 903 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

07.05.2008 Bulletin 2008/19

(51) Int Cl.:

G09G 3/288 (2006.01)

(21) Application number: **07101549.9**

(22) Date of filing: **01.02.2007**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**

Designated Extension States:

AL BA HR MK RS

(30) Priority: **02.11.2006 KR 20060107747**

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Remarks:

Amended claims in accordance with Rule 137 (2) EPC.

(54) **Plasma display and controlling device and method thereof**

(57) The present invention relates to a plasma display, and a controller and driving method thereof. In the driving method for sequentially driving a plasma display by a plurality of subfields divided into first and second subfield groups from one frame, a) it is determined whether at least one subfield to be turned on is included in one subfield group among the first and second subfield

groups, b) a subfield turn-on time control signal for controlling a turn-on time of the subfield to be turned on is generated according to a determined result in a), and c) the subfield is turned on at the turn-on time corresponding to the subfield turn-on time control signal.

EP 1 918 903 A1

Description

BACKGROUND OF THE INVENTION

(a) Field of the Invention

[0001] The present invention relates to a plasma display, and a controller and driving method thereof.

(b) Description of the Related Art

[0002] A plasma display uses a plasma display panel (PDP) that uses plasma generated by a gas discharge process to display characters or images. The PDP includes, depending on its size, more than several scores to millions of pixels arranged in a matrix pattern.

[0003] One frame time is 16.67ms (i.e. 1/60 second) in a national television system committee (NTSC) method using a 60Hz frequency, and one frame time is 20ms (i.e., 1/50 second) in a phase alternate line (PAL) method using a 50Hz frequency.

[0004] Since one frame time of 20ms is long enough so that a person may perceive an image changing in the PAL method, the person may see the screen flickering every 20ms. That is, a flicker phenomenon may occur in the PAL method.

[0005] To prevent the flickering effect, one frame is divided into first and second groups, and subfields having greater weight values are separately applied to the two groups.

[0006] FIG. 1 shows a diagram representing subfield arrangement of one frame in the conventional PAL method.

[0007] As shown in FIG. 1, one frame in the plasma display of the conventional PAL method includes first and second groups, subfields SF1, SF3, SF5, and SF7 are applied to the first group, and subfields SF2, SF4, SF6, and SF8 are applied to the second group. That is, the first and second groups are respectively divided into the plurality of subfields respectively having different luminance weight values, and the respective subfields SF1 to SF8 include address periods A1 to A8 and sustain periods S1 to S8.

[0008] The address periods A1 to A8 are for selecting turn-on/off cells (i.e., cells to be turned on or off) in a panel, and the sustain periods S1 to S8 are for causing a discharge for displaying an image on the discharged cells. Here, lengths of the sustain periods S1 to S8 correspond to weight values of the respective subfields SF1 to SF8, and it is assumed that the lengths of the sustain periods S1 to S8 are respectively 1T, 2T, 4T, 8T, 16T, 32T, 64T, and 128T. In addition, a reset period (not shown) for initializing a discharge cell may be provided before the address periods A1 to A8.

[0009] Here, a sum of weight values determines a grayscale of the discharge cell to be turned on. As shown in FIG. 1, subfields SF1 to SF8 are arranged in increasing order of weight or in decreasing order of weight.

[0010] In the PAL method shown in FIG. 1, a person may perceive a change of image every 10ms since the subfields having greater weight values are divided into two groups, and therefore the flicker effect may be reduced.

[0011] Changes of luminance according to the arrangement of the subfields forming one frame in the conventional PAL method shown in FIG. 1 are shown in FIG. 2.

[0012] FIG. 2 shows a diagram representing the changes of luminance in one frame in the conventional PAL method.

[0013] In FIG. 2, a one-frame time is 20 ms, and 10ms is respectively applied to the first and second groups. In the first and second groups, since subfields SF1, SF3, SF5, and SF7 and subfields SF2, SF4, SF6, and SF8 are arranged from a low weight value subfield to a high weight value subfield, the luminance is increased at latter subfields of each group.

[0014] In FIG. 2A, subfields in the first and second groups are turned on. In addition, the plasma display may express an image on the PDP by turning on subfield in one of the first and second groups according to the grayscale of the image, which is shown in FIG. 2A and B. That is, the subfield in the first group is turned on in FIG. 2B, and the subfield in the second group is turned on in FIG. 2C.

[0015] FIG. 3 shows a diagram representing a relationship between a previous frame and a subsequent frame of a frame that turns on the subfield in one of the two groups.

[0016] In FIG. 3A, the subfields in the first and second groups are turned on to express an image in first and third frames as shown in FIG. 2A, and the subfield in the first group is turned on to express the image in a second frame as shown in FIG. 2B. In FIG. 3A, the subfields in the first and second groups are turned on to express an image in the first and third frames, and the subfield in the first group is turned on to express the image in the second frame as shown in FIG. 2C.

[0017] In FIG. 3A, since a sustain discharge is generated in the subfield of the first group and it is not generated in the subfield of the second group in the second frame, misfiring may be problematically generated in the first group of the subsequent third frame. In FIG. 3B, a time delay in generating the sustain discharge is generated between the second group of the previous first frame and the second group of the second frame since the sustain discharge is not generated in the subfield of the first group of the second frame, and therefore, the misfiring may be problematically generated in the second group of the second frame.

