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JPH114405A null

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Classifications:

IPC **H04N5/262; H04N5/77; H04N5/907; H04N101/00; H04N9/808; (IPC1-7): H04N5/907;**

CPC **H04N5/2621 (EP,US); H04N5/2624 (EP,US); H04N5/772 (EP,US); H04N2009/8084 (EP,US); H04N5/907 (EP,US);**

Priorities: JP15716397A 1997-06-13

Application: JP15716397A 1997-06-13

Publication: JPH114405A 1999-01-06

Published as: **JP3496744B2; JPH114405A;US6721002B1**

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Abstract

PROBLEM TO BE SOLVED: To omit troublesome operations for recording by recording composite image data by having only to mount other memory card having a sufficient idle capacity. SOLUTION: When the operator selects template image data and photographed image data recorded on a memory card 46, a CPU 28 uses a DRAM 24 for compositing both the image data. A CPU 28 compares the data amount of the composite image data with an idle capacity of the memory card. When the data amount is an idle capacity or below, the composite image data are recorded on the memory card. On the other hand, when the data amount is larger than the idle capacity, the CPU 28 displays a prescribed warning message on an LCD 34. When the operator loads other memory card, the CPU 28 again compares the composite image data with the idle capacity of the memory card newly mounted. If the idle capacity is sufficient, the composite image data are recorded on the memory card.

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**[0001]** BACKGROUND OF THE INVENTION 1. Field of the Invention The present invention relates to a method of recording image data and a digital camera, and more particularly to a method of recording image data and a digital camera for recording composite image data obtained by combining a plurality of image data in a memory. Regarding

**[0002]** 2. Description of the Related Art In a conventional digital camera, all captured image data is recorded in a built-in flash memory. Then, when a plurality of images are selected using the LCD, the plurality of image data are combined and the combined image data is stored in the flash memory.

**[0003]** However, in such a conventional technique, the composite image data cannot be recorded when the flash memory does not have sufficient free space. It was necessary to delete the image data, create free space, and repeat the above operation. That is, when the free space of the flash memory becomes small, a troublesome operation is required.

**[0004]** Therefore, a main object of the present invention is to provide an image data recording method capable of recording composite image data in a memory without performing a troublesome operation.

**[0005]** According to a first aspect of the invention, (a) a plurality of desired image data recorded in a memory card are combined, and (b) data of the combined image data obtained in step (a). Compare the amount and the free space of the memory card, (c) record the composite image data in the memory card when the data amount is less than the free space, (d) generate a warning when the data amount is larger than the free space, and (e) The method for recording image data, which returns to step (b) when another memory card is inserted.

**[0006]** A second invention is a synthesizing unit for synthesizing a plurality of desired image data recorded on a memory card, a comparing unit for comparing the data amount of the synthetic image data output from the synthesizing unit with the free space of the memory card, and data. A digital camera is provided with a recording means for recording composite image data in a memory card when the amount of data is less than or equal to the free space, and a generating means for issuing a warning when the amount of data is larger than the free space.

**[0007]** When the operator selects, for example, the template image data and the photographed image data recorded on the memory card, the CPU uses the DRAM to combine both image data. Next, the CPU compares the data amount of the combined image data with the free space of the memory card, and if the data amount is less than or equal to the free space, records the combined image data in the memory card. On the other hand, if the data amount is larger than the free space, the CPU displays a predetermined warning message on the LCD. Here, if the operator mounts another memory card, the CPU again compares the data amount of the composite image data with the free space of the newly mounted memory card. Then, if the free space is equal to or larger than the data amount of the composite image data, the CPU records the composite image data in the memory card.

**[0008]** According to the present invention, a warning is issued when the data amount of the composite image data is larger than the free space of the memory card, and when another memory card having a sufficient free space is attached, the composite image data is recorded on the memory card, so troublesome operations can be omitted.

**[0009]** The above-mentioned objects, other objects, features and advantages of the present invention will be more apparent from the following detailed description of the embodiments with reference to the drawings.

**[0010]** DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS Referring to FIG. 1, a digital camera 10 of this embodiment includes a lens 12, and an optical image incident from this lens 12 has Cy, Yc, Mg and G arranged in a mosaic pattern. The CCD imager 14 is illuminated through the color filter. When outputting a moving image from the monitor 34, the CCD imager 14 performs so-called pixel mixed reading,

and the obtained pixel signal is given to the CDS/AGC circuit 16. The CDS/AGC circuit 16 performs well-known noise removal and level adjustment on the input pixel signal, and the pixel signal processed by the CDS/AGC circuit 16 is converted into digital data, that is, pixel data by the A/D converter 18. Is converted to. Since each pixel data has a color component of any one of Cy, Ye, Mg, and G, the first signal processing circuit 20 follows the formulas 1 and 2 based on the four pixel data having different color components. Color separation,

