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(54) TITLE OF THE INVENTION

PHOTO STAND

(57) Abstract

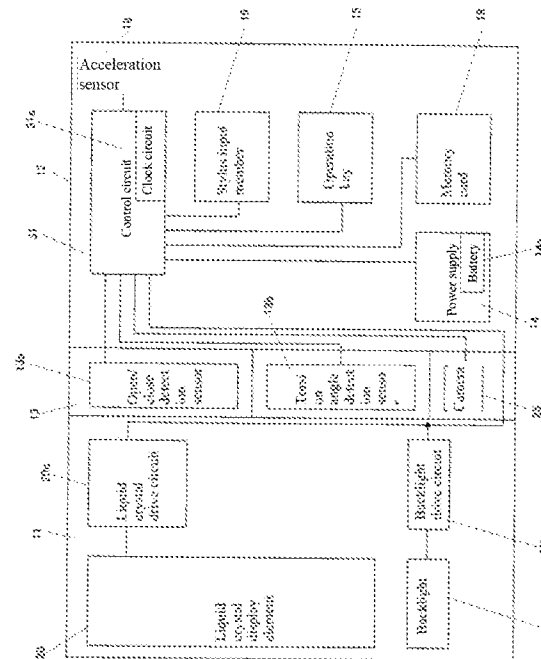
PROBLEM

To reduce power consumption of a photo stand equipped with a display monitor that displays playback images from image data, and a photograph holding part that holds printed photographs.

RESOLUTION MEANS

Making a determination using a detection signal from an opening angle detection sensor 13c enables:

- automatically switching to book mode where the photo stand is assumed to be held or in operation and that a liquid crystal display element 20 is being observed rather than a printed photograph 23 (FIG. 3);
- automatically switching to frame mode 1 when the photo stand is placed and it is assumed that the liquid crystal display element 20 is being observed rather than a printed photograph 23 (FIG. 3); or
- automatically switching to frame mode 2 when the photo stand is placed and it is assumed that a printed photograph 23 (FIG. 3) is being observed rather than the liquid crystal display element 20. In frame mode 2, the liquid crystal display is turned OFF, the backlight 20a is turned OFF, photographing by the camera 25 is stopped, and power supplied to each block is turned OFF, except to the opening angle detection sensor 13c.



[Selected Drawing] FIG. 4

CLAIMS

[Claim 1]

A photo stand, comprising:

a display monitor that displays playback images from image data;
a photograph holding part for holding printed photographs; and
display control means that determines whether or not a display image is being observed using the display monitor rather than a printed photograph and instructs the display monitor to turn playback image display ON or OFF based on the determination results.

[Claim 2]

The photo stand according to claim 1, further comprising:

a hinge member that rotatably supports a base part in contact with a placement surface for the photo stand in a state for being placed and a display part where the display monitor and photograph holding part are provided; and
angle detecting means for detecting the relative angle between the base part and the display part that changes based on rotation of the hinge member; wherein

the display control means determines the observation state of the display image based on a detection signal output from the angle detecting means.

[Claim 3]

The photo stand according to claim 1, further comprising:

placement direction detecting means for detecting direction when placed on a placement member, wherein

the display control means determines the observation state of the display image based on a detection signal output from the placement direction detecting means.

[Claim 4]

The photo stand according to claim 1 or 2, wherein the display control means instructs the display monitor to turn the display OFF upon determining that the display image is not being observed.

[Claim 5]

The photo stand according to claim 4, further comprising:

rocking detecting means for detecting rocking of the photo stand, wherein

the display control means does not instruct the display to turn OFF if a rocking detection signal is output from the rocking detecting means.

DETAILED DESCRIPTION OF THE INVENTION

TECHNICAL FIELD

[0001]

The present invention is related to a photo stand for enjoying digital pictures and printed photographs.

BACKGROUND TECHNOLOGY

[0002]

Digital photo frames that display playback images from digital picture data are well known (see Patent Document 1).

[0003]

Patent Document 1: Japanese Unexamined Patent Application 2004-295033

DISCLOSURE OF THE INVENTION

PROBLEM TO BE RESOLVED BY THE INVENTION

[0004]

When a storing medium is provided in the digital photo frame of Patent Document 1, continuous playback display is provided if image data is stored on the storing medium. Patent document 1 does not disclose any technology for energy conservation of this type of photo frame.

MEANS FOR SOLVING THE PROBLEM

[0005]

A photo stand of the present invention, includes:

a display monitor that displays playback images from image data;

a photograph holding part for holding printed photographs; and

display control means that determines whether or not a display image is being observed using the display monitor rather than a printed photograph and instructs the display monitor to turn ON/OFF playback image display based on the determination results.

The photo stand according to claim 1, may further include:

a hinge member that rotatably supports a base part in contact with a placement surface for the photo stand in a state for being placed and a display part where the display monitor and photograph holding part are provided; and

angle detecting means for detecting the relative angle between the base part and the display part that changes based on rotation of the hinge member; and in this case

the display control means determines the observation state of the display image based on a detection signal output from the angle detecting means.

The photo stand according to claim 1, may further include:

placement direction detecting means for detecting direction when placed on a placement member, and in this case

the display control means determines the observation state of the display image based on a detection signal output from the placement direction detecting means.

The photo stand according to claim 1 or 2, where the display control means may instruct the display monitor to turn the display OFF upon determining that the display image is not being observed.

The photo stand according to claim 4, may further include:

rocking detecting means for detecting rocking of the photo stand, wherein

the display control means may be set up so as to not instruct the display to turn OFF if a rocking detection signal is output from the rocking detecting means.