[0018] The above information disclosed in this Background section is only for enhancement of understanding of the background of the invention and therefore it may contain information that does not form the prior art that is already known in this country to a person of ordinary skilled in the art.

SUMMARY OF THE INVENTION

[0019] The present invention has been made in an effort to provide a plasma display for preventing a misfiring operation, and a controller and driving method thereof.

[0020] In an exemplary driving method for sequentially driving a plasma display by a plurality of subfields divided into first and second subfield groups from one frame, a) it is determined whether at least one subfield to be turned on is included in one subfield group among the first and second subfield groups, b) a subfield turn-on time control signal for controlling a turn-on time of the subfield to be turned on is generated according to a determined result in a), and c) the subfield is turned on at the turn-on time corresponding to the subfield turn-on time control signal.

[0021] In b), when it is determined in a) that the subfields to be turned on are included in the first subfield group, the subfield turn-on time control signal for delaying the turn-on time of the subfield to be turned on by a predetermined time may be generated.

[0022] In b), when it is determined in a) that the subfields to be turned on are included in the second subfield group, the subfield turn-on time control signal for advancing the turn-on time of the subfield to be turned on by a predetermined time may be generated.

[0023] In b), when it is determined in a) that the subfields to be turned on are included in the first and second subfield groups, the subfield turn-on time control signal for turning on the subfield without changing the turn-on time may be generated.

[0024] An exemplary controller of a plasma display driven by a plurality of subfields divided, according to a vertical synchronization signal of a first frequency, into first and second subfield groups from one frame includes a subfield location controller and a subfield data generator. The subfield location controller generates a subfield turn-on time control signal for controlling a turn-on time of the subfield according to whether at least one subfield value is included in the first subfield group, the second subfield group, or both subfield groups. The subfield data generator transmits the subfield value of the subfield to be turned on to the subfield location controller to express a grayscale for each frame according to the video signal, controls the turn-on time of the subfield according to the subfield turn-on time control signal, and transmits controlled turn-on time to the subfield location controller.

[0025] An exemplary plasma display includes a plasma display panel (PDP), a controller, and a driving circuit unit. The PDP includes a first electrode, a second electrode, and a third electrode in a direction crossing the first and second electrodes. The controller divides a frame, according to an externally input vertical synchronization signal of a first frequency, into first and second subfield groups respectively including a plurality of subfields, and generates a subfield turn-on time control signal varying according to whether the subfield to be turned on is included in the subfield first group, the second subfield group, or both subfield groups, to express a gray-

scale for each frame according to an input video signal. The driving circuit unit drives the first to third electrodes according to a controlling operation of the controller to change a turn-on time of the subfield according to the subfield turn-on time control signal.

[0026] The subfield turn-on time control signal may delay the turn-on time when the subfields to be turned on are included in the first subfield group, and it may advance the turn-on time when the subfields to be turned on are included in the second subfield group.

[0027] The subfield turn-on time control signal may maintain the turn-on time when the subfields to be turned on are included in the first and second subfields groups.

[0028] The first frequency may be a vertical synchronization frequency of a phase alternate line (PAL) method.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029]

FIG. 1 shows a diagram representing subfield arrangement of one frame in a conventional PAL method.

FIGS. 2A to 2C show a diagram representing changes of luminance in one frame in the conventional PAL method.

FIGS. 3A to 3B show a diagram representing a relationship between a previous frame and a subsequent frame of a frame that turns on a subfield in one of two groups.

FIG. 4 shows a block diagram of a plasma display according to an exemplary embodiment of the present invention.

FIG. 5 shows a block diagram representing a controller of a PDP according to the exemplary embodiment of the present invention.

FIG. 6 shows a diagram representing grayscales when a subfield in a first group is turned on.

FIG. 7 shows a diagram representing a subfield turn-on controlling operation of a subfield location controller when a video signal having the grayscale shown in FIG. 6 is input.

FIG. 8 shows a table representing grayscales when the subfield in the second group according to the exemplary embodiment of the present invention is turned on.

FIG. 9 shows a diagram representing a subfield turn-on controlling operation of a subfield location controller when a video signal having the grayscale shown in FIG. 8 is input.

FIG. 10 shows a flowchart representing a subfield turn-on time controlling operation of the controller according to the exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0030] In the following detailed description, only certain exemplary embodiments of the present invention have been shown and described, simply by way of illustration. As those skilled in the art would realize, the described embodiments may be modified in various different ways, all without departing from the spirit or scope of the present invention. Accordingly, the drawings and description are to be regarded as illustrative in nature and not restrictive. Like reference numerals designate like elements throughout the specification.

[0031] Throughout this specification and the claims which follow, when it is described that an element is "coupled" to another element, the element may be "directly coupled" to the other element or "electrically coupled" to the other element through a third element.

[0032] In addition, wall charges mentioned in the following description mean charges formed and accumulated on a wall (e.g., a dielectric layer) close to an electrode of a discharge cell. A wall charge will be described as being "formed" or "accumulated" on the electrode, although the wall charges do not actually touch the electrodes. Further, a wall voltage means a potential difference formed on the wall of the discharge cell by the wall charge. Throughout this specification and the claims which follow, unless explicitly described to the contrary, the word "comprise", and variations such as "comprises" or "comprising", will be understood to imply the inclusion of stated elements but not the exclusion of any other elements.