**[0011]** ##EQU1##  $Y_h = C_y + Y_e + M_g + G_{cb} = (C_y + M_g) - (Y_e + G) \quad C_r = (Y_e + M_g) - (C_y + G)$

**[0012]** ##EQU2##  $R = k_{11} \times Y_h + k_{12} \times C_b + k_{13} \times C_r \quad G = k_{21} \times Y_h + k_{22} \times C_b + k_{23} \times C_r \quad B = k_{31} \times Y_h + k_{32} \times C_b + k_{33} \times C_r$   
The R, G and B data obtained by color separation are 3 into Y (=YL), U and V data. Incidentally, when the color difference signals Cb and Cr are calculated based on the equation 1, the color difference signals Cb and Cr are alternately generated line by line, so that they are actually omitted by using a 1H delay line (not shown). The other color difference signal is compensated.

**[0013]** ##EQU3##  $Y_L = 0.299 \times R + 0.587 \times G + 0.114 \times B \quad U = B - Y_L \quad V = R - Y_L$  The Y, U and V data thus generated are stored in the memory via the internal bus 22. The data is written in the memory area 24a of the DRAM 24 by the control circuit 26 and then output to the second signal processing circuit 30. When outputting a moving image, the second signal processing circuit 30 performs predetermined horizontal interpolation and vertical interpolation on the Y, U and V data (moving image data) from the DRAM 24 so as to match the display screen size of the LCD 34. Then, the moving image data from the second signal processing circuit 30 is converted into an analog signal by the D/A converter 32, applied to the LCD 34, and output from the output terminal 36. Therefore, a moving image with improved image quality is output from the LCD 34.

**[0014]** When the shutter button 40 is pressed by the operator, the system controller 42 controls the CCD imager 14 to perform so-called all-pixel reading. As a result, the CCD imager 14 outputs a pixel signal for each line. Since the CCD imager 14 is equipped with a mosaic color filter, Cy and Ye are alternately output on the odd lines and Mg and G are alternately output on the even lines. The CDS/AGC circuit 16 performs noise removal and level adjustment on the pixel signal as described above, and the A/D converter 18 converts the pixel signal from the CDS/AGC circuit 16 into digital data, that is, pixel data. The CCD imager 14 is disabled after outputting a pixel signal for one frame, and the pixel data for one frame generated by the A/D converter 18 is directly processed without being processed by the first signal processing circuit 20. It is given to the bus 22 and written in the memory area 24a by the memory control circuit 26.

**[0015]** The CPU 28 YUV-converts the pixel data in the memory area 24a according to the equations 1 to 3 using the work area 24b, compresses the converted Y, U and V data, that is, the photographed image data according to the JPEG format, and compresses the compressed data. Is written in the memory card 46. In the color separation and YUV conversion described above, the data of Cy, Mg, Ye and G of 4 pixels of 2×2 adjacent to each other is used to create the Y, U and V data of one pixel among the 4 pixels. This will yield Y, U and V data for each of all pixels. The memory control circuit 26 also reads out the pixel data of Ye, Cy, Mg and G line by line from the memory area 24a and supplies them to the second signal processing circuit 30. When the shutter button 40 is pressed, the second signal processing circuit 30 performs color separation and YUV conversion on this pixel data according to Formulas 1 to 3, whereby a captured image (freeze image) is output from the LCD 34. .

**[0016]** When the operator presses the play button 49, the CPU 28 reads desired compressed data from the memory card 46 and decompresses the compressed data using the work area 24b. The expanded photographed image data (YUV data) is expanded in the memory area 24a and then read. The second signal processing circuit 30 performs horizontal interpolation and vertical interpolation on the Y, U, and V data, and thereby a reproduced image with improved image quality is displayed on the LCD 34.

**[0017]** As the memory card 46, for example, when a template card in which the template image shown in FIG. 2A is prepared and a template code is written is used, the operator operates the reproduction mode setting button 48 to change the standard reproduction mode and Either one of the card function playback modes can be set. In the standard reproduction mode, the operator operates the + button 54 or the-button 56 to read out any one of the image data recorded in the memory card 46, and the reproduced image is displayed on the LCD 34 in the same manner as described above. To be done. That is, if the template image shown in FIG. 2A and the photographed image shown in FIG. 2B are recorded in the memory card 46, one of the images is output from the LCD 34. On the other hand, when the card function reproduction mode is set, the operator operates the + button 54, the-button 56, and the selection button 52 to combine the template image and the captured image, as shown in FIG. 2C. Can be generated.