EFFECT OF THE INVENTION

[0006]

With the present invention, a photo stand includes a display monitor that displays playback images from image data and a photograph holding part for holding printed photographs. Here, turning display of the playback images ON or OFF is set according to the result of determining whether or not a display image is being observed using the display monitor rather than a printed photograph. Therefore, power consumption can be reduced compared to the case of continuing display even if the display image is not being observed.

PREFERRED EMBODIMENTS OF THE INVENTION

[0007]

Preferred embodiments for implementing the invention are described below with reference to the drawings.

Embodiment 1

FIG. 1 is a three view drawing describing a photo stand that is a device for appreciation according to embodiment 1 of the present invention. In FIG. 1, the photo stand is a display part 11 having a liquid crystal display element 20 and an operating part (base part) 12 having operation keys 15 and stylus inputting member 16 integrated by a hinge 13. The hinge 13 is configured to rotate freely with the rotation shaft O as a central axis and supports the display part 11 and operating part 12 at an arbitrary relative angle therebetween. The weight of the operating part (base part) 12 is preferably configured to be heavier than the weight of the display part 11.

[0008]

The following is a description of how to use the photo stand.

Book Mode

FIG. 1 illustrates an example of how the photo stand is used in book mode. The photo stand in book mode is, for example, enabling the liquid crystal display element 20 surface (hereinafter called display surface) 11a of the display part 11 and the surface 12a (hereinafter called operation surface) on the side with the operation keys 15 of the operating part 12 and the stylus inputting member 16 to be directed in the direction of the user (in particular their eyes), where the hinge 13 is opened from a folded state (opening angle of 0 degrees) to approximately 180 degrees, and is held in the hands of the user.

[0009]

While viewing images displayed on the liquid crystal display element 20 of the display part 11 and information related to these images, the user presses the operation keys 15 and writes input into the stylus inputting member 16 using a stylus pen 17. The image displayed on the liquid crystal display element 20 is directed by a control circuit 31 described below based on an operation signal from the operation keys 15 and stylus inputting member 16.

[0010]

In book mode, the liquid crystal display element 20 is viewed in portrait view. The photo stand provides playback display of images that are normally in landscape view on the liquid crystal display element 20 as a portrait view.

In this case, the long edge (horizontal direction) of the image being played back is set to the short edge of the liquid crystal display element 20 and information (Exif information) appended to this playback image data is displayed as text in the blank space (code 21 in FIG. 1) in the short edge direction (vertical direction) of the playback display image. In the example of FIG. 1, as Exif information, the image data filename "DSCNxxx1.JPG", date picture was taken "2004/8/5", time picture was taken "10:45", and shutter speed and aperture value "1/250 F2.8" as shooting conditions are displayed in the lower area 21 of the playback image. The items displayed as Exif information are configured so as to enable suitably being changed based on operation of the operation keys 15.

[0011]

The configuration enables information input through writing using the stylus pen 17 on the stylus inputting member 16 "Traveling in Europe in 2004" to be recorded in the image data file along with the Exif information. Therefore, information written and input and additionally recorded in the image data file is automatically displayed in the area 21 along with the other Exif information during the next playback display.

[0012]

Frame Mode 1

FIG. 2 illustrates a usage form of the photo stand in frame mode 1. The hinge 13 is opened from a folded state to approximately 290 degrees and the operating part 12 operating surface 12a is faced down and placed on a flat surface such as a desk. The angle between the display part 11 and the operating part 12 is approximately 70 degrees. Thus, the user enjoys the images displayed on the liquid crystal display element 20 of the display part 11.

[0013]

The images displayed on the liquid crystal display element 20 are, for example, playback images from image data corresponding to a plurality of image files stored on a memory card 18 (FIG. 4) described below that are displayed in order as a slideshow. In addition, rather than displaying the plurality of playback images in order as a slideshow, the configuration may be set up to playback display prescribed images (for example, images specified beforehand using an operation signal from the operation keys 15) stored on the memory card 18.

[0014]

The photo stand provides playback display of images that are normally in landscape view on the liquid crystal display element 20 as a landscape screen. In this case, the long side (horizontal direction) of the playback display image corresponds to the long side of the liquid crystal display element 20. Text display of the Exif information is omitted and the display size of the playback display image is larger than the display size of the playback display image displayed on the liquid crystal display element 20 while in book mode.

[0015]

Frame Mode 2

FIG. 3 illustrates a usage form of the photo stand in frame mode 2 (photo frame). The hinge 13 is opened from a folded state to approximately 80 degrees and the operating part 12 back surface 12b is faced down and placed on a flat surface such as a desk. The angle between the display part 11 and the operating part 12 is approximately 80 degrees. A removable transparent cover 22 is provided on a back surface 11b of the display unit 11 and a printed photograph 23 is held between the display part 11 and the transparent cover 22. The user enjoys the printed photograph 23 that is held. The printed photograph 23 that is held can be enjoyed in a folded state with an opening angle of 0 degrees as well, functioning as a decorative part for appearance.

[0016]

FIG. 4 is a block diagram describing the configuration of the photo stand. In FIG. 4, the liquid crystal display element 20, a liquid crystal drive circuit 20c, backlight 20a, and backlight drive circuit 20b are included on the display part 11 side. The liquid crystal drive circuit 20c generates a liquid crystal panel drive signal corresponding to the display data output from the control circuit 31 described below and the generated drive signal is used to drive the liquid crystal display element 20. Specifically, a voltage corresponding to the display data is applied to the liquid crystal layer (not shown) of the liquid crystal display element 20 for each pixel. The arrangement of liquid crystal elements changes for a liquid crystal layer with voltage applied and this changes the light transmittance of this liquid crystal layer.

[0017]

In accordance with a lighting instruction output from the control circuit 31, the backlight drive circuit 20b turns ON the backlight 20a at the instructed luminance. The liquid crystal display element 20 is illuminated by the turned ON backlight 20a.

