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(54) **INFORMATION PROCESSING APPARATUS, IMAGE FORMING APPARATUS, AND NON-TRANSITORY COMPUTER READABLE MEDIUM**

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(57) **ABSTRACT**

An information processing apparatus includes: a display that displays an overlapping image including plural images which are partially overlapped and are mutually deviated; a gaze detection unit that detects a gaze of an operator, which is fixed on the overlapping image; a motion detection unit that detects a specific motion that is made when the operator performs an operation on the overlapping image; and a display control unit that changes an arrangement of the plural images included in the overlapping image in a case where the gaze fixed on the overlapping image is detected and where the specific motion is detected.

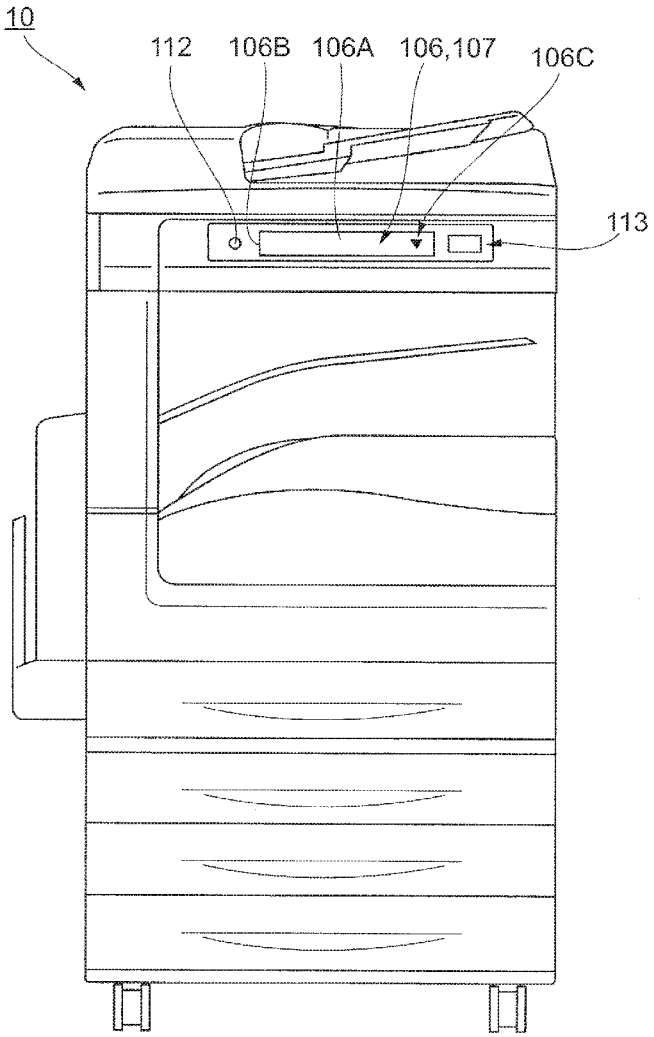


FIG. 1

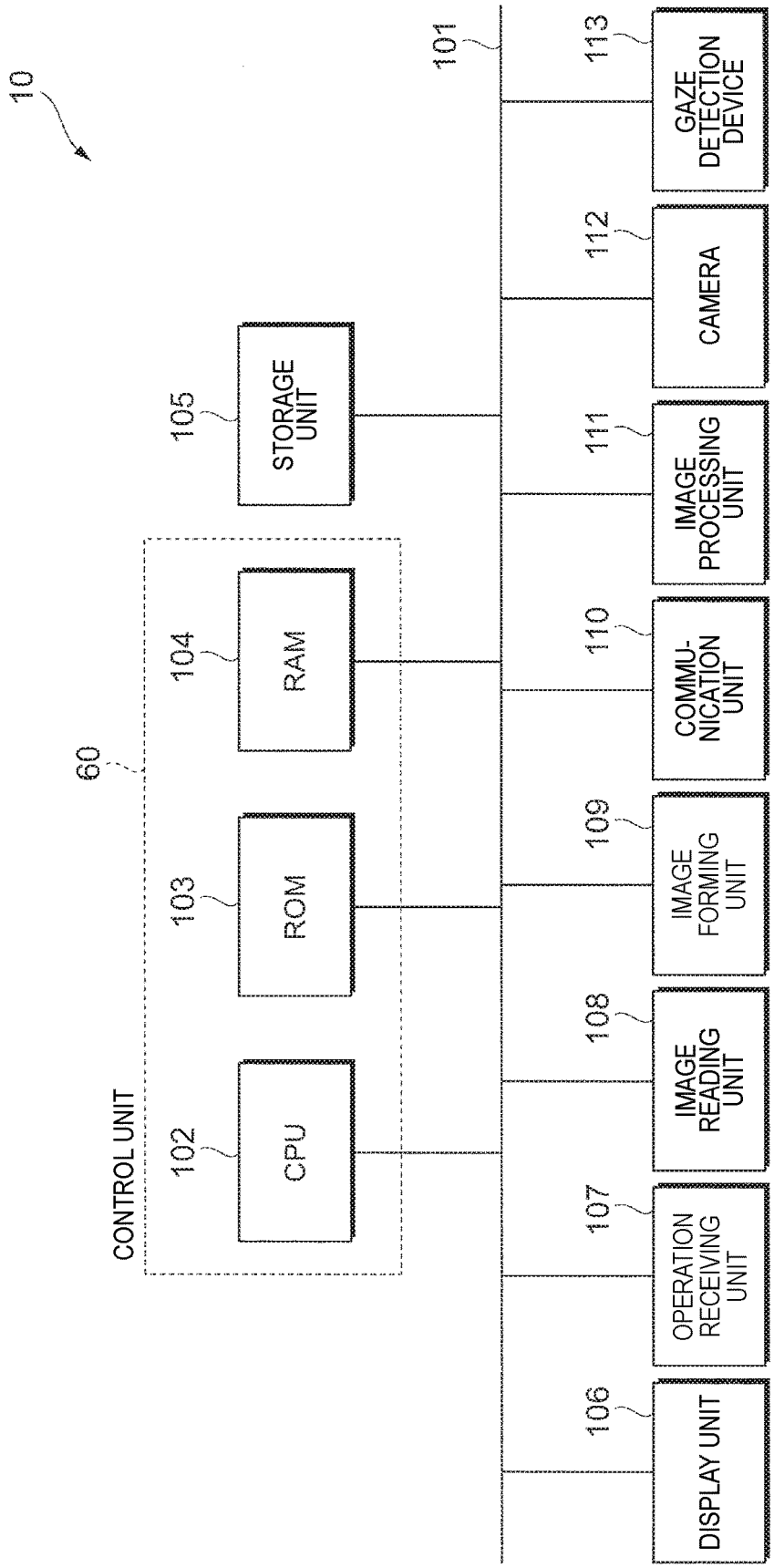

10
101
113
GAZE DETECTION DEVICE
112
CAMERA
111
IMAGE PROCESSING UNIT
110
COMMU-NICATION UNIT
109
IMAGE FORMING UNIT
108
IMAGE READING UNIT
107
OPERATION RECEIVING UNIT
106
DISPLAY UNIT
105
STORAGE UNIT
60
CONTROL UNIT
104
RAM
103
ROM
102
CPU