**[0018]** If a binarized card in which a binarized code is written is used as the memory card 46, title image data as shown in FIG. 3A and captured image data as shown in FIG. By synthesizing, a synthetic image as shown in FIG. 3C can be generated. With the title image data shown in FIG. 3A, the operator sets the shooting mode to the title image mode with the shooting mode setting button 51, and the subject with the characters as shown in FIG. Obtainable.

**[0019]** Note that the template image data and the title image data are stored in an image file with the file name "syn0000S.jpg" (S is an integer), and the captured image data and the composite image data have the file name "pic0000P.jpg" (P is an integer) image file. The CPU 28 performs the above-mentioned operation according to the program stored in the flash memory 38. Of these, the operation when the card function reproduction mode is set follows the flowcharts shown in FIGS. 4 and 5. That is, the CPU 28 first determines in step S1 whether or not the template code or the binary code is present in the memory card 46, and if "NO", returns to the standard reproduction mode. That is, if the desired memory card is not mounted, the card function reproduction mode is not set even if the operator operates the reproduction mode setting button 48. If "YES" in the step S1, the CPU 28 resets the count value S of the syn counter 28a in a step S3, and determines in a step S5 whether or not the image file "syn0000S.jpg" exists. Then, if "NO", the process returns to step S3, but if "YES", the data of the image file is developed in the memory area 24a of the DRAM 24 and the desired image is displayed on the LCD 34 in step S7.

**[0020]** Subsequently, the CPU 28 determines in step S9 whether the selection button 53 has been pressed, and if "NO", determines in step S11 whether the + button 54 or the-button 56 has been pressed. If neither the + button 54 nor the-button 56 is pressed, the process returns to step S9, whereby the LCD 34 continues to display the same image. On the other hand, if the + button 54 or the-button 56 is pressed, the CPU 28 changes the count value S of the syn counter 28a according to the button operation in step S13, and returns to step S5. As a result, the image displayed on the LCD 34 is switched. When the operator presses the selection button 53, the CPU 28 advances the process from step S9 to S15. In this way, first, the desired template image data or title image data is held in the memory area 24a of the DRAM 24.

**[0021]** In step S15, the CPU 28 resets the count value P of the pic counter 28b, and then in step S17, it is determined whether or not the image file "pic0000P.jpg" exists in the memory card 46. If "NO" here, the process returns to step S15, but if "YES", the image data of the image file is developed in the work area 24b of the DRAM 24 and the desired image is displayed on the LCD 34 in step S19. Thereafter, the CPU 28 determines in step S21 whether the selection button 53 has been pressed, and if "NO", determines in step S23 whether the + button 54 or the-button 56 has been pressed. If "NO", the process returns to step S21, but if "YES", the count value P is changed in step S25, and the process returns to step S17.

**[0022]** That is, after the template image data or the title image data is selected, the CPU 28 outputs the desired captured image data from the LCD 34 and waits for the operator's selection. When the operator finds a desired photographed image and presses the selection button 53, the CPU 28 determines "YES" in step S21, and combines the two selected images in step S27.

**[0023]** More specifically, when synthesizing the template image data and the captured image data, the captured image data developed in the work area 24b is overwritten with the template image data in the memory area 24a. In the case of the template image shown in FIG. 2(A), since the data does not exist in the portion other than the curtain, the photographed image data is not completely erased at the time of overwriting, and the composite image is as shown in FIG. 2(B). Becomes

**[0024]** On the other hand, when synthesizing the title image data and the photographed image data, the title image data is binary data having either "0" or "1", so that the work corresponding to the address having "1" is generated. Predetermined color data is overwritten on the address of the area 24b. Therefore, when the title image shown in FIG. 3A and the photographed image shown in FIG. 3B are combined, the combined image shown in FIG. 3C is obtained.

**[0025]** After that, the CPU 28 determines in step S29 whether or not the free space of the memory card 46 is sufficient. That is, the CPU 28 compares the data amount of the composite image data obtained in step S27 and stored in the work area 24b with the free space of the memory card 46. If "YES", the combined image data is recorded in the memory card 46 in step S31 and the process ends, but if "NO", the CPU 28 says "please replace the card" in step S33. Is displayed on the LCD 34. In response to this, when the operator replaces the memory card 46 and presses any button, the CPU 28 determines "YES" in the step S35, and in a step S37, the binary

code or Determine if template code exists. If "NO", a caution message "The card is wrong" is displayed on the LCD 34 in step S39, and the process returns to step S35. On the other hand, if it is determined in step S37 that the binary code or the template code exists, the CPU 28 returns the process to step S29 and repeats the same process as described above.