The illumination light from the backlight 20a is transmitted through the liquid crystal layer of the liquid crystal display element 20 and modulated, enabling display of playback images from display data.

[0018]

The control circuit 31, acceleration sensor 19, stylus inputting member 16, operation keys 15, power supply 14 with a battery 14a, and camera 25 are included on the operating part 12 side and a memory card 18 configured to be insertable is installed. Based on a control program, the control circuit 31 performs prescribed calculations using signals input from various parts included in the photo stand and sends control signals to various parts of the photo stand to control camera operation and image display operation, respectively. Note, the control program is stored in non-volatile memory (not shown) in the control circuit 31.

[0019]

The control circuit 31 is provided with a clock circuit 31a that generates time information through division of a clock signal (not shown).

[0020]

The stylus inputting member 16 outputs an input signal corresponding to input operation by the user to the control circuit 31.

The operation keys 15 outputs an operation signal corresponding to operation by the user to the control circuit 31. The memory card 18 is made up of non-volatile memory such as flash memory and writing, storing, and reading of data are feasible based on control circuit 31 commands. The power supply 14 is made up of a DC/DC conversion circuit that converts the voltage of the battery 14a to DC voltage needed in various parts in the photo stand and the converted voltage is supplied to each of the blocks.

[0021]

The camera 25 includes an image sensor and a photographing lens that forms an image of the subject on the image sensor. The camera 25 captures the subject image based on a photograph instruction by the control circuit 31 and after performing prescribed signal processing on the image data, sends this image data to the control circuit 31. A CCD or CMOS imaging elements is used as the image sensor. The camera 25 is configured to photograph a main subject facing the display surface 11a of the display part 11 in the frame mode 1 usage form.

[0022]

The hinge 13 is equipped with an opening angle detection sensor 13a and a torsion angle detection sensor 13b. The opening angle detection sensor 13a outputs the detection signal corresponding to the size of the opening angle of the hinge 13 rotated centered on the rotation shaft O to the control circuit 31. The torsion angle detection sensor 13b is described below.

[0023]

In the photo stand described above, in order to display playback images from image data stored on the memory card 18 on the liquid crystal display element 20 of the display part 11, the control circuit 31 reads image data from the memory card 18, generates display data corresponding to the number of display pixels of the liquid crystal display element 20 using the read image data, sends the generated display data to the liquid crystal drive circuit 20c, and sends a turn ON instruction to the backlight drive circuit 20b.

[0024]

Display control processing for power conservation performed by the control circuit 31 is described with reference to the flowchart illustrated in FIG. 5. The control circuit 31 repeats the processing according to FIG. 5 when the battery 14a is provided in the photo stand.

[0025]

In step S11 of FIG. 5, the control circuit 31 determines whether or not the opening angle of the hinge 13 is within the range of 0 to 90 degrees. The control circuit 31 determines yes in step S11 and processing proceeds to step S14 if the detection signal from an opening angle detection sensor 13c corresponds to the range of the opening angle of 0 to 90 degrees. If the detection signal from the opening angle detection sensor 13c exceeds an opening angle of 90 degrees, no is determined in step S11 and processing proceeds to step S12. The case of proceeding to step S14 assumes that the photo stand is placed and a printed photograph 23 is observed rather than an image being displayed on the liquid crystal display element 20.

[0026]

In step S12, the control circuit 31 determines whether or not the opening angle of the hinge 13 is within the range of 91 to 270 degrees. The control circuit 31 determines yes in step S12 and processing proceeds to step S15 if the detection signal from an opening angle detection sensor 13c corresponds to the range of an opening angle of 91 to 270 degrees. If the detection signal from the opening angle detection sensor 13c exceeds an opening angle of 270 degrees, no is determined in step S12 and processing proceeds to step S13. The case of proceeding to step S15 assumes the user is holding or operating the photo stand and that images displayed on the liquid crystal display element 20 are being observed rather than a printed photograph 23.

[0027]

In step S13, the control circuit 31 determines if the opening angle of the hinge 13 is in the range of 271 to less than 360 degrees and processing proceeds to step S16. In this case, the photo stand is assumed to be placed and that images displayed on the liquid crystal display element 20 are being observed rather than a printed photograph 23.

[0028]

In step S14, the control circuit 31 switches to frame mode 2 (photo frame) and processing returns to step S11. In the process of switching to frame mode 2, an instruction turning OFF display of the liquid crystal display element 20 is sent to the liquid crystal drive circuit 20c, instruction turning OFF the backlight 20a is sent to the backlight drive circuit 20b, instruction stopping photographing is sent to the camera 25, and an instruction turning power supply OFF to each block except the opening angle detection sensor 13c and control circuit 31 is sent to the power supply 14. Note, if processing is already switched to frame mode 2, frame mode 2 is maintained and processing returns to step S11.

[0029]

In step S15, the control circuit 31 switches to book mode and processing returns to step S11. In the process of switching to book mode, an instruction stopping photographing is sent to the camera 25, an instruction turning power supply OFF to the camera 25 and turning power supply ON to each of the blocks in the display part 11 except the camera 25 is sent to the power supply 14, and an instruction of display mode of the liquid crystal display element 20 as illustrated in FIG.1 of content a1 to f1 described below is sent to the liquid crystal drive circuit 20c and the backlight drive circuit 20b. Image processing required to change the gradation, saturation, and contour enhancement characteristics is performed by the control circuit 31. Note, if processing is already switched to book mode, book mode is maintained and processing returns to step S11.