FIG. 2

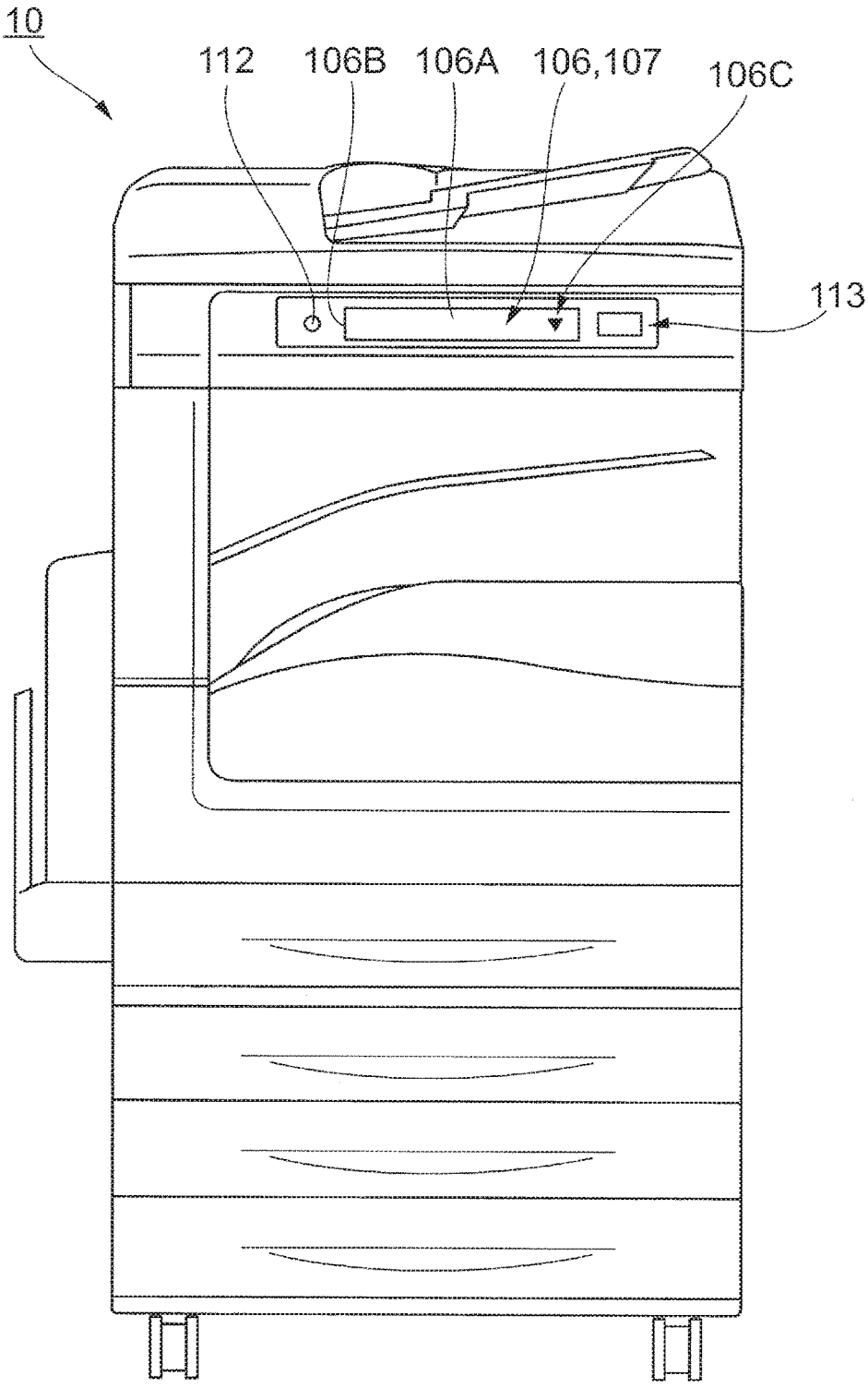


FIG. 3

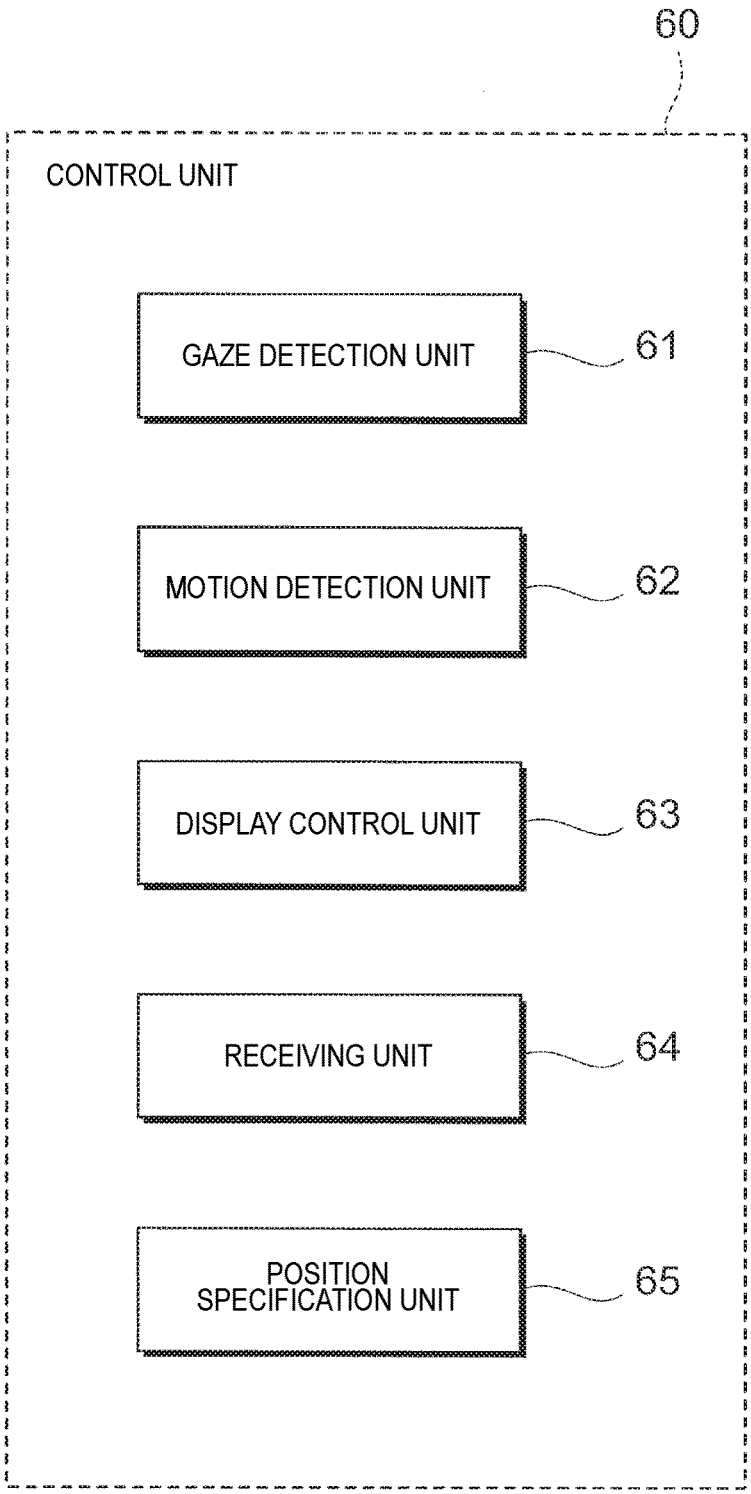

60
CONTROL UNIT
GAZE DETECTION UNIT
61
MOTION DETECTION UNIT
62
DISPLAY CONTROL UNIT
63
RECEIVING UNIT
64
POSITION SPECIFICATION UNIT
65