[0033] A plasma display according to an exemplary embodiment of the present invention, and a controller and a driving method thereof will now be described with reference to the figures.

[0034] FIG. 4 shows a block diagram of the plasma display according to the exemplary embodiment of the present invention.

[0035] As shown in FIG. 4, the plasma display according to the exemplary embodiment of the present invention includes a plasma display panel (PDP) 100, a controller 200, an address electrode driver 300, a scan electrode driver 400, and a sustain electrode driver 500.

[0036] The PDP 100 includes a plurality of address electrodes A1 to Am extending in a column direction, and a plurality of sustain and scan electrodes X1 to Xn and Y1 to Yn in pairs extending in a row direction. The sustain electrodes X1-Xn are formed in respective correspondence to the scan electrodes Y1 to Yn, and ends of the sustain electrodes X1-Xn are connected in common. In addition, the PDP 100 includes a substrate (not shown) having the sustain and scan electrodes X1-Xn and Y1 to Yn, and a substrate (not shown) having the address electrodes A1-Am. The two substrates are arranged to face each other with a discharge space between them so that the scan electrodes Y1 to Yn and the sustain electrodes X1-Xn may cross the address electrodes A1-Am. Here, discharge spaces provided at crossing regions of the ad-

dress electrodes and X and Y electrodes form discharge cells. This formation of the plasma display panel 100 is an example, and another formation of a panel for applying driving waveforms that will be described may be applied to the present invention.

[0037] The controller 200 receives external video signals, and outputs an address driving control signal Sa, a sustain electrode driving control signal Sx, and a scan electrode driving control signal Sy. In addition, the controller 200 divides a frame into a plurality of subfields, and each subfield has a reset period, an address period, and a sustain period in a temporal manner.

[0038] After receiving the address driving control signal Sa from the controller 200, the address electrode driver 300 applies a display data signal for selecting discharge cells to be displayed to the respective address electrodes A1-Am.

[0039] The scan electrode driver 400 receives the scan electrode driving control signal Sy from the controller 200, and applies the driving voltage to the scan electrode Y.

[0040] The sustain electrode driver 500 receives the sustain electrode driving control signal Sx from the controller 200, and applies a driving voltage to the sustain electrode X.

[0041] FIG. 5 shows a block diagram representing the controller of the PDP according to the exemplary embodiment of the present invention.

[0042] As shown in FIG. 5, the controller 200 of the PDP according to the exemplary embodiment of the present invention includes a subfield data generator 220 and a subfield location controller 240.

[0043] The subfield data generator 220 transmits a control signal to the scan electrode driver 400 and the sustain electrode driver 500 so that subfields SF1, SF3, SF5, and SF7 in the first group and the subfields SF2, SF4, SF6, and SF8 are turned on according to the gray-scale for each frame.

[0044] The subfield data generator 220 transmits information of the turned on subfield to the subfield location controller 240, receives a subfield turn-on timing control signal generated by the subfield location controller 240, and transmits a control signal for turning on the corresponding subfield to the scan electrode driver 400 and the sustain electrode driver 500.

[0045] The subfield location controller 240 determines whether information on the plurality of subfields received from the subfield data generator 220 includes the subfields of the first and second group, or whether it includes the subfields SF1, SF3, SF5, and SF7 or SF2, SF4, SF6, and SF8 of one of the two groups. According to a determined result, the subfield location controller 240 generates the subfield turn-on timing control signal for delaying a turn-on time of the subfield by a predetermined time when the input information includes the subfield in the first group, and the subfield location controller 240 generates the subfield turn-on timing control signal for advancing the turn-on time of the subfield by the predetermined time when the information includes the subfield in

the second group, and transmits the subfield turn-on timing control signals to the subfield data generator 220. In addition, when the received information includes the subfields in the first and second groups, the subfield location controller 240 generates the subfield turn-on timing control signal, but there is no change in the turn-on time of the subfield.

[0046] The turn-on time of the subfield that is controlled by the subfield location controller 240 shown in FIG. 5 will now be described with reference to FIG. 6 to FIG. 9.

[0047] FIG. 6 shows a diagram representing the grayscales when the subfield in the first group is turned on, and FIG. 7 shows a diagram representing a subfield turn-on controlling operation of the subfield location controller 240 when a video signal having the grayscale shown in FIG. 6 is input.

[0048] The grayscales shown in FIG. 6 correspond to the second frame among the first and third frames shown in FIG. 7, and it is assumed that the video signal having the dark-colored grayscales 1, 4, 5, 16, 17, 20, and 21 are turned on in the second frame.

[0049] As shown in FIG. 7, the subfield data generator 220 informs the subfield location controller 240 of the turned on subfields SF1, SF3, and SF5, and the subfield location controller 240 delays the turn-on time of the subfield by the predetermined time since the received information of the subfields includes the subfield in the first group.

[0050] FIG. 8 shows a table representing grayscales when the subfield in the second group according to the exemplary embodiment of the present invention are turned on, and FIG. 9 shows a diagram representing a subfield turn-on controlling operation of the subfield location controller 240 when a video signal having the grayscale shown in FIG. 8 is input.

[0051] The grayscales correspond to the second frame among the first and third frames shown in FIG. 9, and video signals having dark-colored grayscales 2, 8, 10, 32, 34, 40, and 42 are turned on in the second frame.