[0030]

a1. Provides playback display of images that are normally in landscape view on the liquid crystal display element 20 as portrait view.

b1. Text display of Exif information appended to the playback image data in the blank space 21 (FIG. 1) of the short side of the playback display image.

c1. Set the display luminance (brightness) to the standard setting value.

d1. Set the gradation characteristics (including contrast and γ characteristics) to the standard setting values.

e1. Set the saturation characteristics to the standard setting values.

f1. Set the contour enhancement characteristics to the standard setting values.

[0031]

In step S16, the control circuit 31 switches to frame mode 1 and processing returns to step S17. In the process of switching to frame mode 1, an instruction turning ON the power supply to each of the blocks in the display part 11 is sent to the power supply 14, an instruction to start photographing is sent to the camera 25, and an instruction of display mode of the liquid crystal display element 20 as illustrated in FIG. 2 of content a2 to f2 described below is sent to the liquid crystal drive circuit 20c and backlight drive circuit 20b. Note, if processing is already switched to frame mode 1, frame mode 1 is maintained and processing proceeds to step S17.

[0032]

a2. Provides playback display of images that are normally landscape on the liquid crystal display element 20 as a landscape screen.

b2. Omits display of Exif information.

c2. Increases display luminance (brightness) above standard value (makes display brighter).

d2. Changes the gradation characteristics set values from standard setting values to display the images in a flashy manner.
e2. Changes the saturation characteristics set values from standard setting values to display images in a vivid manner.
f2. Set the contour enhancement characteristics to stronger than the standard setting values.

[0033]

5 In step S17, the control circuit 31 determines whether or not the AF (auto focus) information obtained by the camera 25 corresponds to a distance farther than a prescribed distance. The control circuit 31 performs well-known AF calculation processing (for example, mountain climbing AF) using image data transmitted from the camera 25 and calculates the distance to the nearest subject. If the calculated distance is, for example, farther than 1 m, step S17 is determined to be yes and processing proceeds to step S18. In the case that the calculated distance is 1 m or less, the control circuit 31 determines no in
10 step S17 and processing returns to step S11. Note, the distance measurement means described above may be distance measurement means based on the principle of triangulation, distance measurement means using laser or sound waves or the like, or phase difference method distance measurement means or the like.

[0034]

15 In step S18, the control circuit 31 sends an instruction to further emphasize to the liquid crystal drive circuit 20c and processing returns to step S11. If there is already an instruction to further emphasize, this emphasis is maintained and processing returns to step S11. With the instruction to further emphasize, an instruction with the content below is sent to the liquid crystal drive circuit 20c as display mode of the liquid crystal display element 20.

d3. Set the gradation characteristics to a setting value that is more flashy than what is normal for frame mode 1.

e3. Set the saturation characteristics to a setting value that is more vivid than what is normal for frame mode 1.

20 f3. Set the contour enhancement characteristics to a setting value that is stronger than what is normal for frame mode 1.

[0035]

The following effects can be obtained based on embodiment 1 described above.

(1) Performing of determination using a detection signal from the opening angle detection sensor 13c enables:

25 automatically switching to book mode where the photo stand is assumed to be held or in use and it is assumed that, rather than a printed photograph 23, the liquid crystal display element 20 is being observed (step S15);

automatically switching to frame mode 1 when the photo stand is placed and it is assumed that, rather than a printed photograph 23, the liquid crystal display element 20 is being observed (step S16); or

automatically switching to frame mode 2 when the photo stand is placed and it is assumed that, rather than the liquid crystal display element 20, a printed photograph 23 is being observed (step S14); and

30 therefore, switching operation by the user is unnecessary.

(2) In frame mode 2 where a printed photograph 23 is enjoyed, the liquid crystal display is turned OFF, the backlight 20a is turned OFF, photographing by the camera 25 is stopped, and power supplied to each block is OFF except to the opening angle detection sensor 13c and control circuit 31 so power consumption can be greatly reduced.

[0036]

35 (3) In book mode, an instruction to stop photographing is sent to the camera 25, power supply to the camera 25 is turned OFF, and power supply is turned ON to each of the blocks in the display part 11 except the camera 25 so power consumption of the camera 25 can be suppressed.

[0037]

40 (4) In book mode, playback image is displayed on the liquid crystal display element 20 as portrait view and Exif information appended to the image data is displayed in the blank space 21 enabling the user to easily confirm the date and conditions the photograph was taken and information can easily be added to the Exif information using the stylus inputting member 16.

[0038]

45 (5) In book mode, the display characteristics of the liquid crystal display element 20 are the content of c1 to f1 described above so playback images from image data stored in the memory card 18 are displayed as-is without changing display characteristics. This enables the user to observe detailed gradations and resolution of the image data.

[0039]

(6) In frame mode 1, display of the Exif information appended to the image data is omitted and the playback image is displayed in full size as landscape view, filling the liquid crystal display element 20 screen so the user can observe the display image from a position away from the photo stand.

[0040]

(7) In frame mode 1, the display characteristics of the liquid crystal display element 20 are the content of c2 to f2 described above so display characteristics of playback images from image data stored in the memory card 18 are changed to enhance display. This enables the user to enjoy playback images from a distant position. Note, the enhanced content may be at least one or more of the c2 to f2 described above.

[0041]

(8) In frame mode 1, the distance to the nearest subject is calculated and if the calculated distance is farther than 1 m, display characteristics of the playback image are further emphasized enabling the user to enjoy the playback images from a position even further away. Note, the enhanced content may be at least one or more of the d3 to f3 described above.

[0042]

The emphasizing of display characteristics in (8) described above is not limited to having a distance of 1 m but may be, for example, suitably changed based on size of the liquid crystal display element 20. For example, 1 m for 15-inch and 3 m for 20-inch. Note, emphasis processing of display characteristics according to AF information may be omitted and in this case, the camera 25 can be omitted.