FIG. 4

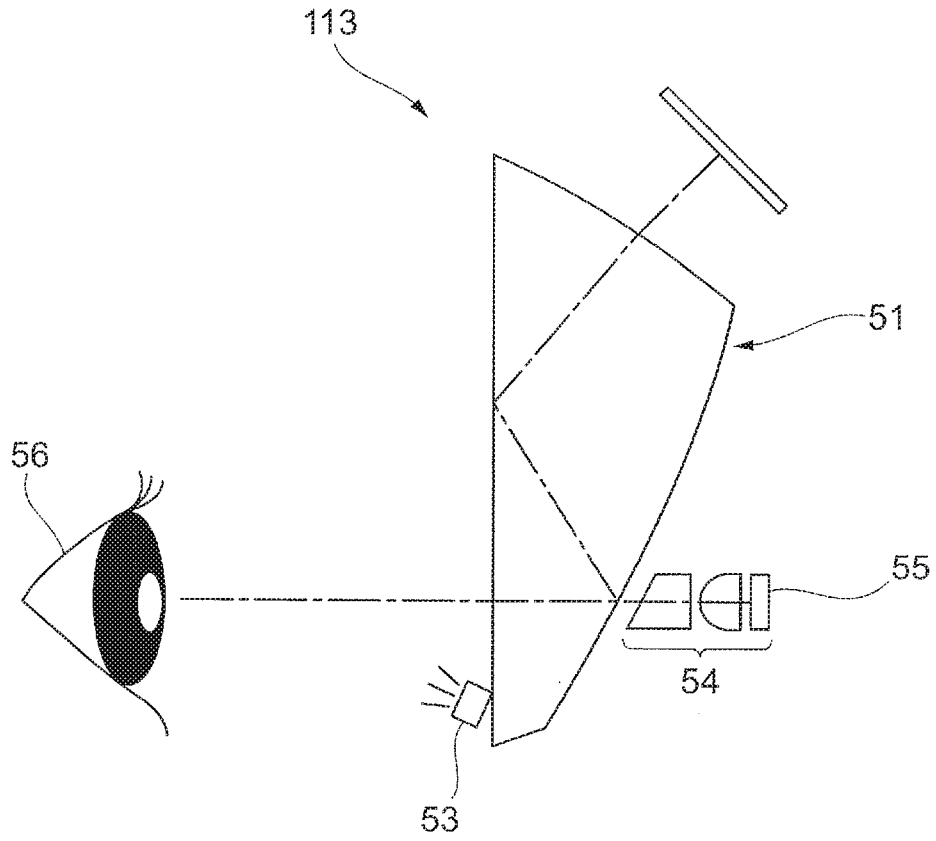


FIG. 5A

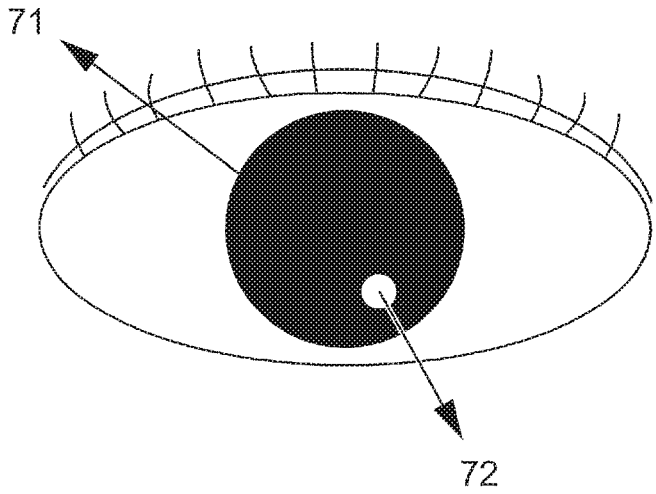


FIG. 5B

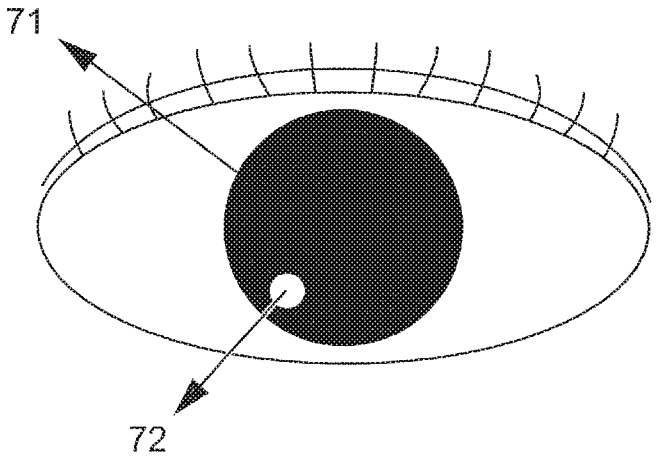


FIG. 6A

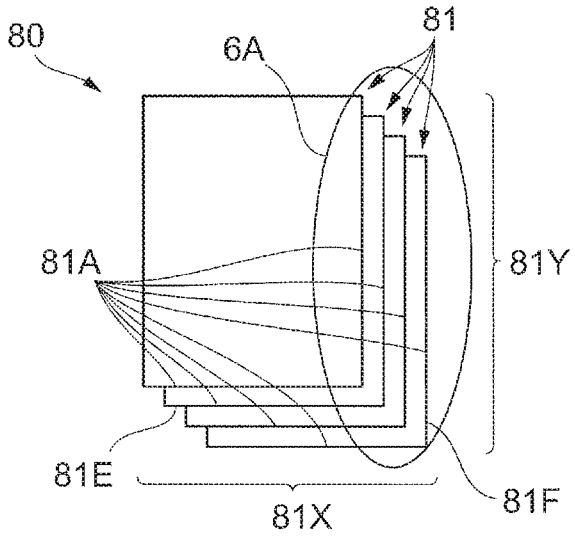


FIG. 6B

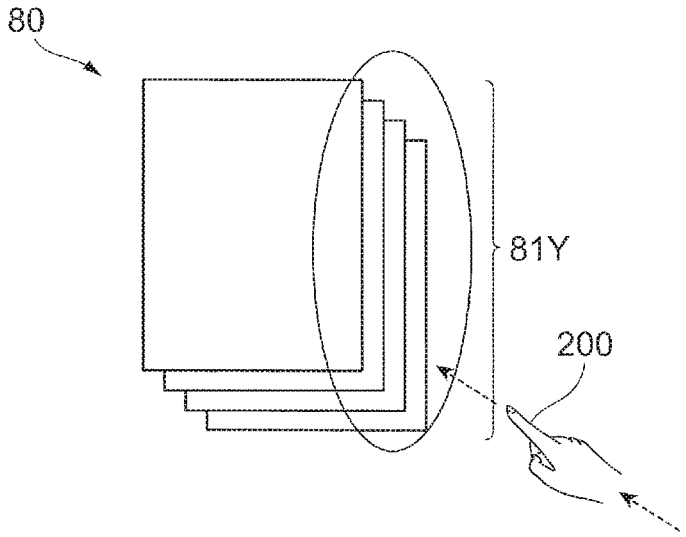


FIG. 6C

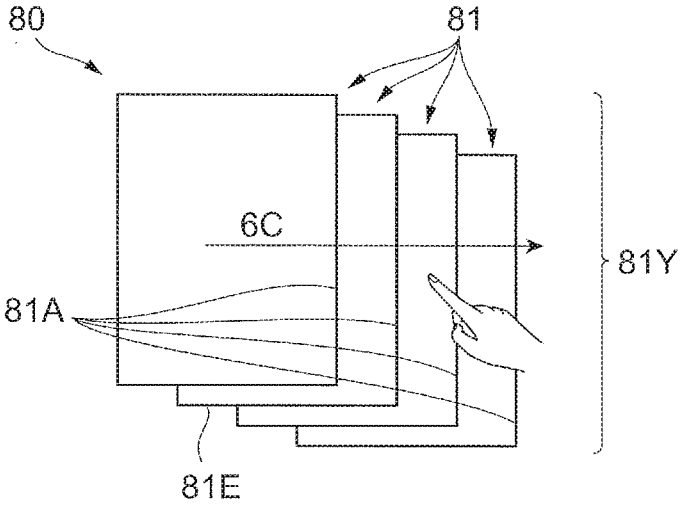


FIG. 7A

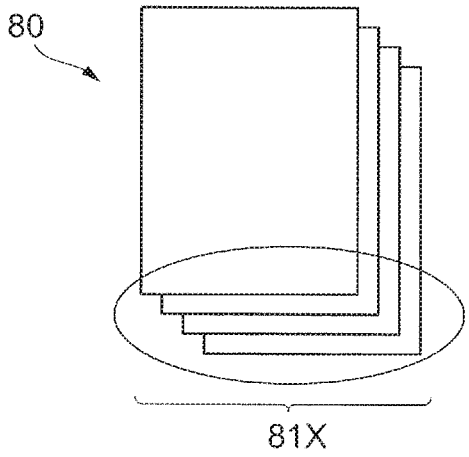


FIG. 7B

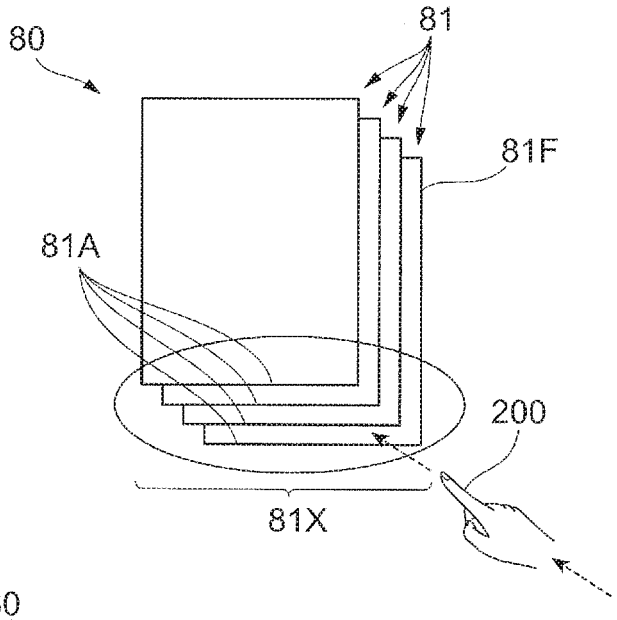