[0052] As shown in FIG. 9, the subfield data generator 220 informs the subfield location controller 240 of the turned on subfields SF2, SF4, and SF6, and the subfield location controller 240 advanced the turn-on time of the subfield by the predetermined time since the received information of the subfields includes the subfields in the second group.

[0053] FIG. 10 shows a flowchart representing a subfield turn-on time controlling operation of the controller 200 according to the exemplary embodiment of the present invention.

[0054] Firstly, the subfield data generator 220 receiving the video signal initializes the number N of frames in step S602. In this case, the number N of frames is exemplarily initialized to be 1 in FIG. 10, but another natural number, a prime number, or a value with a predetermined character (e.g. an alphabet) may be used. In addition, in step S602, while the plasma display is turned on from a standby state, the controller 200 may perform the subfield

turn-on time control operation from the first frame generated by using the input video signal, and the subfield data generator 220 may perform an initialization operation when the number of frames is increased to be higher than a predetermined value since the video signal is continuously input.

[0055] The subfield data generator 220 performing the initialization operation in step S602 transmits a turn-on subfield value to the subfield location controller 240 according to a grayscale to be expressed in a frame according to the video signal, and the subfield location controller 240 determines in step S604 whether the subfield value includes the subfield in the first group and the subfield in the second group.

[0056] When it is determined, according to a determined result in step S604, that the grayscale of the corresponding frame is expressed by the subfield in one of the first and second groups, the subfield location controller 240 determines in step S606 whether the received subfield value includes the subfield in the first group.

[0057] When it is determined, according to a determined result in step S606, that the received subfield value includes the subfield in the first group, the subfield location controller 240 generates the subfield turn-on time control signal for delaying the subfield turn-on time by a predetermined time, and transmits it to the subfield data generator 220 in step S608. When it is determined that the received subfield value does not include the subfield in the first group, the subfield location controller 240 determines that it include the subfield value includes the subfield in the second group, generates the subfield turn-on time control signal for advancing the subfield turn-on time by the predetermined time, and transmits it to the subfield data generator 220 in step S610.

[0058] In addition, in step S606, it may be established to determine whether the received subfield value include the subfield in the second group, and in this case, the steps S608 and S610 are changed from each other.

[0059] When it is determined, according to the determined result in step S604, that the subfields in the first and second groups of the corresponding frame are turned on, the subfield location controller 240 generates the subfield turn-on time control signal for turning on the corresponding subfield without changing the turn-on time, and transmits it to the subfield data generator 220. The subfield data generator 220 receiving the subfield turn-on time control signal in step S604, S608, or S610 transmits a control signal to the scan electrode driver 400 and the sustain electrode driver 500 so that the corresponding subfield is turned on the controlled turn-on time in step S612.

[0060] The subfield data generator 220 determining the turn-on time of the corresponding frame and transmitting the control signal in step S612, increases the number of frames in step S614, and performs the step S604.

[0061] As described above, in a frame where subfields are divided into first and second groups respectively hav-

ing different weight values, the subfield in one of the first and second groups is turned on. Accordingly, misfiring may be prevented, and the plasma display may be stably driven.

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Claims

1. A driving method for sequentially driving a plasma display by a plurality of subfields divided into first and second subfield groups from one frame, the driving method comprising:

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- a) determining whether at least one subfield to be turned on is included in one subfield group among the first and second subfield groups;
- b) generating a subfield turn-on time control signal for controlling a turn-on time of the subfield to be turned on, according to a determined result in a); and
- c) turning on the subfield at the turn-on time corresponding to the subfield turn-on time control signal.

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2. The driving method of claim 1, wherein, in b), when it is determined in a) that the subfields to be turned on are included in the first subfield group, the subfield turn-on time control signal for delaying the turn-on time of the subfield to be turned on by a predetermined time is generated.

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3. The driving method of claim 1, wherein, in b), when it is determined in a) that the subfields to be turned on are included in the second subfield group, the subfield turn-on time control signal for advancing the turn-on time of the subfield to be turned on by a predetermined time is generated.

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4. The driving method according to one of claims 1 - 3, wherein, in b), when it is determined in a) that the subfields to be turned on are included in the first and second subfield groups, the subfield turn-on time control signal for turning on the subfield without changing the turn-on time is generated.

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5. A controller of a plasma display driven by a plurality of subfields divided, according to a vertical synchronization signal of a first frequency, into first and second subfield groups from one frame, the controller comprising:

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- a subfield location controller for generating a subfield turn-on time control signal for controlling a turn-on time of the subfield according to whether at least one subfield value is included in the first subfield group, the second subfield group, or both subfield groups ; and
- a subfield data generator for transmitting the

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subfield value of the subfield to be turned on to the subfield location controller to express a gray-scale for each frame according to the video signal, controlling the turn-on time of the subfield according to the subfield turn-on time control signal, and transmitting controlled turn-on time to the subfield location controller.

6. A plasma display comprising:

a plasma display panel (PDP) comprising a first electrode, a second electrode, and a third electrode in a direction crossing the first and second electrodes;
the controller of claim 5; and
a driving circuit unit for driving the first to third electrodes according to a controlling operation of the controller to change a turn-on time of the subfield according to the subfield turn-on time control signal.

7. The plasma display of claim 6, wherein the subfield turn-on time control signal delays the turn-on time when the subfields to be turned on are included in the first subfield group, and it advances the turn-on time when the subfields to be turned on are included in the second subfield group.