[0043]

The hinge 13 can be configured as a free-angle hinge that can rotate around a shaft R (FIG. 2) that is orthogonal to the rotation shaft O. In this case, the torsion angle detection sensor 13b outputs a detection signal according to the rotation angle of the display part 11 rotated centered on the rotation shaft R to the control circuit 31. If the display part 11 rotates from the state in FIG. 2 (frame mode 1) with a rotation angle of approximately 180 degrees (for example, 150 to 210 degrees), the control circuit 31 switches processing from frame mode 1 to frame mode 2.

[0044]

Conversely, if the display part 11 rotates from the state in FIG. 3 (frame mode 2) with a rotation angle of approximately 180 degrees (for example, 150 to 210 degrees), the control circuit 31 switches processing from frame mode 2 to frame mode 1.

[0045]

The configuration of c2 described above of the display luminance (brightness) in frame mode 1 being higher than standard settings may be performed according to that remaining in the battery 14a. By not brightening the display brightness when the battery 14a is low, the power consumption of the backlight 20a is suppressed and the time until the battery 14a is discharged can be extended.

[0046]

This provides for switching display control based on the opening angle of the hinge 13 but the determination angle does not have to be that described above and may be suitably set.

[0047]

In addition, with the opening angle of the hinge 13 being in the range of 91 to 270 degrees, the photo stand is assumed to be being held or being operated by the user; however, assumption that the user is holding or operating the photo stand may be based on detection of oscillation of the photo stand such as by an acceleration sensor (see FIG. 4). If the user is assumed to be holding or operating, processing switches to book mode.

[0048]

Embodiment 2

A usage form of the photo stand that is an entertainment device will be described as embodiment 2. Note, descriptions for parts common with embodiment 1 will be omitted.

Frame Mode 1

FIG. 6 is a perspective view describing the photo stand body 30 used in frame mode 1. In FIG. 6, the photo stand body 30 is placed on a mounting stand 40 in a manner enabling the user to observe the surface (hereinafter called display surface) 30a having the liquid crystal display element 20 and operation keys 15.

The photo stand body 30 is provided with a switch 35 for detecting placement of the photo stand body 30 on a mounting stand 40 with the display surface 30a facing forward. Thus, the user enjoys the images displayed on the liquid crystal display element 20. Note, a recessed part 40a of the mounting stand 40 is provided to prevent operation of the switch 35 if the photo stand body 30 is placed on the mounting stand 40 with the back surface of the display surface 30a that is a photograph holding surface 30b facing forward.

[0049]

The images displayed on the liquid crystal display element 20 are, for example, playback images from image data corresponding to a plurality of image files stored on a memory card 18 (FIG. 8) that are displayed in order as a slideshow. In addition, rather than displaying the plurality of playback images in order as a slideshow, the configuration may be set up to playback display prescribed images (for example, images specified beforehand using an operation signal from the operation keys 15) stored on the memory card 18.

[0050]

Frame Mode 2

FIG. 7 is a perspective view describing the photo stand body 30 used in frame mode 2. In FIG. 7, the photo stand body 30 is placed on the mounting stand 40 enabling the user to observe the photograph holding surface 30b. A removable transparent cover 22 is provided on the photograph holding surface 30b and a printed photograph 23 is held between the transparent cover 22 and the case of the photo stand body 30. The user enjoys the printed photograph 23 that is held.

[0051]

Frame Mode 3

Frame mode 3 is the mode where the photo stand body 30 is held by hand. Thus, the user enjoys the images displayed on the liquid crystal display element 20 up close. Note, operation using the operation keys 15 specifying playback images is performed in this mode.

[0052]

FIG. 8 is a block diagram describing the configuration of the photo stand body 30. In FIG. 8, the same numerals are used for members with the same configuration as FIG. 4 and the description thereof is omitted.

[0053]

The acceleration sensor 19 detects rocking of the photo stand body 30 and outputs a detection signal to the control circuit 31. The control circuit 31 determines that the stand is being swung if there is variation in the detection signal and determines that the stand is placed if there is no variation in the detection signal.

[0054]

The detection switch 35 issues an ON signal when pressure is applied and an OFF signal when no pressure is applied. The signal output from the detection switch 35 is input to the control circuit 31 as a signal for detecting direction of the photo stand body 30 placed on the mounting stand 40. The control circuit 31 determines that the orientation is for observation of the display surface 30a if an ON signal is input and determines that the orientation is for observation of the photograph holding surface 30b if an OFF signal is input.

[0055]

In the photo stand body 30 described above, in order to display playback images from image data stored on the memory card 18 on the liquid crystal display element 20, the control circuit 31 reads image data from the memory card 18, generates display data corresponding to the number of display pixels of the liquid crystal display element 20 using the read image data, sends the generated display data to the liquid crystal drive circuit 20c, and sends a turn ON instruction to the backlight drive circuit 20b.

[0056]

Display control processing for power conservation performed by the control circuit 31 is described with reference to the flowchart illustrated in FIG. 9. The control circuit 31 repeats the processing according to FIG. 9 when the battery 14a is equipped in the photo stand body 30.

[0057]

In step S51 of FIG. 9, the control circuit 31 determines whether or not the detection switch 35 is ON. If an ON signal is input from the detection switch 35, the control circuit 31 determines step S51 to be yes and processing proceeds to step S52 while if an OFF signal is input, determines step S51 to be no and processing proceeds to step S53. The case where processing proceeds to step S52 is where the photo stand body 30 is assumed to be placed with orientation enabling observation of the display surface 30a where the case of proceeding to step S53 is where the photo stand body 30 is assumed to be placed with orientation different from that enabling observation of the display surface 30a (including upside down) or not placed.