FIG. 7C

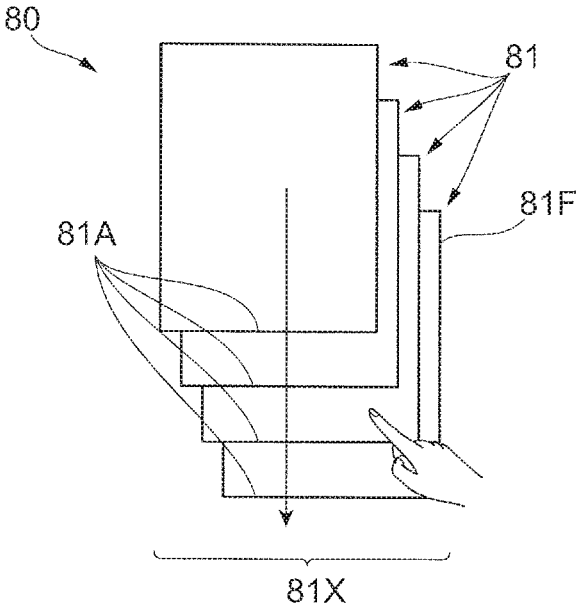


FIG. 8A

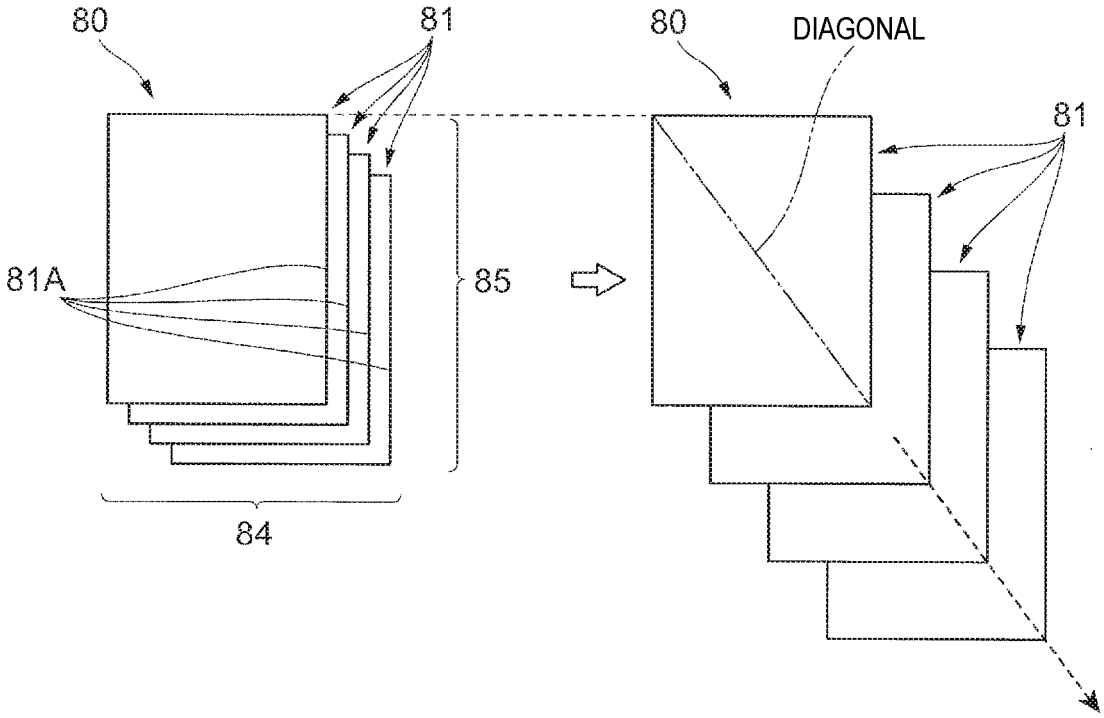


FIG. 8B

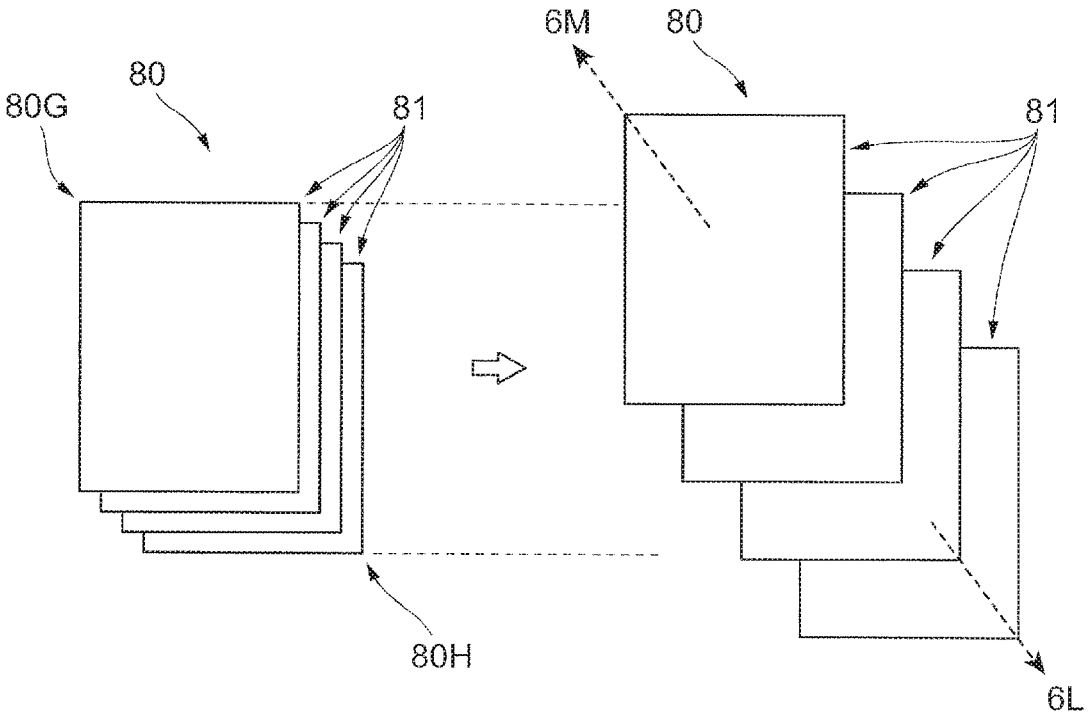


FIG. 9

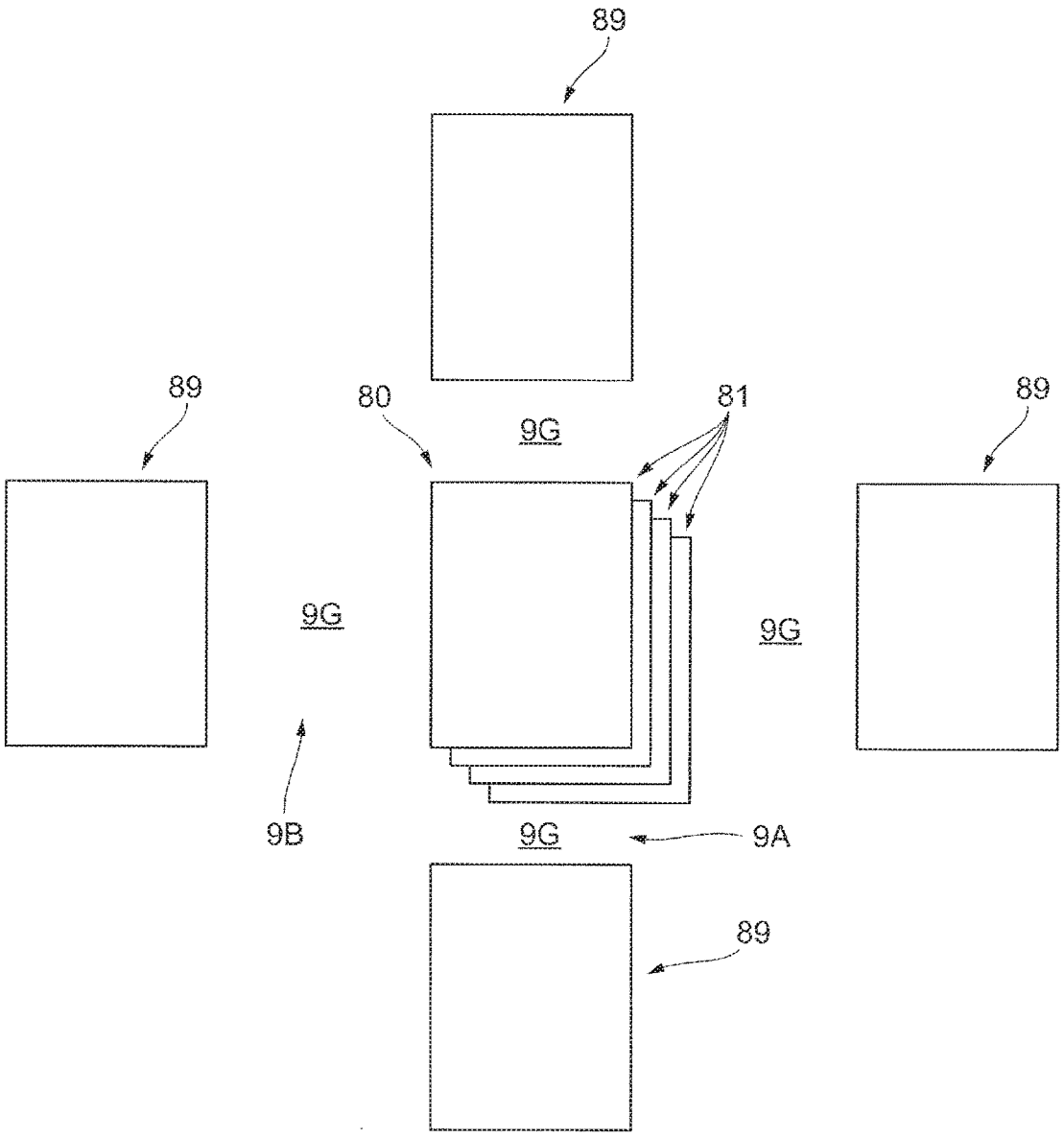


FIG. 10

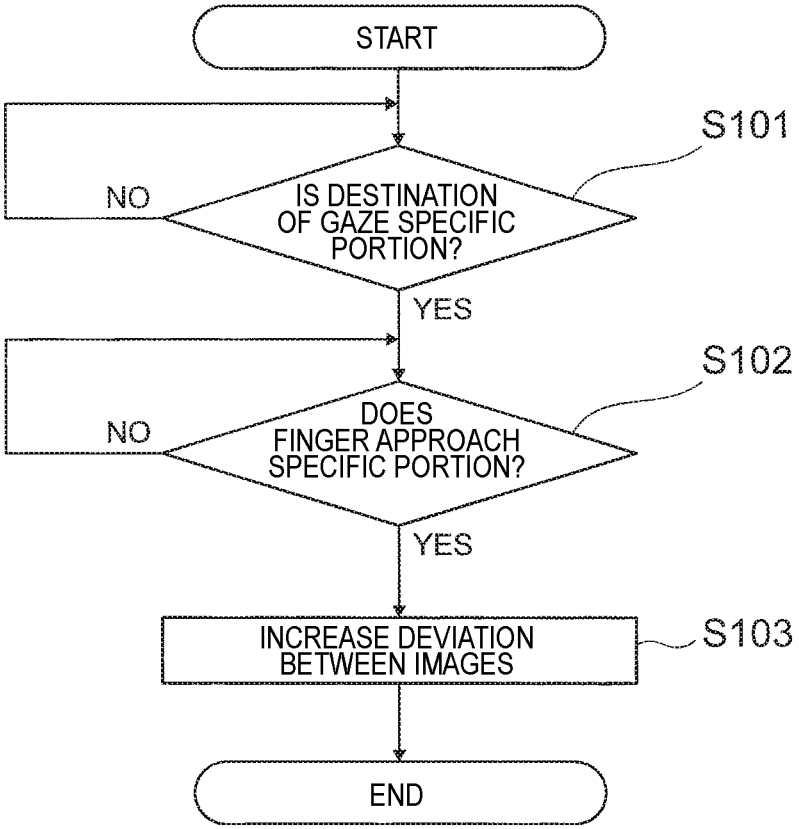

START
S101
IS DESTINATION OF GAZE SPECIFIC PORTION?
NO
YES
S102
DOES FINGER APPROACH SPECIFIC PORTION?
NO
YES
INCREASE DEVIATION BETWEEN IMAGES
S103
END