8. The plasma display of claim 6, wherein the subfield turn-on time control signal maintains the turn-on time when the subfields to be turned on are included in the first and second subfields groups.

9. The plasma display of one of the claims 6 to 8, wherein the first frequency is a vertical synchronization frequency of a phase alternate line (PAL) method.

Amended claims in accordance with Rule 137(2) EPC.

1. A driving method for sequentially driving a plasma display by a plurality of subfields divided into first and second subfield groups of one frame, **characterised in that** the driving method comprises:

- a) determining whether the first and the second group of subfields have on-subfields;
- b) if only the first group of subfields has at least one on-subfield, delaying the subfield turn-on time with respect to the beginning of the frame; and/or
- c) if only the second group of subfields has at least one on-subfield, advancing the subfield turn-on time with respect to the beginning of the frame.

2. A controller of a plasma display driven by a plurality

of subfields divided, according to a vertical synchronization signal of a first frequency, into first and second subfield groups of one frame, **characterised in that** the controller is adapted to determine whether the first and the second group of subfields of a frame have on-subfields;
wherein if only the first group of subfields has at least one on-subfield, the controller is adapted to delay the turn-on time of the group of subfields with respect to the beginning of the frame; and/or
wherein if only the second group of subfields has at least one on-subfield, the controller is adapted to advance the turn-on time of the group of subfields with respect to the beginning of the frame..

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3. A plasma display comprising:

a plasma display panel (PDP) comprising a first electrode, a second electrode, and a third electrode in a direction crossing the first and second electrodes;
the controller of claim 2; and
a driving circuit unit for driving the first to third electrodes according to a controlling operation of the controller to change a turn-on time of the subfield according to the subfield turn-on time control signal.

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4. The plasma display of claim 3, wherein the first frequency is a vertical synchronization frequency of a phase alternate line (PAL) method.