[0058]

In step S52, the control circuit 31 switches to frame mode 1 and processing returns to step S51. In the processing of switching to frame mode 1, an instruction is sent to the power supply 14 to turn ON power supply to each of the blocks in the photo stand body 30 and an instruction of content of a2 to f2 described above as display mode of the liquid crystal display element 20 is sent to the liquid crystal drive circuit 20c and backlight drive circuit 20b. Note, if processing is already switched to frame mode 1, frame mode 1 is maintained and processing proceeds to step S51.

[0059]

In step S53, the control circuit 31 determines whether or not there is no change of the detection signal from the acceleration sensor 19 for a prescribed amount of time (for example 5 minutes). If there is no change in the input signal, the control circuit 31 determines step S53 to be yes and processing proceeds to step S55 and if there are changes in the input signal, determines step S53 to be no and processing proceeds to be step S54. Processing proceeding to step S54 is where the photo stand body 30 is assumed to be hand-held and the case of processing proceeding to step S53 is where the photo stand body 30 is assumed to be placed.

[0060]

In step S54, the control circuit 31 switches to frame mode 3 and processing returns to step S51. In the processing of switching to frame mode 3, an instruction is sent to the power supply 14 to turn ON power supply to each of the blocks in the photo stand body 30 and an instruction of content of a2, b2, and c1 to f1 described above as display mode of the liquid crystal display element 20 is sent to the liquid crystal drive circuit 20c and backlight drive circuit 20b. Note, if processing is already switched to frame mode 3, frame mode 3 is maintained and processing proceeds to step S51.

[0061]

In step S55, the control circuit 31 switches to frame mode 2 and processing returns to step S51. In the process of switching to frame mode 2, an instruction turning OFF display of the liquid crystal display element 20 is sent to the liquid crystal drive circuit 20c, instruction turning OFF the backlight 20a is sent to the backlight drive circuit 20b, and an instruction turning power supply OFF to each of the blocks except the control circuit 31, the detection switch 35, and the acceleration sensor 19 is sent to the power supply 14. Note, if processing is already switched to frame mode 2, frame mode 2 is maintained and processing returns to step S51.

[0062]

The following effects can be obtained based on embodiment 2 described above.

(1) Performing determination using a signal from the detection switch 35 enables:

automatically switching to frame mode 1 for the case where the photo stand body 30 is assumed to be placed with orientation enabling observation of the liquid crystal display element 20 (printed photograph 23 not observed) (step S52), automatically switching to frame mode 2 for the case where the photo stand body 30 is assumed to be placed in an orientation differing from that enabling observation of the liquid crystal display element 20 (printed photograph 23 observed) (step S55), and automatically switching to frame mode 3 for the case that the liquid crystal display element 20 is assumed to be hand-held (rather than the printed photograph 23, the liquid crystal display element 20 being observed) (step S54), therefore switching operation by the user is unnecessary.

[0063]

(2) In frame mode 2 where the printed photograph 23 is enjoyed, power supply is turned OFF to each of the blocks in the photo stand body 30 except the control circuit 31, the detection switch 35, and the acceleration sensor 19 so power consumption can be dramatically reduced.

[0064]

(3) In frame mode 3, the display characteristics of the liquid crystal display element 20 are the content of a2, b2, and c1 to f1 described above so playback images from image data stored in the memory card 18 are displayed as-is without changing display characteristics. This enables the user to observe detailed gradations and resolution of the image data.

[0065]

(4) In frame mode 1, the display characteristics of the liquid crystal display element 20 are the content of a2 to f2 described above so display characteristics of playback images from image data stored in the memory card 18 are changed to enhance display. This enables the user to enjoy playback images from a distant position. Note, the enhanced content may be at least one or more of the c2 to f2 described above.

[0066]

While a detection switch 35 for detecting the orientation of the photo stand body 30 placed on the mounting stand 40 is provided, a configuration with a posture sensor provided in place of the detection switch 35 and determining placement orientation based on the posture sensor detection signal is also feasible. An optical sensor may be used instead of a posture sensor.

[0067]

In the description above, an example of a transmissive type liquid crystal panel was used as the liquid crystal display element but a configuration with a reflective type liquid crystal or semi-transmissive type liquid crystal in place of the transmissive type liquid crystal panel is also feasible. In addition, a configuration using another type of display device such as an organic EL element is also feasible.

[0068]

A description of how each of the components in the scope of patent claims matches the elements in the preferred embodiment of the invention is provided below. The display monitor includes, for example, the liquid crystal display element 20 and the backlight 20a. The photograph holding part includes, for example, the transparent cover 22. The display control means includes, for example, the control circuit 31. The angle detecting means includes, for example, the open/close angle detection sensor 13a (torsion angle detection sensor 13b). The placement direction detecting means includes, for example, the detection switch 35. The rocking detecting means includes, for example, the acceleration sensor 19. Note, that described above are merely examples and do not restrict in any way the interpretation of the present invention or the relationship of how the components of the embodiments described above match the components of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0069]

FIG. 1 is a three view drawing describing a photo stand according to embodiment 1 of the present invention.

FIG. 2 illustrates a usage form of the photo stand in frame mode 1.

FIG. 3 illustrates a usage form of the photo stand in frame mode 2.

FIG. 4 is a block diagram describing the configuration of the photo stand.

FIG. 5 is a flowchart describing the display control process performed by the control circuit.

FIG. 6 is a perspective view describing a photo stand according to embodiment 2.

FIG. 7 is a perspective view describing a photo stand according to embodiment 2.

FIG. 8 is a block diagram describing the configuration of the photo stand body.

FIG. 9 is a flowchart describing the display control process performed by the control circuit.