FIG. 11A

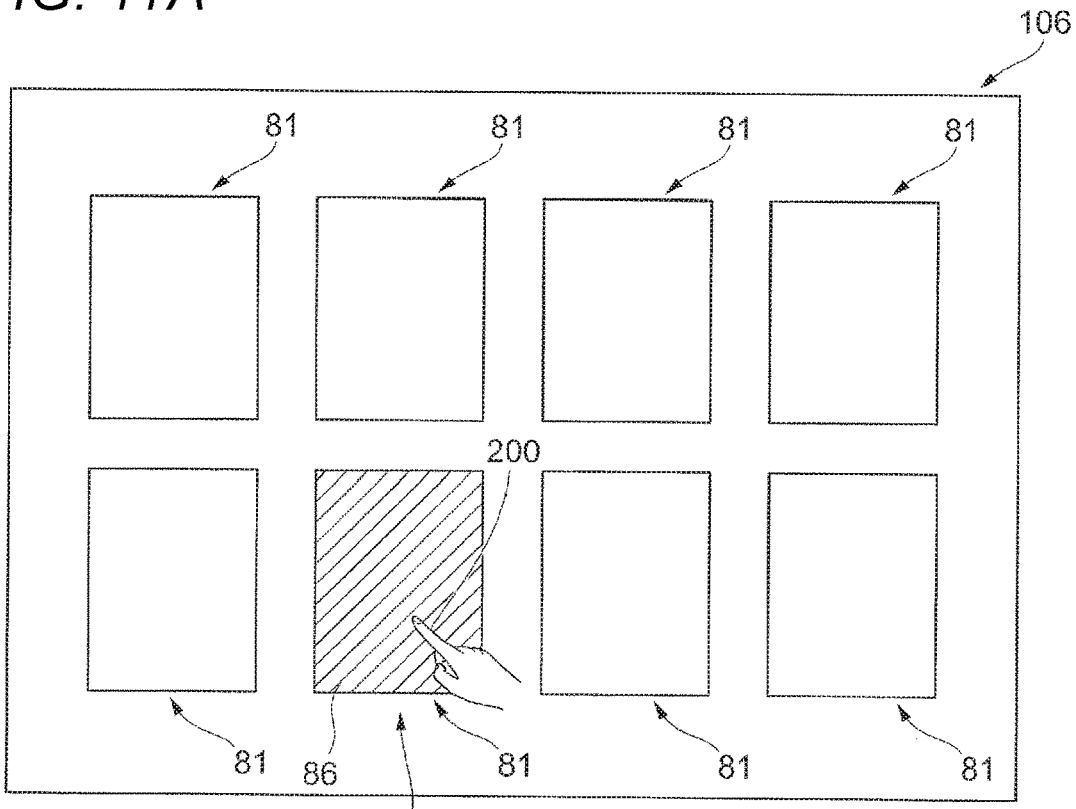


FIG. 11B

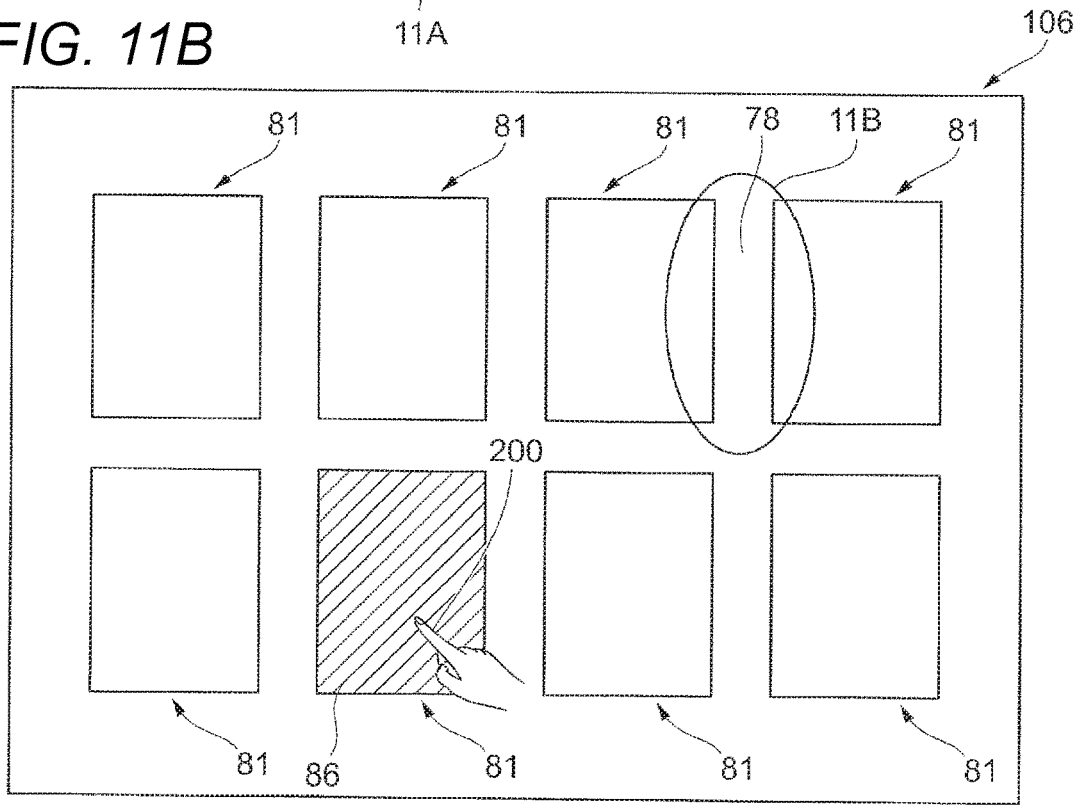


FIG. 12A

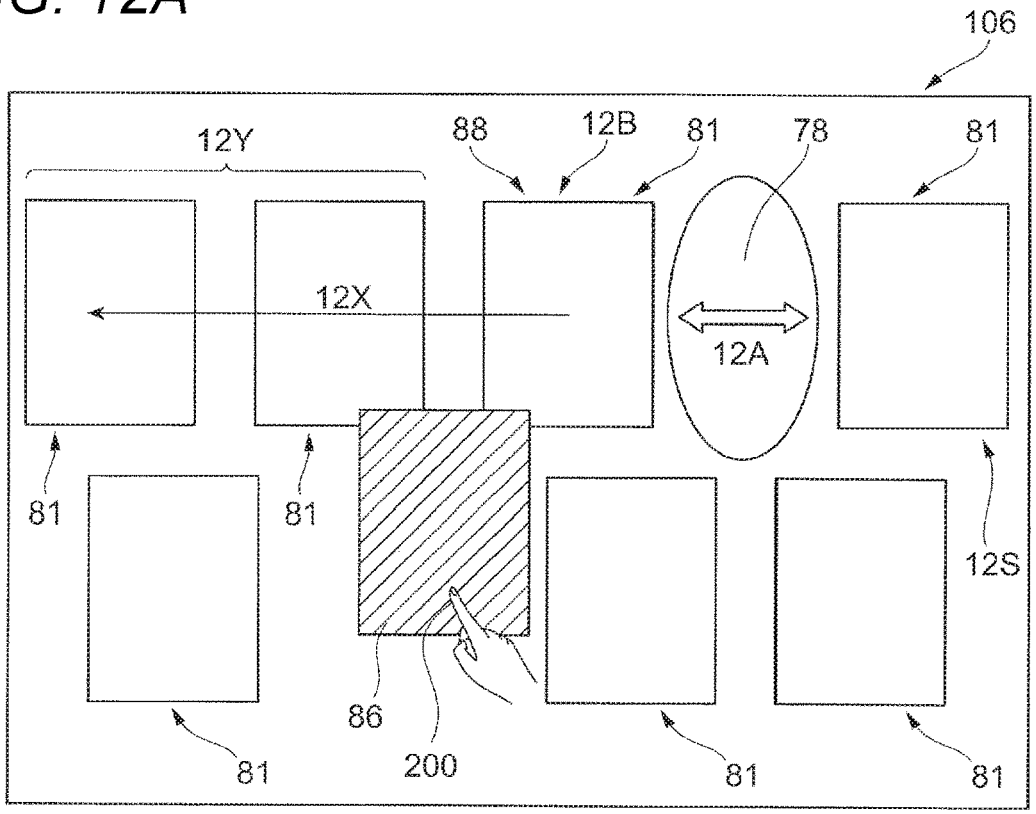


FIG. 12B

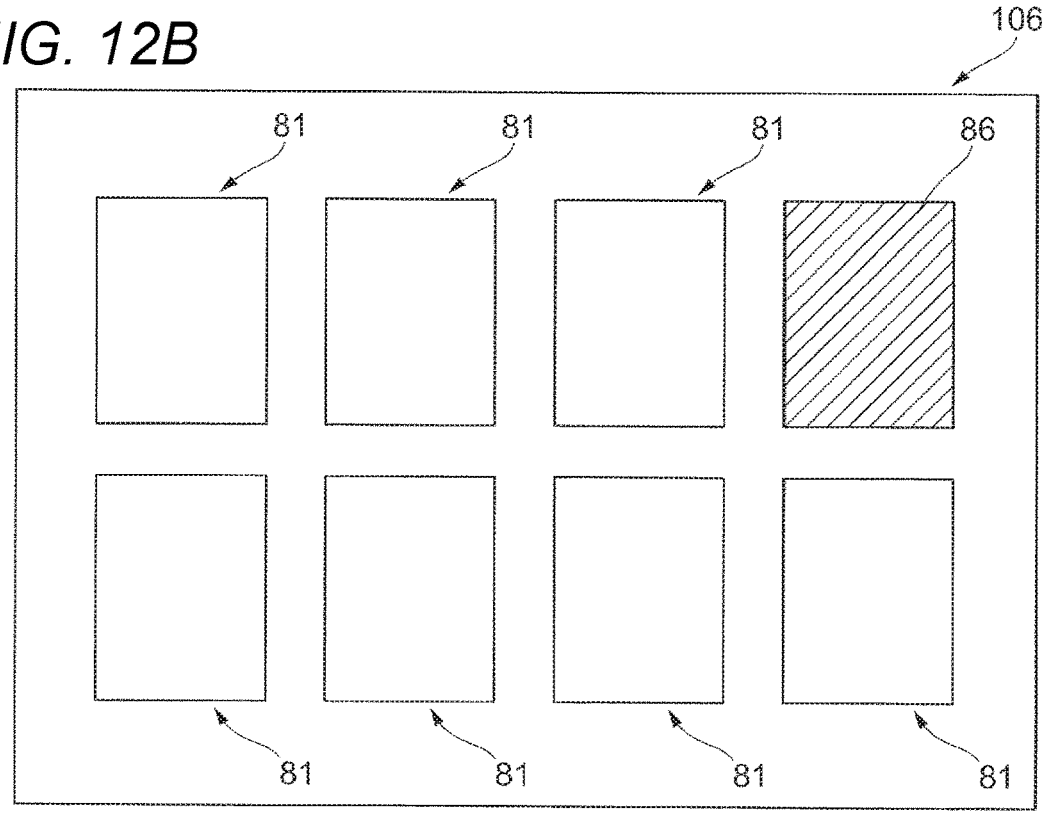


FIG. 13A

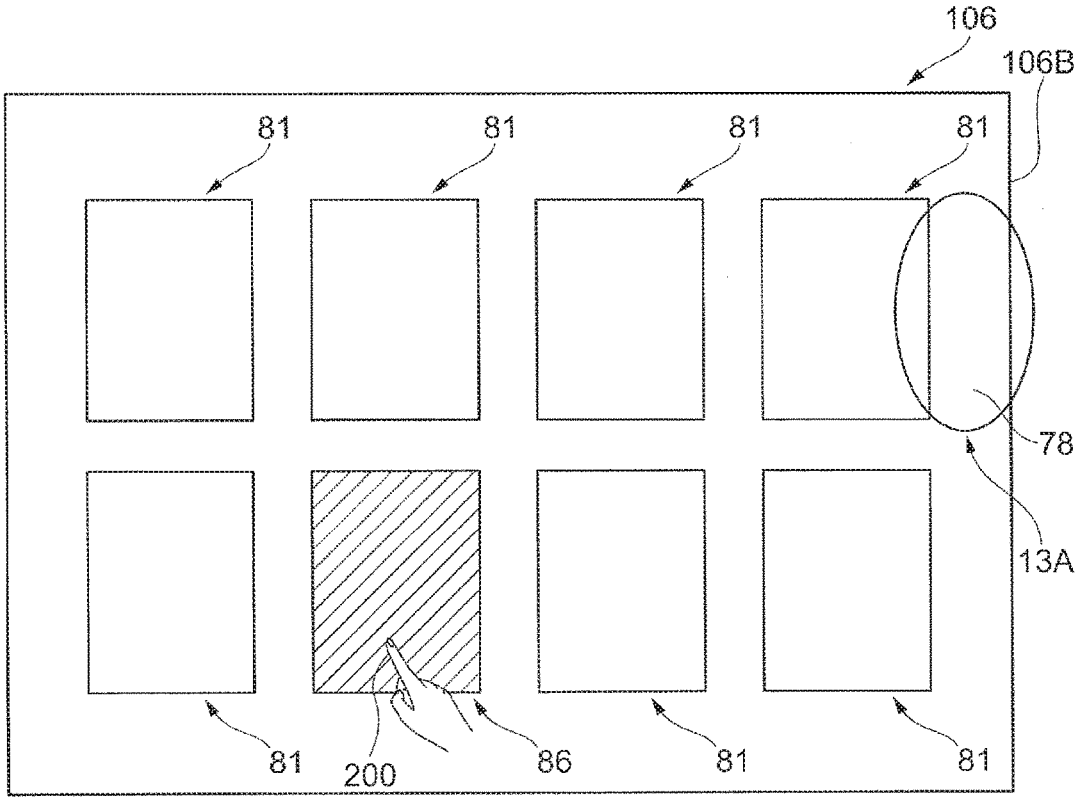


FIG. 13B

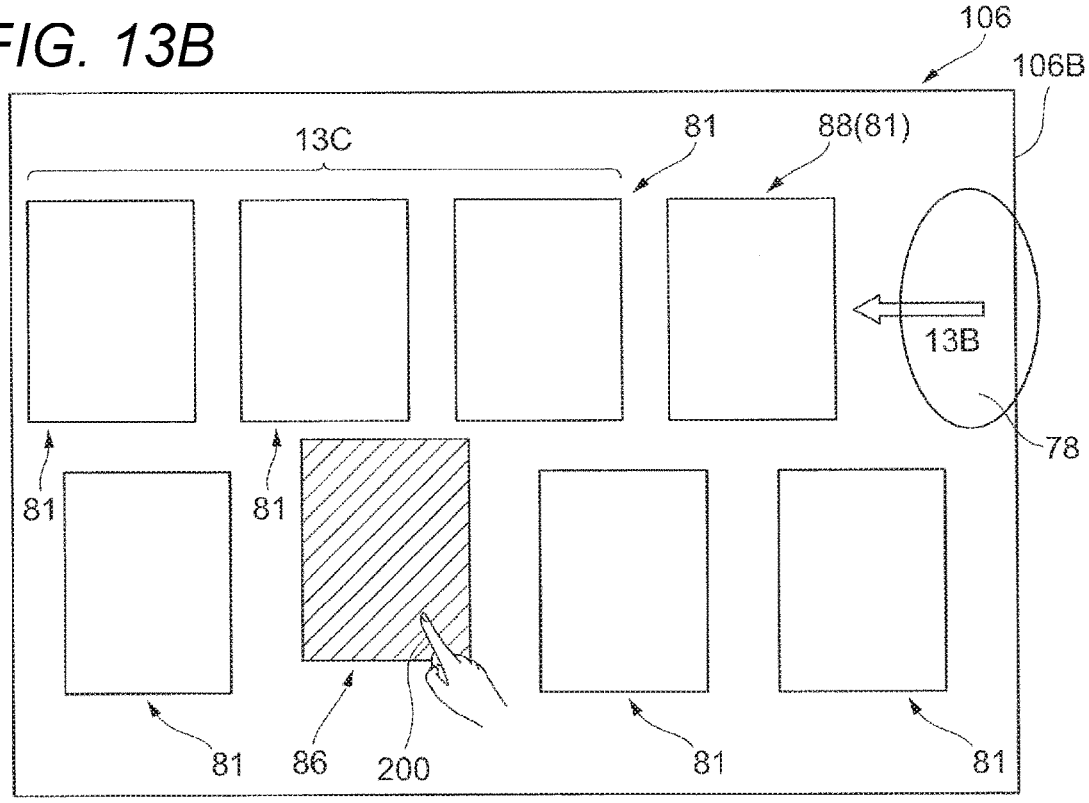
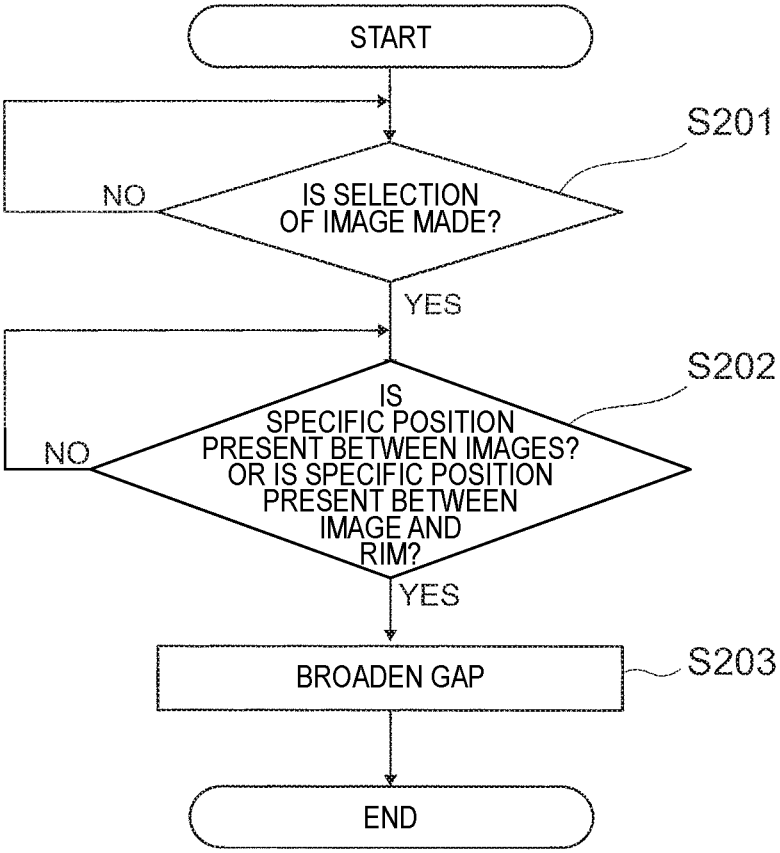