[0026] Therefore, if the newly installed memory card has the binarization code or the template code and has sufficient free space, the composite image data is recorded in the memory card. Referring to FIG. 6, memory card 46 is a template card in which template image data and photographed image data are recorded as shown in FIG. 6A, and this template card has a sufficient space. When the operator has a capacity and the desired template image data and standard image data are combined by the operator, the combined image data is recorded following the photographed image data as shown in FIG. 6B. The image file name of the composite image data has the same "pic" as the captured image data, and in this example, the image file name of the composite image data is "pic00003.jpg".

[0027] On the other hand, as shown in FIG. 7A, when the operator combines desired template image data and standard image data in a state where the memory card 46 has almost no free space, a warning message is displayed on the LCD 34. If the operator replaces a new memory card with only the template image data and then the composite image data is recorded on the newly installed memory card. That is, as shown in FIG. 7B, the combined image data is recorded following the template image data.

[0028] According to this embodiment, the composite image data is held in the DRAM 24 prior to the determination of the free space of the memory card 46, and when the memory card having the sufficient free space is attached, the composite image data is recorded in the memory card. By doing so, it is not necessary to recreate the composite image data, and complicated operations can be eliminated. If step S28 is provided prior to step S29 in FIG. 5 and the captured image data used for composition is erased at that step, the free space increases by the amount of the erased image data. It is possible to reduce the frequency of exchanging the memory card when creating.

[0029] The operation when step S28 is added as shown in FIG. 8 will be described with reference to FIGS. 9 and 10. When template image data and photographed image data are recorded in the memory card as shown in FIG. 9A, if the operator combines one of the template image data and the photographed image data, the photographed image data is It is erased, and then the composite image data is recorded as shown in FIG. 9B, for example. That is, the area where the composite image data was recorded is used for recording the composite image data.

[0030] On the other hand, when the template image data and the captured image data, and the combined image data are recorded as shown in FIG. 10A, one of the template image data and the standard image data is combined. Then, the standard image data is erased as shown in FIG. However, if the total free space after erasing is less than the data amount of the combined image data, the combined image data is recorded in the newly mounted memory card. That is, as shown in FIG. 10C, for example, the composite image data is recorded in the memory card in which only the template image data and the template image data are recorded.

[0031] As the memory card, various cards such as SSFDC (solid state floppy disk card) can be applied. In this embodiment, the description has been given using the complementary color filter in which Ye, Cy, Mg and G are arranged in a mosaic pattern, but a primary color filter in which R, G and B are arranged in a mosaic pattern may be used.

[0032] Brief description of the drawings

[0033] 1 is a block diagram showing an embodiment of the present invention.

[0034] 2A is an illustrative view showing a template image, FIG. 2B is an illustrative view showing a standard image, and FIG. 2C is an illustrative view showing a composite image.

[0035] 3A is an illustrative view showing a title image, FIG. 3B is an illustrative view showing a standard image, and FIG. 3C is an illustrative view showing a composite image.

[0036] 4 is a flowchart showing a part of the operation of FIG. 1 embodiment.

[0037] 5 is a flowchart showing another part of the operation of FIG. 1 embodiment.

[0038] 6 is an illustrative view showing a part of the operation of FIG. 1 embodiment.

[0039] 7 is an illustrative view showing another part of the operation of FIG. 1 embodiment.

[0040] 8 is a flowchart showing a part of the operation of another embodiment of the present invention.

[0041] 9 is an illustrative view showing a part of the operation of FIG. 8 embodiment.

[0042] 10 is an illustrative view showing another part of the operation of FIG. 8 embodiment.

[0043] Explanation of symbols

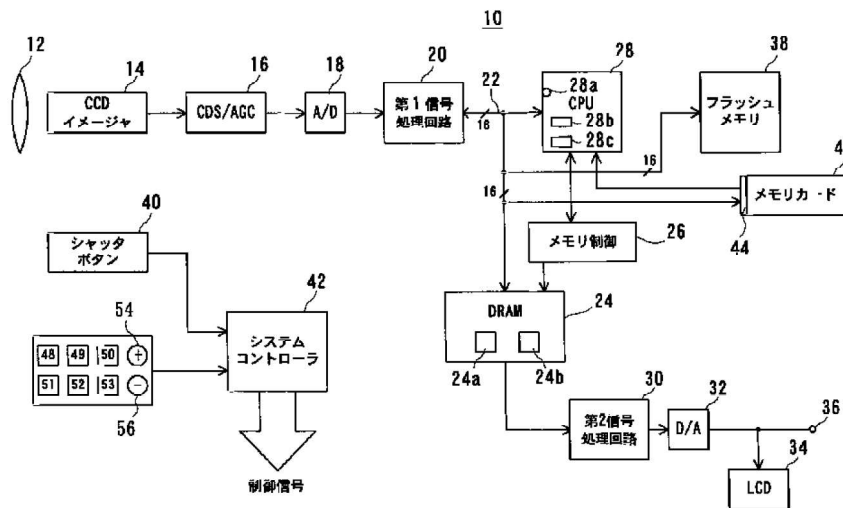
[0044] 10 ...デジタルカメラ24 ...DRAM28 ...CPU46 ...メモリカード