LIST OF REFERENCE NUMERALS

[0070]

11. Display part

11a. Display surface

11b. Back surface

12. Operating part

12a. Operation surface

12b. Back surface

13. Hinge

13a. Open/close angle detection sensor

13b. Torsion angle detection sensor

- 14. Power supply
- 14a. Battery
- 15. Operation keys
- 16. Stylus inputting member
- 18. Memory card
- 19. Acceleration sensor
- 20. Liquid crystal display element
- 20a. Backlight
- 20b. Backlight drive circuit
- 20c. Liquid crystal drive circuit
- 22. Transparent cover
- 23. Printed photograph
- 25. Camera
- 30. Photo stand body
- 31. Control circuit
- 35. Detection switch
- O, R. Rotation shaft

FIG. 1

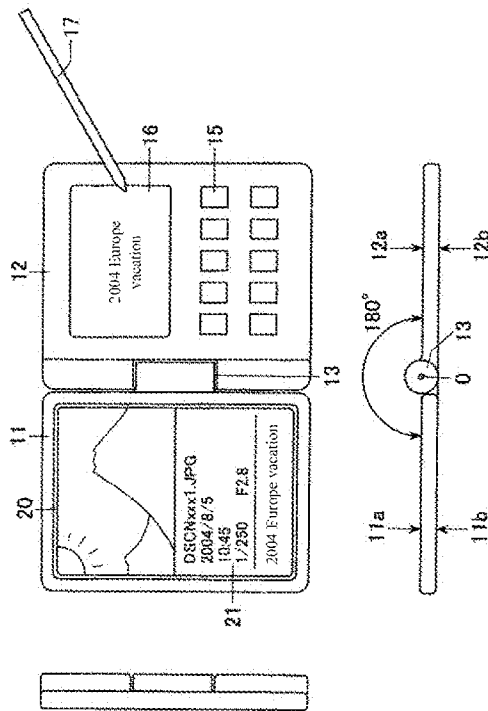


FIG. 2

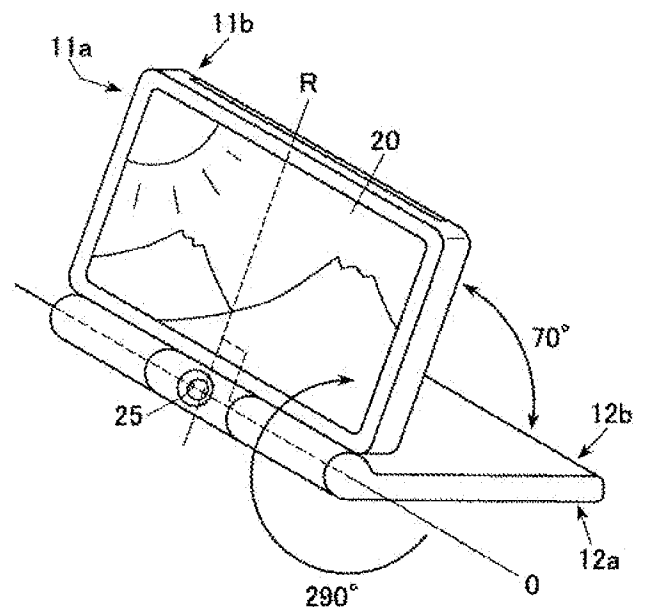


FIG. 3

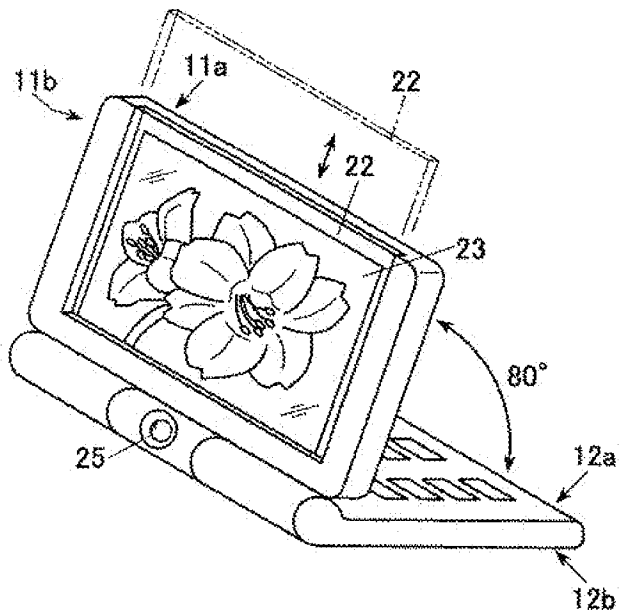


FIG. 4

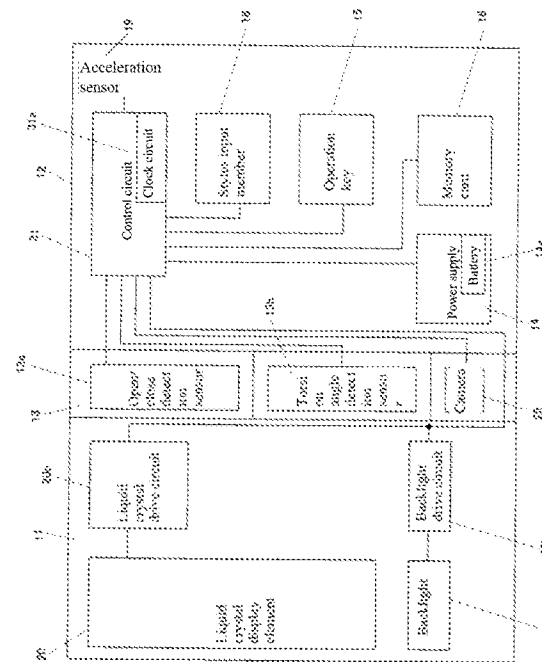


FIG. 5