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FIG.1

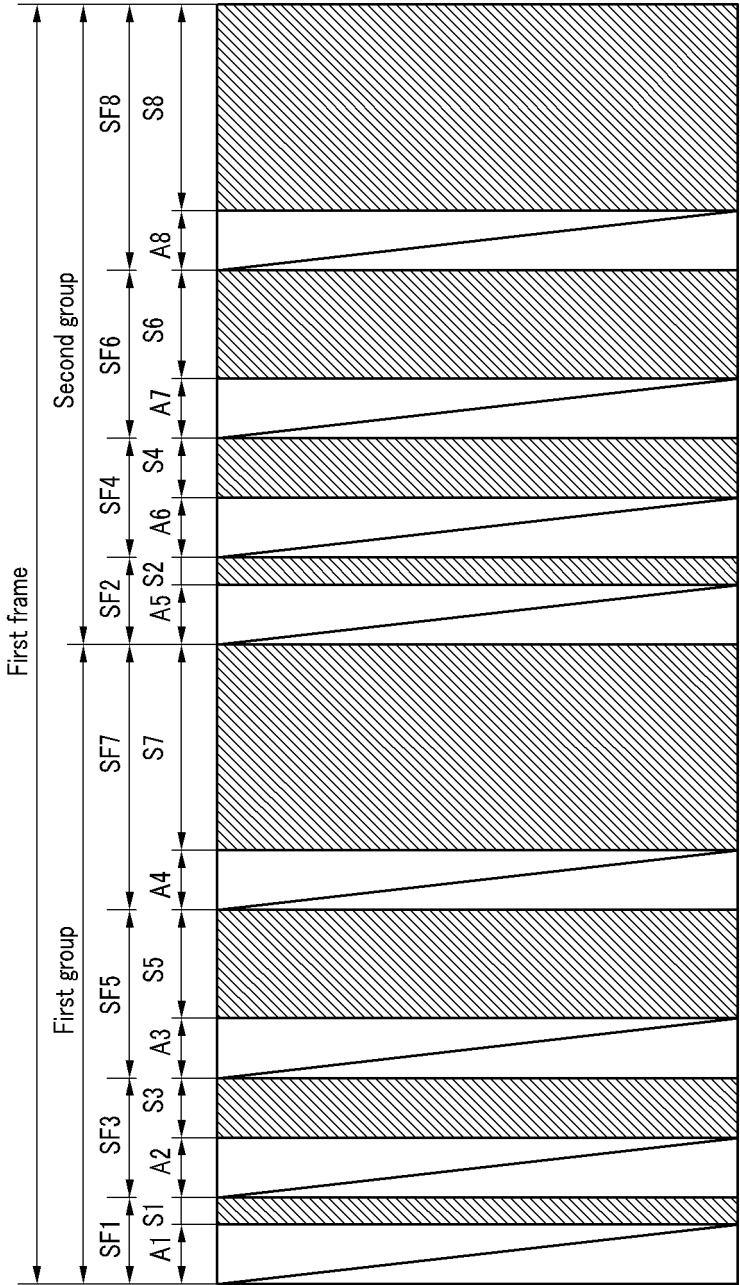


FIG.2A

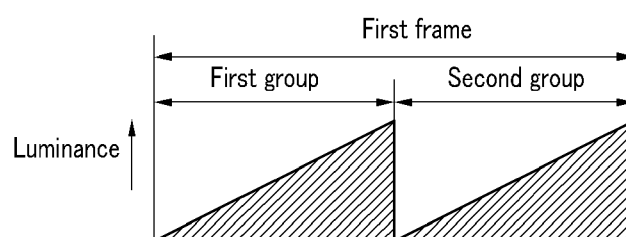


FIG.2B

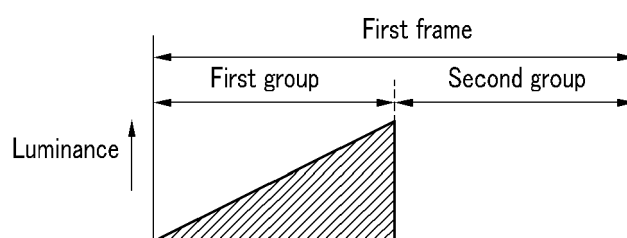


FIG.2C

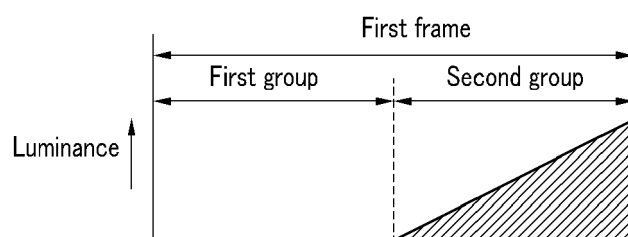


FIG.3A

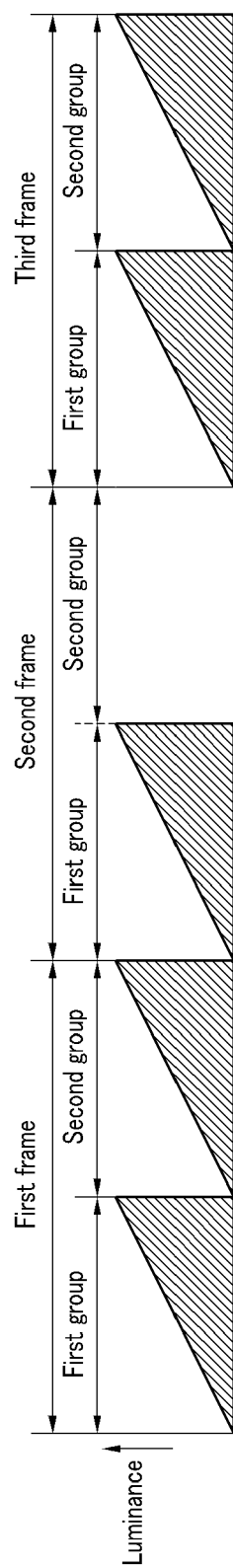


FIG.3B

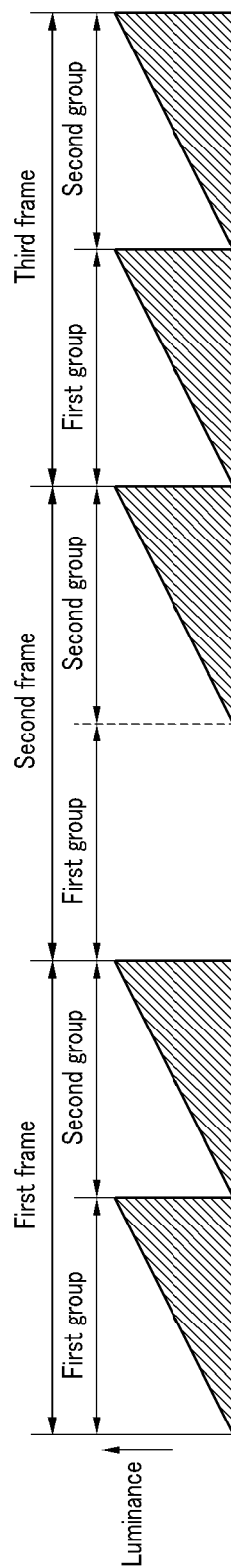


FIG.4

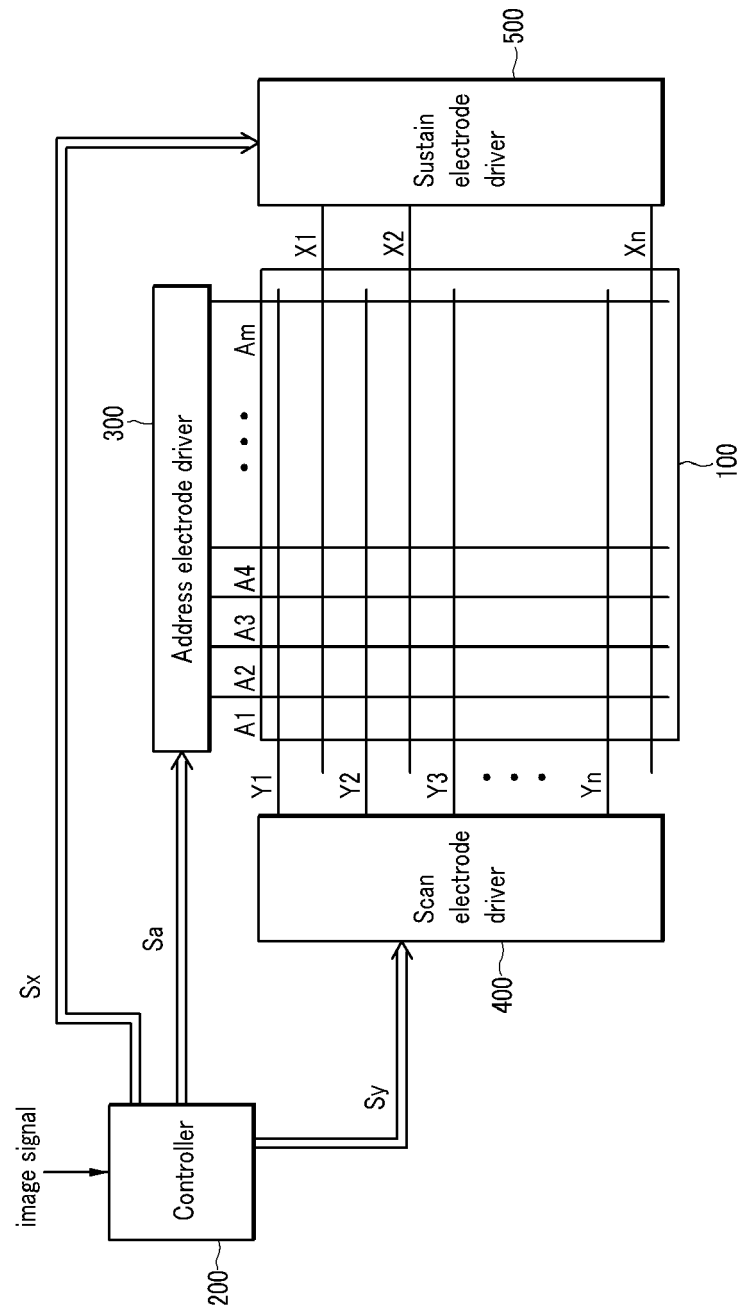


FIG.5

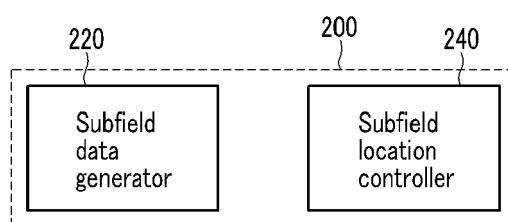


FIG.6

Frame	Second frame							
Group	First group				Second group			
Subfield	SF1	SF3	SF5	SF7	SF2	SF4	SF6	SF8
Weight Grayscale	1	4	16	64	2	8	32	128
0	X	X	X	X	X	X	X	X
1	0	X	X	X	X	X	X	X
2	X	X	X	X	0	X	X	X
3	0	X	X	X	0	X	X	X
4	X	0	X	X	X	X	X	X
5	0	0	X	X	X	X	X	X
6	X	0	X	X	0	X	X	X
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
15	0	0	X	X	0	0	X	X
16	X	X	0	X	X	X	X	X
17	0	X	0	X	X	X	X	X
18	X	X	0	X	0	X	X	X
19	0	X	0	X	0	X	X	X