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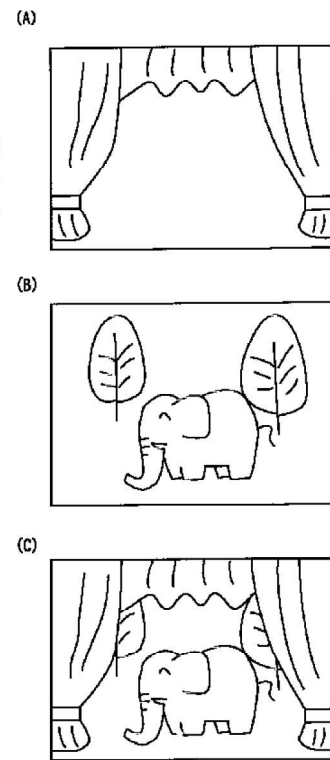
*The wording below is an initial machine translation of the original publication. To generate a version using the latest translation technology, go to the original language text and use Patent Translate.*

1. (a) combine a plurality of desired image data recorded in the memory card, (b) compare the data amount of the combined image data obtained in step (a) with the free space of the memory card, c) recording the composite image data in the memory card when the data amount is less than or equal to the free space, (d) generating a warning when the data amount is larger than the free space, and (e) another memory card The method for recording image data, wherein the step returns to the step (b) when is attached.
2. The image data recording method according to claim 1, wherein none of the plurality of image data is erased in the step (a).
3. (f) The method of recording image data according to claim 1, wherein at least one of the plurality of image data is erased prior to the step (b).
4. A synthesizing unit for synthesizing a plurality of desired image data recorded on the memory card, a comparing unit for comparing the data amount of the synthetic image data output from the synthesizing unit with the free space of the memory card, and the data amount is A digital camera comprising: recording means for recording the composite image data in the memory card when the free space is less than or equal to the free space; and generating means for issuing a warning when the data amount is larger than the free space.