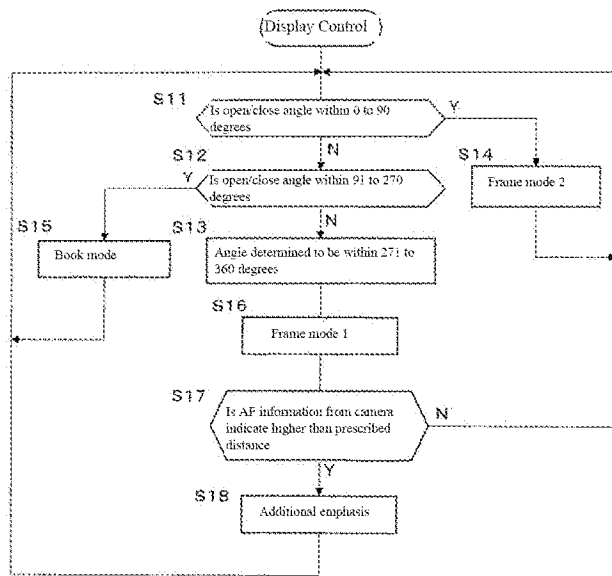


FIG. 6

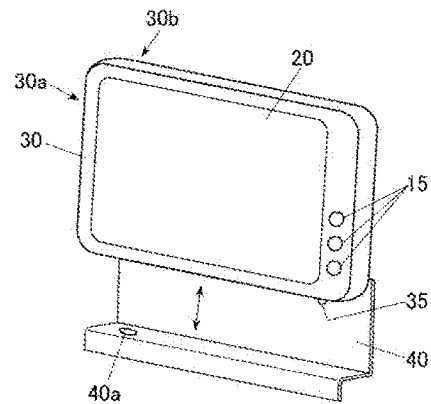


FIG. 7

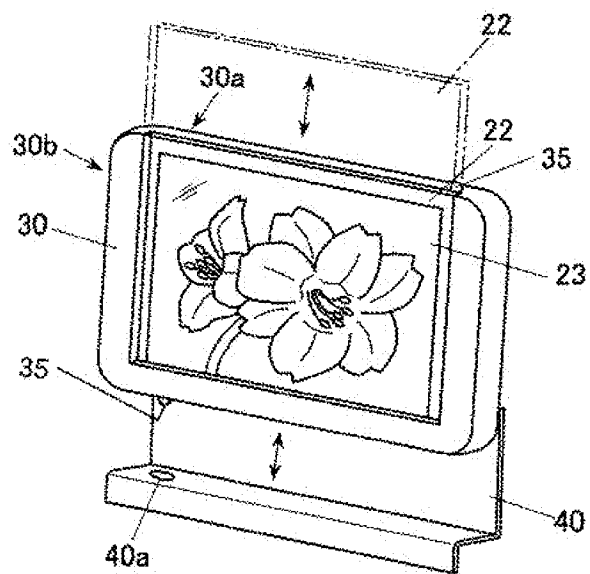
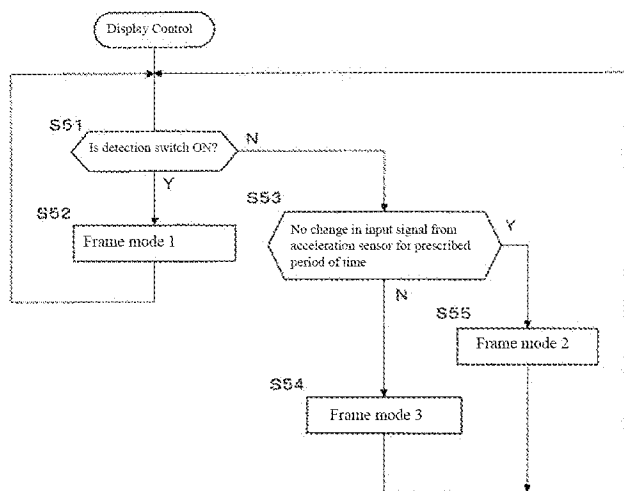


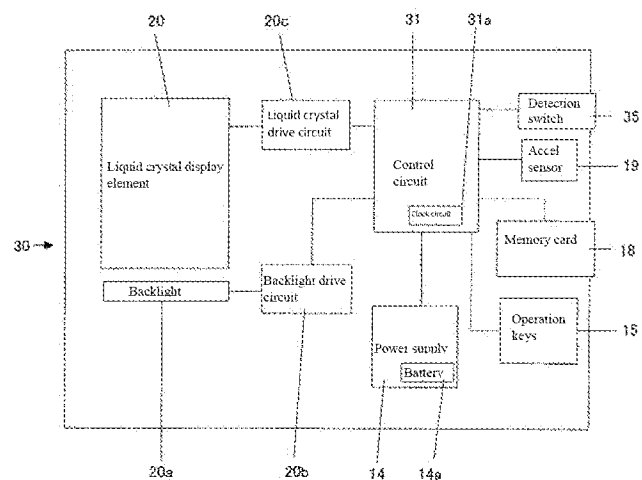
FIG. 9



(14)

JP 2006-243137 A 2006.9.14

FIG. 8



I, Michael Fletcher, declare as follows:

1. I am over eighteen years of age and fully competent to make this affidavit. I have personal knowledge of the information contained in this affidavit, and it is true and accurate to the best of my knowledge.
2. I am a translator fluent in the Japanese and English languages.
3. I translated the Japanese patent file JP2006243137A.pdf into English and the English translation is a true and accurate translation of the Japanese patent 2006-243137 to the best of my knowledge.

Executed on: the 10th of March, 2022, at 962 N. 4200 W. Parowan UT 84761



Signed by Michael Fletcher