FIG. 14


START
S201
IS SELECTION OF IMAGE MADE?
NO
YES
S202
IS SPECIFIC POSITION PRESENT BETWEEN IMAGES? OR IS SPECIFIC POSITION PRESENT BETWEEN IMAGE AND RIM?
NO
YES
BROADEN GAP
S203
END

INFORMATION PROCESSING APPARATUS, IMAGE FORMING APPARATUS, AND NON-TRANSITORY COMPUTER READABLE MEDIUM

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application is based on and claims priority under 35 USC 119 from Japanese Patent Application No. 2017-170612 filed Sep. 5, 2017.

BACKGROUND

Technical Field

[0002] The present invention relates to an information processing apparatus, an image forming apparatus, and a non-transitory computer readable medium.

Related Art

[0003] JP-A-2011-186742 discloses an apparatus that includes a detection unit that detects that one object overlaps with any other object, and a display unit that displays, when the detection unit detects that the one object overlaps with the any other object, the any other object shifting from its alignment position.

SUMMARY

[0004] In an information processing apparatus that includes a display unit, for example, an operator performs an operation on the display unit, and thus an image on the display unit is selected, or the image on the display unit is moved. At this point, for example, when images on the display unit are arranged in a manner that approaches each other, an error in an operation may occur. An image which is different from an image that is originally intended to be selected may be selected, or an image may be moved to a portion which is different from an originally intended portion.

[0005] Aspects of non-limiting embodiments of the present disclosure relate to reduce an error in an operation performed by an operator on an image which is displayed on a display unit, when the operator performs the operation on the image on the display unit, compared with a case where processing that changes an arrangement of images is not performed.

[0006] Aspects of certain non-limiting embodiments of the present disclosure overcome the above disadvantages and/or other disadvantages not described above. However, aspects of the non-limiting embodiments are not required to overcome the disadvantages described above, and aspects of the non-limiting embodiments of the present disclosure may not overcome any of the disadvantages described above.

[0007] According to an aspect of the present disclosure, there is provided an information processing apparatus including: a display that displays an overlapping image including plural images which are partially overlapped and are mutually deviated; a gaze detection unit that detects a gaze of an operator, which is fixed on the overlapping image; a motion detection unit that detects a specific motion that is made when the operator performs an operation on the overlapping image; and a display control unit that changes an arrangement of the plural images included in the overlapping image in a case where the gaze fixed on the overlapping image is detected and where the specific motion is detected.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Exemplary embodiments of the present invention will be described in detail based on the following figures, wherein:

[0009] FIG. **1** is a diagram illustrating each function unit that constitutes an image forming apparatus;

[0010] FIG. **2** is a front-view diagram of the image forming apparatus;

[0011] FIG. **3** is a block diagram illustrating a functional configuration of a control unit;

[0012] FIG. **4** is a diagram for describing a configuration of a gaze detection device.

[0013] FIGS. **5**A and **5**B are diagrams describing the configuration of the gaze detection apparatus;

[0014] FIGS. **6**A, **6**B and **6**C are diagrams describing display processing;

[0015] FIGS. **7**A, **7**B and **7**C are diagrams illustrating other display processing;

[0016] FIGS. **8**A and **8**B are diagrams illustrating other display processing on a display unit;

[0017] FIG. **9** is a diagram illustrating a display example on the display unit;

[0018] FIG. **10** is a flowchart illustrating a flow for processing that is described with reference to FIGS. **6**A to **9**;

[0019] FIGS. **11**A and **11**B are diagrams illustrating other display processing on the display unit;

[0020] FIGS. **12**A and **12**B are diagrams illustrating other display processing on the display unit;

[0021] FIGS. **13**A and **13**B are diagrams illustrating other processing on the display unit; and

[0022] FIG. **14** is a flowchart illustrating a flow for processing that is illustrated in FIGS. **11**A to **13**B.

DETAILED DESCRIPTION

[0023] Exemplary embodiments of the present invention will be described below with reference to the accompanying drawings.

[0024] FIG. **1** is a diagram illustrating each functional unit that constitutes an image forming apparatus **10** according to an exemplary embodiment.

[0025] FIG. **2** is a front-view diagram of the image forming apparatus **10**.

[0026] As illustrated in FIG. **1**, each functional unit that constitutes the image forming apparatus **10** according to the present embodiment is connected to a bus **101**, and performs data transmission and reception through the bus **101**.

[0027] A display unit **106** as one example of a display displays an image and thus performs notification of information to an operator who operates the image forming apparatus **10**. The display unit **106**, as illustrated in FIG. **2**, is formed in a rectangular shape. Moreover, the display unit **106** has a display screen **106**A on which an image displayed, and a rim **106**B that surrounds the display screen **106**A.

[0028] An operation from a user is received by an operation receiving unit **107** (see FIGS. **1** and **2**). Specifically, the user's operation with respect to display content that is displayed on the display unit **106** is received by the operation receiving unit **107**.

[0029] At this point, the display unit **106** and the operation receiving unit **107**, for example, are configured with a touch panel type display. The display unit **106** and the operation receiving unit **107** are arranged in such a manner as to be overlapped on each other in terms of shape.

[0030] It is noted that, in the present embodiment, the case where the operation receiving unit **107** is configured with the touch panel type display is described, but that the operation receiving unit **107** may be configured with a pointing device such as a mouse.

[0031] In this case, when a user operates the pointing device, a pointer **106**C (see FIG. **2**) moves that is displayed on display unit **106**. Then, when the selection or the like of an image by the user is made, the pointer **106**C is positioned on an image on the display unit **106**, and then the user's operation (an operation such as clicking) with respect to the pointing device is performed.

[0032] The display unit **106** (see FIG. **1**) is controlled by a control unit **60**. Moreover, in the present embodiment, the user's operation with respect to the display content on the display unit **106** is received by the operation receiving unit **107**.

[0033] Then, in the present embodiment, according to the user's operation that is received by the operation receiving unit **107**, processing that corresponds to the operation is performed.

[0034] An image reading unit **108** (see FIG. **1**) is configured with a so-called scanning apparatus, reads an image on an original document that is set, and generates a reading image (image data) of the original document.

[0035] The image forming unit **109** as one example of an image forming unit, for example, uses an electrographic method, and forms a toner image in accordance with the image data, a paper sheet that is one example of a recording material. It is noted that, in the image forming unit **109**, image formation may be performed using any other method such as an ink jet head method. The communication unit **110** functions as a communication interface that is connected to a communication line (not illustrated) and performs communication with any other apparatus that is connected to the communication line.

[0036] An image processing unit **111** performs image processing, such as color correction or gray level correction, on an image that is represented by the image data.

[0037] The camera **112** is one example of an image capture unit, and image-captures a station in the vicinity of the image forming apparatus **10**. Furthermore, in a case where an operator is standing in front of the image forming apparatus **10**, the camera **112** image-captures the operator.

[0038] The camera **112** is configured with a Charge Coupled Device (CCD) or the like. The camera **112**, as illustrated in FIG. **2**, is installed on the front side of the image forming apparatus **10**. Moreover, the camera **112** is positioned side by side with the display unit **106** (the operation receiving unit **107**).

[0039] A gaze detection device **113** (see FIG. **1**) detects a gage of the operator who performs operation of the image forming apparatus **10**.

[0040] The gaze detection device **113**, as illustrated in FIG. **2**, is also installed on the front side of the image forming apparatus **10**. Furthermore, the gaze detection device **113** is positioned side by side with the display unit **106** (the operation receiving unit **107**).

[0041] For example, data that is received in the communication unit **110**, or the reading image (the image data) that is generated in the image reading unit **108** is stored in a storage unit **105** (see FIG. **1**) that is configured with a hard disk device or the like.

[0042] The control unit **60** controls each unit of the image forming apparatus **10**. The control unit **60** is configured with a Central Processing Unit (CPU) **102**, a Read Only Memory (ROM) **103**, and a Random Access Memory (RAM) **104**.

[0043] A program that is executed by the CPU **102** is stored in the ROM **103**. The CPU **102** reads the program that is stored in the ROM **103**, and executes the program with the RAM **104** as a working area.

[0044] At this point, the program that is executed by the CPU **102** may be provided to the image forming apparatus **10**, in a state of being stored in a magnetic recording medium (such as a magnetic tape or a magnetic disk), an optical recording medium (such as an optical disc), a magneto-optical recording medium, a semiconductor memory, or the like, which is computer-readable.

[0045] Furthermore, the program that is executed by the CPU **102** may be downloaded to the image forming apparatus **10** using communication means such as the Internet.

[0046] When the program is executed by the CPU **102**, each unit of the image forming apparatus **10** is controlled by the CPU **102**, and thus, the image forming apparatus **10**, for example, forms an image on a paper sheet, or reads an original document and generates a reading image of the original document.

[0047] Furthermore, in the present embodiment, the program is executed by the CPU **102**, and thus, as illustrated in FIG. **3** (which is a block diagram illustrating a functional configuration of the control unit **60**), the control unit **60** functions as a gaze detection unit **61**, a motion detection unit **62**, a display control unit **63**, a receiving unit **64**, and a position specification unit **65**.

[0048] At this point, the display unit **106** and the control unit **60** according to the present embodiment may be regarded as an information processing apparatus that performs image display.

[0049] The gaze detection unit **61** (see FIG. **3**) as one example of a gaze detection unit detects an operator's gaze fixed on an overlapping image (which will be described below) that is displayed on the display unit **106**.