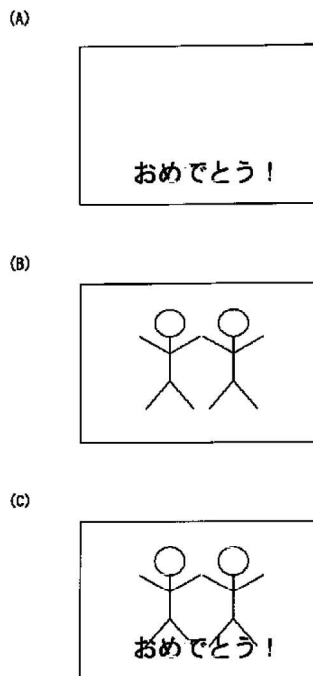
【図1】



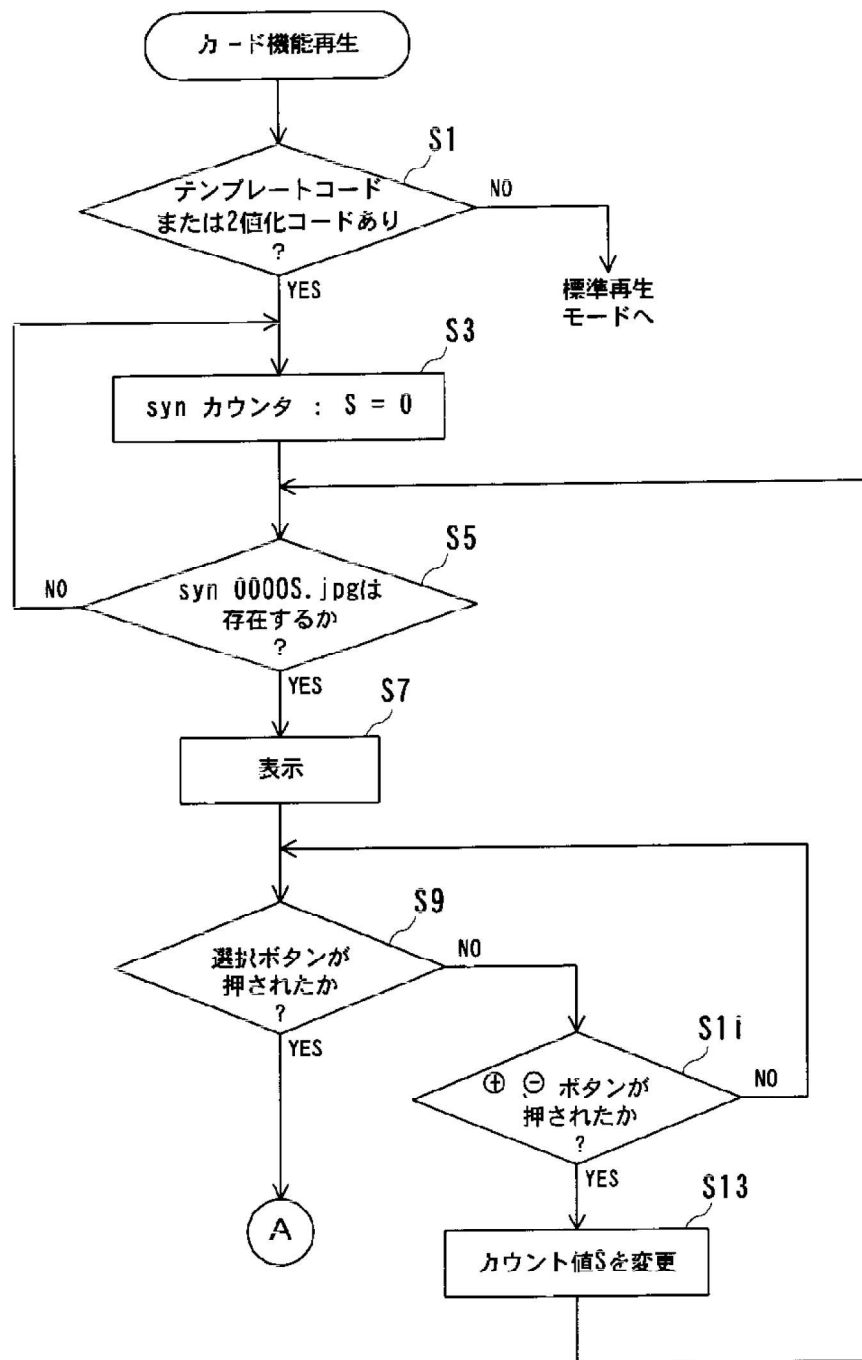
【図2】



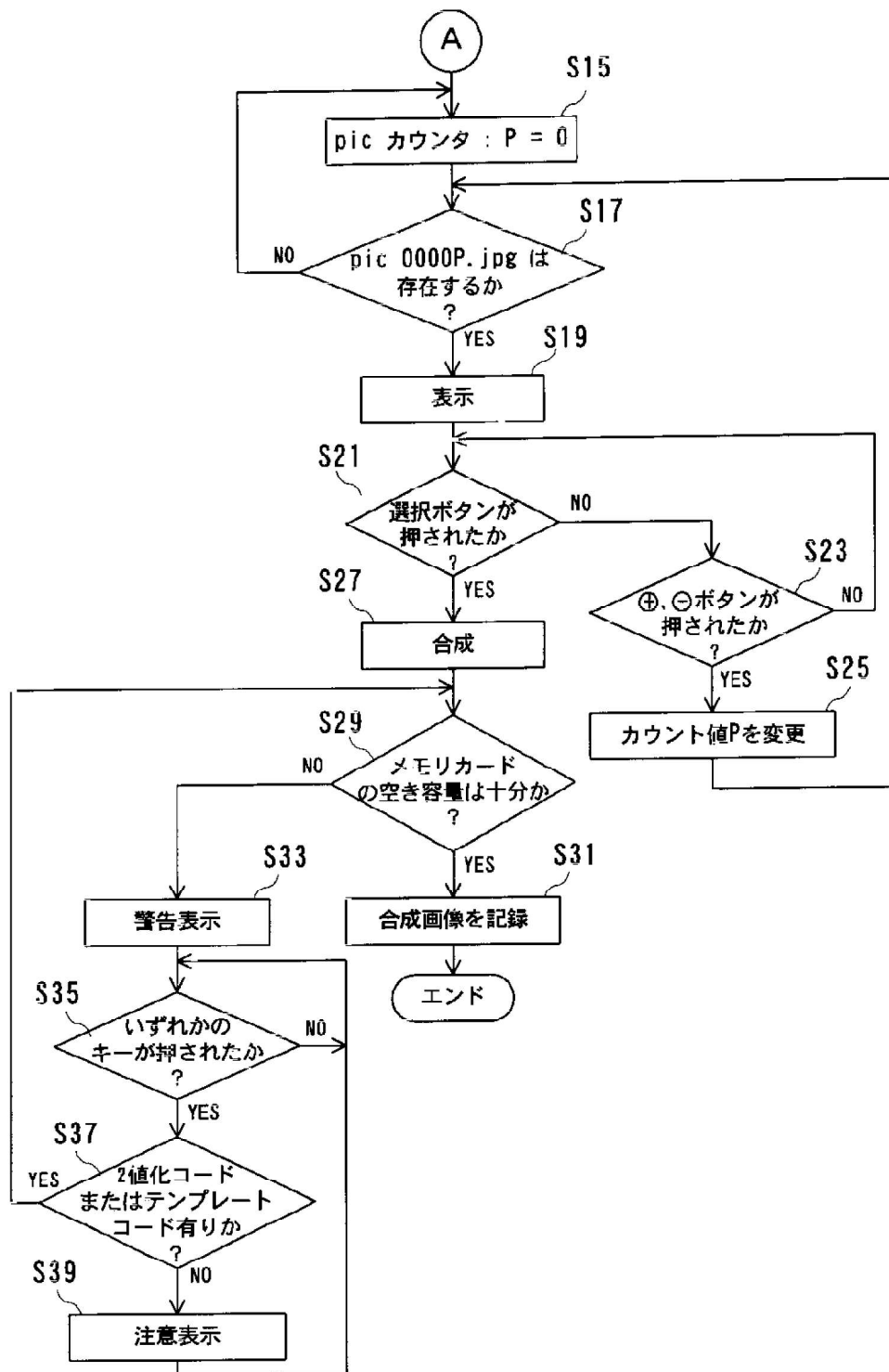
【図3】



【図4】



【図5】



【図6】

(A)

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| テンプレート画像① |
| テンプレート画像② |
| 画像①       |