20	X	0	0	X	X	X	X	X
21	0	0	0	X	X	X	X	X
22	X	0	0	X	0	X	X	X
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
255	0	0	0	0	0	0	0	0

FIG.7

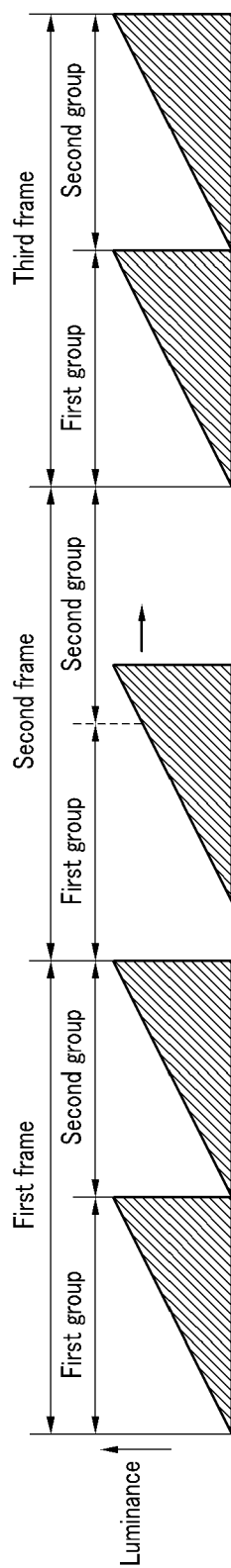


FIG.8

Frame	Second frame							
Group	First group				Second group			
Subfield	SF1	SF3	SF5	SF7	SF2	SF4	SF6	SF8
Weight	1	4	16	64	2	8	32	128
Grayscale								
0	X	X	X	X	X	X	X	X
1	0	X	X	X	X	X	X	X
2	X	X	X	X	0	X	X	X
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
8	X	X	X	X	X	0	X	X
9	0	X	X	X	0	0	X	X
10	X	X	X	X	0	0	X	X
11	0	X	X	X	0	0	X	X
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
31	0	0	0	X	0	0	X	X
32	X	X	X	X	X	X	0	X
33	0	X	X	X	X	X	0	X
34	X	X	X	X	0	X	0	X
35	0	X	X	X	0	X	0	X
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
39	0	0	X	X	0	X	0	X
40	X	X	X	X	X	0	0	X
41	0	X	X	X	X	0	0	X
42	X	X	X	X	0	0	0	X
43	0	X	X	X	0	0	0	X
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
255	0	0	0	0	0	0	0	0