[0050] Specifically, based on positional information indicating a position of the overlapping image on the display unit **106**, and on an output from the gaze detection device **113**, the gaze detection unit **61** detects the operator's gaze fixed on the overlapping image.

[0051] In other words, the gaze detection unit **61** determines whether or not the overlapping image is present on a destination of the operator's gaze, and, in a case where the overlapping image is present, outputs information to the effect that the operator is taking a look at the overlapping image.

[0052] The motion detection unit **62** as one example of an operation detection unit interprets an output from the camera **112** or the pointing device, and detects a specific motion that is made when the operator performs an operation on the overlapping image.

[0053] Specifically, in the present embodiment, the motion detection unit **62** detects an operator's motion of causing causes an operation tool or a finger of his/her own to approach the overlapping image, or an operator's motion of

causing the pointer **106**C, which is displayed on the display unit **106**, to approach the overlapping image. At this point, a pen-type tool is given as one example of the operation tool.

[0054] The display control unit **63** as one example of a display control unit performs display control on the display unit **106**.

[0055] Specifically, in a case where the gaze fixed on the overlapping image is detected and the specific motion is detected, the display control unit **63** changes a state where a plurality of images that are included in the overlapping image are arranged.

[0056] Furthermore, among the plurality of images that are displayed on the display control unit **63**, the display unit **106** moves an image having a predetermined positional relationship with a specific position that is specified by the position specification unit **65** (which will be described below).

[0057] An operator's selection with respect to the image on the display unit **106** is received by the receiving unit **64** as one example of a receiving unit.

[0058] Specifically, the receiving unit **64** obtains positional information on an image that is displayed on the display unit **106**, and an output (information indicating an operation position at which the operator performs an operation) from the operation receiving unit **107** (see FIGS. **1** and **2**), and specifies content (an image that is selected by the operator) that is selected by the operator). The selected content (the image that is selected by the operator) is received by the receiving unit **64**.

[0059] Based on the output from the gaze detection device **113**, the position specification unit **65** as one example of a specification unit specifies a position on the display unit **106**, which is a position of a destination toward which the operator's gaze is directed.

[0060] FIGS. **4**, **5**A and **5**B are diagrams, each describing a configuration of the gaze detection device **113**.

[0061] As described in FIG. **4**, the gaze detection device **113** has a light source **53** that illuminates an eyeball **56** of the user with an infrared light in the form of a spot, and an infrared reflection light from the eyeball **56** passes through a minute aperture diaphragm that is provided on an eyepiece lens **51** and is incident on an optical lens group **54**. The optical lens group **54** image-forms the incident infrared reflection light in the form of a dot on an image capture surface of the CCD **55**, and the CCD **55** converts a virtual image (a Purkinje image) due to corneal reflection, which results from the image formation on the image capture surface, into an electrical signal, and outputs the electrical signal.

[0062] The virtual image, as illustrated in FIGS. **5**A and **5**B, is an image **72** due to the corneal reflection of the infrared light emitted from the light source **53** from a pupil **71**, and a relative positional relationship between the center of the pupil **71** and the virtual image **72** changes in proportion to a rotation angle of an eyeball. In the present embodiment, image processing is performed using the electrical signal representing the virtual image from the CCD **55**, and a direction of a user's gaze is detected based on a result of the image processing.

[0063] It is noted that the detection of the direction of the user's gaze may be performed any other known method, without being limited to methods that are illustrated in FIGS. **4**, **5**A, and **5**B.

[0064] FIGS. **6**A to **6**C are diagrams, each for describing display processing according to the present embodiment.

[0065] In FIG. **6**A, the overlapping image **80** is illustrated that is displayed on the display unit **106**.

[0066] The overlapping image **80** is configured with a plurality of images **81** that are partially overlapped and are mutually deviated or shifted. Additionally, the overlapping image **80** is configured with the plurality of images **81** that correspond to a plurality of pages, respectively, which are mutually deviated.

[0067] Furthermore, in the overlapping image **80**, the plurality of images **81** that correspond to a plurality of pages, respectively, are arranged in a state of being deviated in the direction of a diagonal of an image **81** that corresponds to any one page. Furthermore, in the overlapping image **80**, the images **81**, which constitute the overlapping image **80**, are arranged side by side in a manner that is equally spaced.

[0068] Furthermore, in FIG. **6**A, the operator's gaze is directed toward a specific portion (a portion that is indicated by a reference character **6**A in FIG. **6**A) of the overlapping image **80**, and with the gaze detection unit **61**, it is detected that the destination of the operator's gaze is in the specific portion.

[0069] Specifically, in the present embodiment, a portion (hereinafter referred to as an edge part and portion) where edge parts **81**A that the images **81** have are arranged side by side, of the overlapping image **80**, is registered in advance, as a specific portion, in the storage unit **105** of the image forming apparatus **10**. In an example that is illustrated in FIG. **6**A, with the gaze detection unit **61**, it is detected that the destination of the operator's gaze is in the specific portion (the edge part and portion).

[0070] At this point, each image **81** that is included in the overlapping image **80** that is formed in the shape of a rectangle and that has sides. Specifically, each image **81** has a short side **81**E and a long side **81**F as sides.

[0071] For this reason, in the present embodiment, as the edge part and portion, there are present a first edge part and portion **81**X in which the edge parts **81**A are arranged side by side along the short side **81**E in the upward-downward direction in FIG. **6**A, and a second edge part and portion **81**Y in which the edge parts **81**A are arranged side by side the long side **81**F in the leftward-rightward direction in FIG. **6**A.

[0072] Then, in the present embodiment, the first edge part and portion **81**X and the second edge part and portion **81**Y, in which the edge parts **81**A are arranged side by side, and the like are registered in advance, as the specific portion.

[0073] In an example that is illustrated in FIG. **6**A, an edge part and portion that is positioned in the destination of the operator's gaze is the second edge part and portion **81**Y, and in the present embodiment, with the gaze detection unit **61**, it is detected that the destination of the operator's gaze is present in the second edge part and portion **81**Y (the specific portion).

[0074] FIG. **6**B illustrates a state next to the state that is illustrated in FIG. **6**A.

[0075] In FIG. **6**B, the overlapping image **80** and a finger **200** of the operator's own are illustrated that results when the operator causes the finger **200** of his/her own to approach the second edge part and portion **81**Y.

[0076] In the present embodiment, in this manner, when the operator causes the finger **200** of his/her own to approach the second edge part and portion **81**Y (the specific portion),

this motion in which the finger **200** is caused to approach the second edge part and portion **81**Y is detected by the motion detection unit **62**.

[0077] Additionally, in the present embodiment, the operator's motion of causing the finger **200** of his/her own to approach the specific portion is registered in advance, as a specific motion, in the storage unit **105** of the image forming apparatus **10**. In the present embodiment, when the operator makes this specific motion, the specific motion is detected by the motion detection unit **62**.

[0078] More specifically, the motion detection unit **62** interprets an output from the camera **112**, and, based on the output from the camera **112** and on positional information (information indicating a position of the overlapping image **80** on the display unit **106**) on the overlapping image **80**, the operator interprets whether or not the finger **200** is caused to approach the second edge part and portion **81**Y of the overlapping image **80**.

[0079] Then, in a case where the finger **200** approaches the second edge part and portion **81**Y of the overlapping image **80**, the motion detection unit **62** detects that the operator makes a predetermined specific motion.

[0080] Then, in the present embodiment, in this manner, in a case where the operator's gaze fixed on the specific portion (the second edge part and portion **81**Y) of the overlapping image **80** is detected and where it is detected that the operator makes the predetermined specific motion (the motion of causing the finger **200** to approach the second edge part and portion **81**Y), the display control unit **63**, as illustrated in FIG. **6**C, changes an arrangement of the plurality of images **81** that are included in the overlapping image **80**.

[0081] Specifically, the display control unit **63** changes the arrangement of the plurality of images **81** in such a manner that a deviation between the images **81**, among the plurality of images **81** that are included in the overlapping image **80**, increases.

[0082] More specifically, the display control unit **63** moves each of the plurality of images **81** in such a manner that a gap between the edge parts **81**A adjacent to each other, which are positioned in the second edge part and portion **81**Y.

[0083] Additionally, in an example of the present embodiment, the display control unit **63** moves each image **81** that is included in the overlapping image **80**, along a direction in which the short side **81**E, which each image **81** has, extends.

[0084] Furthermore, the display control unit **63** moves each image **81** in one direction, as indicated by an arrow **6**C in FIG. **6**C, in moving each of the images **81**. Furthermore, each image **81** is moved in such a manner that an amount of movement increases as much as necessary to reach the image **81** that is positioned downstream in a direction of movement.

[0085] In this manner, in a case where the image **81** is moved that is included in the overlapping image **80**, it is difficult for an error in an operation to occur when the operator selects the image **81**. More specifically, it is difficult for the error in an operation to occur when one or several images **81** are selected from among the plurality of images **81** that are included in the overlapping image **80**.

[0086] Additionally, as in the present embodiment, when a deviation between the images **81** is increases, it is difficult for an error in selection to occur when one or several images **81** is selected from among the plurality of images **81**, compared with a case where the deviation between the images **81** is not increased.

[0087] It is noted that, in the present embodiment, when a state is reached that is illustrated in FIG. **6**B, the arrangement of the images **81** starts to be changed.

[0088] In other words, before the finger **200** of the operator reaches the overlapping image **80**, the display control unit **63** changes the arrangement of the plurality of images **81**. Additionally, while the finger **200** of the operator is in the middle of getting closer to the overlapping image **80**, the display control unit **63** moves the image **81** and increases the deviation between the images **81**.

[0089] In this case, the operator makes a selection of the image **81** at an earlier timing than in a case where the arrangement is changed after the finger **200** of the operator reaches the overlapping image **80**.

[0090] It is noted that the processing in the case where the finger **200** is caused to approach is described above, but that, in a case where the selection of the image **81** is made with the operation tool or the pointer **106**C (see FIG. **2**), when the operation tool or the pointer **106**C approaches the second edge part and portion **81**Y, in the same manner, the gap between the edge parts **81**A that are positioned in the second edge part and portion **81**Y and are adjacent to each other is also broadened.

[0091] FIGS. **7**A to **7**C are diagrams, each illustrating any other display processing.

[0092] In the processing that is illustrated in each of FIGS. **6**A to **6**C, which is described above, the case where the destination of the operator's gaze is present in the second edge part and portion **81**Y and where the finger **200** of the operator approaches the second edge part and portion **81**Y is described.

[0093] In contrast, in processing that is illustrated in each of FIGS. **7**A to **7**C, a case where the destination of the operator's gaze is present in the first edge part and portion **81**X and where the finger **200** of the operator is caused to approach the first edge part and portion **81**X.

[0094] In the case where the finger **200** of the operator approaches the first edge part and portion **81**X, as illustrated in FIGS. **7**B and **7**C, each image **81** that is included in the overlapping image **80** moves along a direction in which the long side **81**F, which each image **81** has, extends.