| 画像②       |
|           |

(B)

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|---------------|
| テンプレート画像①     |
| テンプレート画像②     |
| 画像①           |
| 画像②           |
| 画像③<br>(合成画像) |
|               |

【図7】

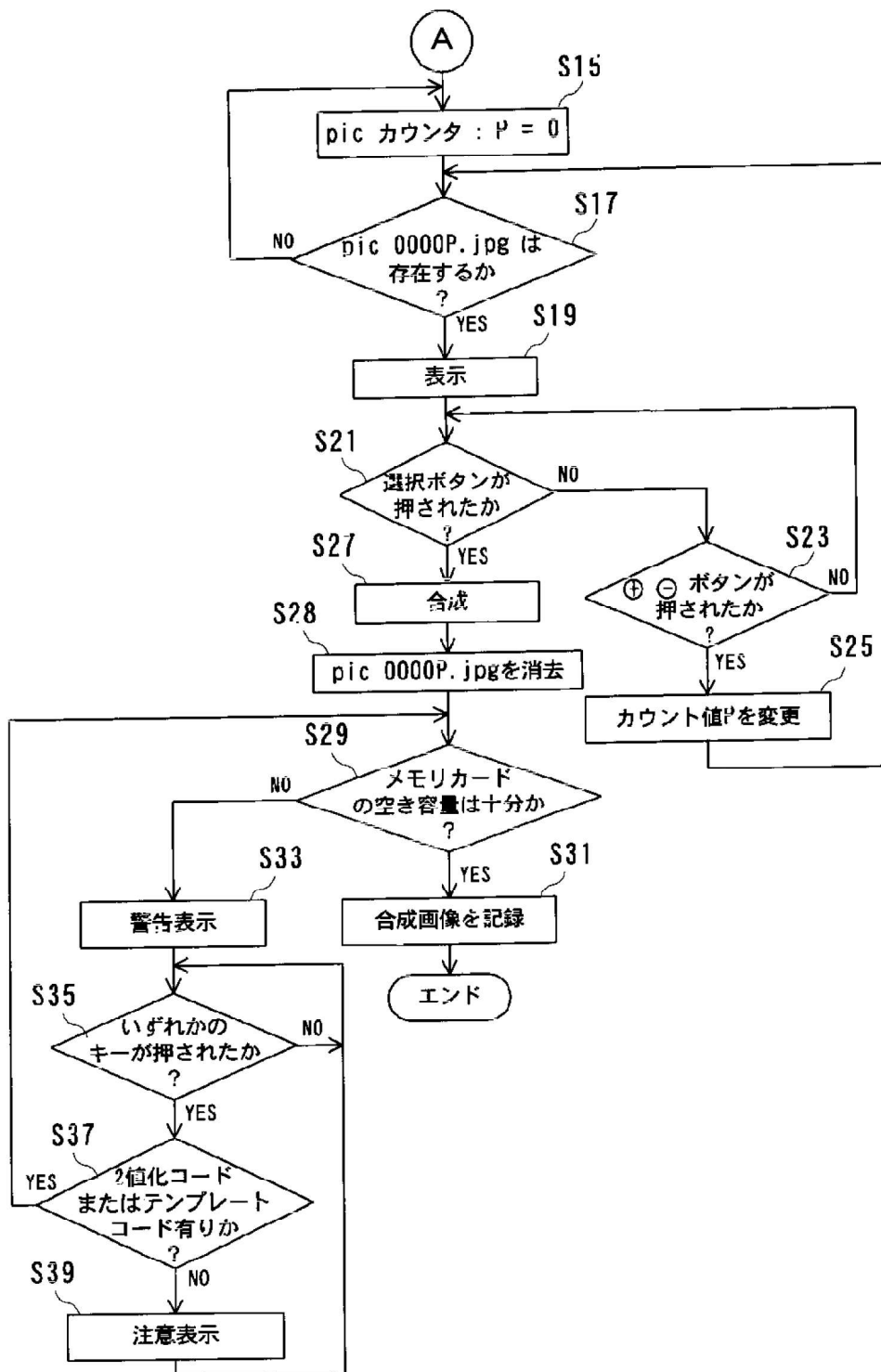
(A)