FIG.9

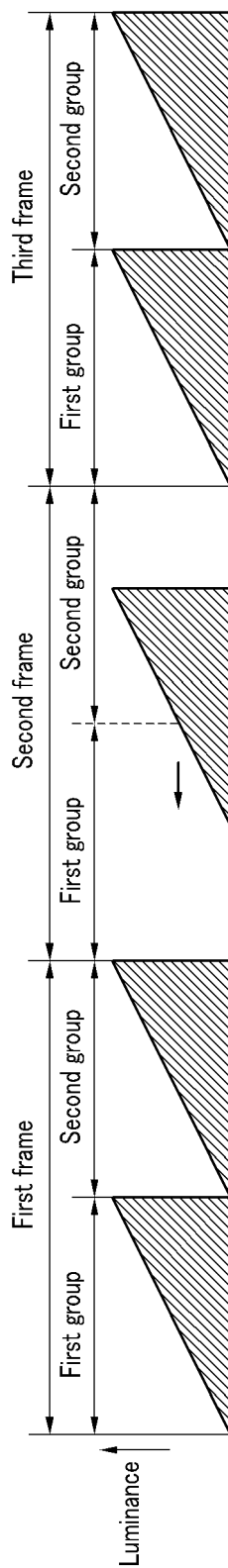
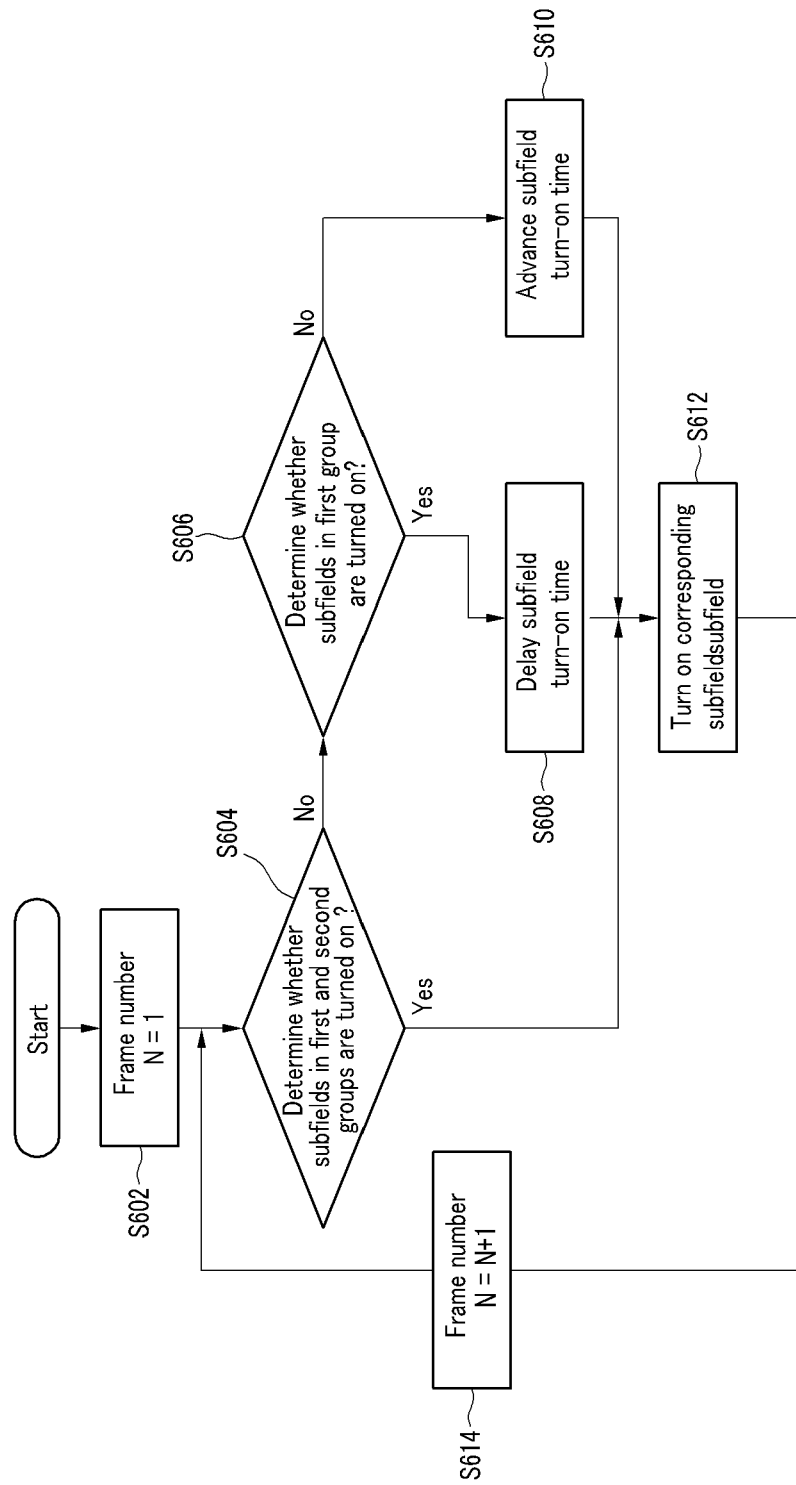


FIG. 10





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
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Place of search The Hague		Date of completion of the search 1 June 2007	Examiner Bellatalla, Filippo
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2

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