|               |
|---------------|
| テンプレート画像①     |
| テンプレート画像②     |
| 画像①           |
| 画像②           |
| 画像③<br>(合成画像) |
| 画像④           |
| 画像⑤           |
|               |

(B)

|               |
|---------------|
| テンプレート画像③     |
| テンプレート画像④     |
| 画像⑥<br>(合成画像) |
|               |

【図8】



【図9】

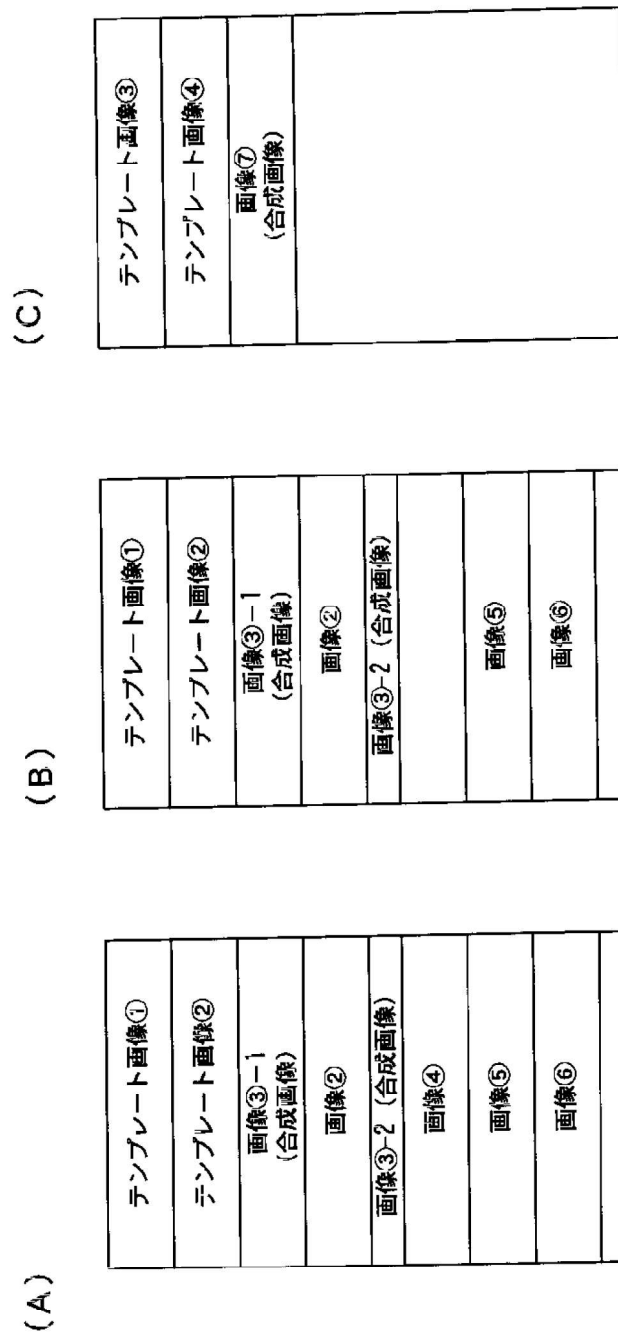
(A)

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|-----------|
| テンプレート画像① |
| テンプレート画像② |
| 画像①       |
| 画像②       |
|           |

(B)

|                 |
|-----------------|
| テンプレート画像①       |
| テンプレート画像②       |
| 画像③-1<br>(合成画像) |
| 画像②             |
| 画像③-2 (合成画像)    |
|                 |

【図10】



フロントページの続き

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