[0095] In other words, each image **81** moves along the downward-upward direction in FIGS. **7**A to **7**C in such a manner that the gap between the edge parts **81**A that are positioned in the first edge part and portion **81**X is broadened. Furthermore, each image **81** moves in such a manner that the amount of movement increases as much as necessary to reach the image **81** that is positioned downstream in the direction of movement.

[0096] In this case, in the same manner as described above, it is also difficult for the error in selection to occur when one or several images **81** are selected from among the plurality of images **81**.

[0097] In the present embodiment, as illustrated in FIGS. **6**C and **7**C, when each image **81** is moved that is included in the overlapping image **80**, each image **81** is moved along a direction in which a side, which each image has, extends.

[0098] Specifically, in an example that is illustrated in FIG. **6**C, each image **81** is moved along a direction in which the short side **81**E extends. Furthermore, in an example that

is illustrated in FIG. **7**C, each image **81** is moved along a direction in which the long side **81**F extends.

[0099] At this point, the direction of movement when each image **81** is moved is not limited to a direction along the side, and may be a direction that intersects the direction along the side.

[0100] Specifically, for example, in a case where the destination of the operator's gaze is present in the overlapping image **80** and where the finger **200** of the operator approaches the overlapping image **80**, as illustrated in FIG. **8**A (a diagram that illustrates any other display processing on the display unit **106**, each image **81** may be moved in a direction in which a diagonal of the image **81**, which is included in the overlapping image **80**, extends.

[0101] In this case, on both the short side **84** side and the long side **85** side of the overlapping image **80**, the deviation between the images **81** increases (the gap between the edge parts **81**A is broadened), and on both the short side **84** side and the long side **85** side, the selection of the image **81** is easy to make.

[0102] It is noted that, in a case where each image **81** is moved in the diagonal direction, an area that is occupied by the overlapping image **80** after the image **81** is moved increases much more than in a case where each image **81** is moved along the side.

[0103] For this reason, for example, in a case where a space for moving the image **81** is small, such as in a case where an area of the display unit **106** is small, and so forth, as illustrated in FIGS. **6**A, **6**B, **6**C, **7**A, **7**B, and **7**C, it is preferable that each image **81** is moved in a direction in which the side extends.

[0104] Furthermore, in moving each image **81** that is included in the overlapping image **80**, instead of moving the image **81** only in one direction, one or several images **81** may be moved in one direction and any other image **81** may be moved in the direction opposite to the one direction.

[0105] Specifically, for example, as illustrated in FIG. **8**B, among the plurality of images **81** that are included in the overlapping image **80**, an image **81** that is positioned close to a corner portion **80**H in the lower right portion of FIG. **8**B may be moved in one direction that is indicated by an arrow **6**L in FIG. **8**B, and an image **81** that is positioned close to a corner portion **80**G in the upper left portion of FIG. **8**B may be moved in the opposite direction that is indicated by an arrow **6**M in FIG. **8**B.

[0106] In other words, in this example, among the images **81** that are included in the overlapping image **80**, an image **81** that is positioned close to one end portion (an end portion (a corner portion) in the lower right side of FIG. **8**B) of the overlapping image **80** is moved in one direction that is indicated by the arrow **6**L in FIG. **8**B, and an image **81** that is positioned close to the opposite end portion (an end portion (a corner portion) in the upper left side of FIG. **8**B) of the overlapping image **80** is moved in the opposite direction that is indicated by the arrow **6**M in FIG. **8**B.

[0107] It is noted that, in this movement, in the same manner as described above, an amount of movement is increased as much as necessary to reach the image **81** that is positioned downstream in the direction of movement.

[0108] At this point, when a configuration is employed in which the image **81** is moved only in one direction, and when any other image or the like is present downstream in the one direction, the amount of the movement of the image **81** is small and the amount of the movement of the image **81** is difficult to secure.

[0109] As described above, if the image **81** is made to be moved not only in one direction, but also the opposite direction, the amount of the movement of the image **81** is easier to secure than in the case where the image **81** is moved only in one direction.

[0110] It is noted that, in an example that is illustrated in FIG. **8**B, the case where the image **81** is moved in the direction of the diagonal of the image **81** in moving the image **81** in one direction and the opposite direction is described, but that, in the same as in the processing that are illustrated in FIGS. **6**A, **6**B, **6**C, **7**A, **7**B, and **7**C, the moving image **81** may be moved along the side of the image **81** that is included in the overlapping image **80**, without the direction of the movement of the image **81** being limited to this.

[0111] At this point, in a case where the image **81** is moved along the side of the image **81** that is included in the overlapping image **80**, one or several images **81** that are included in the overlapping image **80**, for example, is moved in the rightward direction, and any one or several images **81** are moved in the leftward direction.

[0112] Furthermore, in addition to this, in the case where the image **81** is moved along the side of the image **81** that is included in the overlapping image **80**, one or several images **81** that are included in the overlapping image **80**, for example, is moved in the upward direction, and any one or several images **81** are in the downward direction.

[0113] Furthermore, in moving the image **81** that is included in the overlapping image **80**, the image **81** may be made to be moved toward a broader gag, among a plurality of gaps that are positioned adjacent to the overlapping image **80**.

[0114] In many cases, as illustrated in FIG. **9** (a diagram illustrating an example of display on the display unit **106**), in addition to one overlapping image **80**, any other images **89** are displayed on the display unit **106**.

[0115] More specifically, for example, in some cases, any other images **89**, which are arranged to be spaced with a gap **9**G over or under the overlapping image **80**, to the left or right side of the overlapping image **80**, and in any other position adjacent to the overlapping image **80**, may be displayed.

[0116] In this case, in moving the image **81** that is included in the overlapping image **80**, it is preferable that, among gaps **9**G each of which is positioned between the overlapping image **80** and any other image **89**, the image **81** is moved toward a gap **9**G other than the smallest gap **9**G.

[0117] In an example that is illustrated in FIG. **9**, the gap **9**G that is indicated by a referee character **9**A is the smallest gap **9**G and in such a case, it is preferable that the image **81** is moved toward a gap **9**G other than the smallest gap **9**G.

[0118] More preferably, among a plurality of gaps **9**G the image **81** is moved toward the greatest gap **9**G.

[0119] In this example, the gap **9**G that is indicated by a reference character **9**B is the greatest gap **9**G, and it is preferable that the image **81** is moved toward the greatest gap **9**G.

[0120] In a case where the image **81** is moved toward a small gap **9**G, the amount of the movement of the image **81** is difficult to secure. In contrast, in a case where the image **81** is moved toward a great gap **9**G, the amount of the movement of the image **81** is easy to secure.

[0121] FIG. **10** is a flowchart illustrating a flow for the processing that is described with reference to FIGS. **6** to **9**.

[0122] In the present embodiment, first, the gaze detection unit **61** determines whether or not the destination of the operator's gaze is present in the above-described specific portion of the overlapping image **80** (Step **101**).

[0123] Then, in a case where it is determined that the destination of the operator's gaze is present in the specific portion, the motion detection unit **62** determines whether or not the finger **200** approaches the specific place (Step **102**).

[0124] Then, in a case where the finger **200** approaches the specific portion, the display control unit **63** changes the arrangement of the images **81** that are included in the overlapping image **80** and increases the deviation between the images **81** (Step **103**).

[0125] It is noted that, in the present embodiment, the case where the destination of the operator's gaze is present in the specific portion of the overlapping image **80** and where the finger **200** of the operator gets closer to the specific place of the overlapping image **80**, the arrangement of the images **81** is changed.

[0126] Incidentally, in a case where the destination of the operator's gaze is present in any portion of the overlapping image **80** and where the finger **200** of the operator approaches any portion of the overlapping image **80**, the change of the arrangement may be performed. In other words, in a case where, without any limitation to a specific place, the gaze is directed toward any portion of the overlapping image **80** and the finger **200** of the overlapping image **80** gets closer to any portion of the overlapping image **80**, the arrangement may be changed.

[0127] Furthermore, the change of the arrangement may be performed after the finger **200** of the operator reaches the overlapping image **80** (the change of the arrangement may be performed after the finger **200** of the operator reaches the overlapping image **80** and comes into contact with the operation receiving unit **107**).

[0128] FIGS. **11**A, **11**B, **12**A, and **12**B are diagrams, each illustrating other display processing on the display unit **106**.

[0129] In this processing example, as illustrated in FIG. **11**A, a plurality of images **81** are displayed side by side on the display unit **106**. In other words, the plurality of images **81** are arranged in a lattice form. Additionally, a plurality of images **81** are arranged side by side along each of the row direction and the column directions.

[0130] Then, in this processing, as indicated by a reference character **11**A in FIG. **11**A, with the finger **200** of the operator, one or several images **81** are selected from among the plurality of images **81** and the operator's selection with respect to the image **81** on the display unit **106** is received by the receiving unit **64** (see FIG. **3**).

[0131] More specifically, the receiving unit **64** obtains positional information on each of the images **81** that are displayed on the display unit **106**, and an output (the output of an operation position at which the operation performs an operation) from the operation receiving unit **107**, and receives the image **81** (hereinafter referred to as a "selection image **86**"). In other words, the receiving unit **64** receives content that is selected by the operator.

[0132] Next, in the present embodiment, the position specification unit **65** specifies a position on the display unit **106**, which is a position of a destination toward which the gaze of the operator who makes a selection of the image **81** is directed.

[0133] Specifically, based on the output from the gaze detection device **113** (see FIG. **1**), the position specification unit **65** specifies a position on the display unit **106**, which is a position of a destination toward which the operator's gaze is directed.

[0134] In this example, a portion that is indicated by a reference character **11**B in FIG. **11**B is a position (hereinafter referred to as a specific position **78**) that is specified by the position specification unit **65**. In other words, the portion that is indicated by a reference character **11**B is a portion that is positioned in the destination of the operator's gaze.

[0135] At this point, in an example that is illustrated in FIG. **11**B, the specific position **78** is present between two images **81** that are adjacent to each other.

[0136] Thereafter, in this display example, as illustrated in FIG. **12**A, the operator moves the finger **200** that is in a state where the selection image **86** is selected, in such a manner as to face the specific position **78**.

[0137] Thereafter, as illustrated in an arrow **12**A in FIG. **12**A, the display control unit **63** broadens a gap between two images **81** that are adjacent to each other, with the specific position **78** in between.

[0138] In other words, the display control unit **63** moves the image **81** that is positioned adjacent to the specific position **78**, in a direction away from the specific position **78**, and broadens the gap between the two images **81** that is adjacent to each other.

[0139] It is noted that, in this display example, the case is described where the gap between two images **81** is broadened in a case where the operator moves the finger **200** in the state where the selection image **86** is selected, in such a manner as to face the specific position **78**, but that the gap between two images **81** may also be broadened in a case where the finger **200** is not moved in such a manner as to face the specific position **78**.

[0140] Specifically, for example, if a position (the specific position **78**) of the destination of the operator's gaze is present in the gap between two images **81**, although the finger **200** is not moved, the gap between two images **81** may be broadened.

[0141] In the present embodiment, among a plurality of images **81** on the display unit **106**, the display control unit **63** moves an image **81** (an image **81** that is positioned adjacent to the specific position **78**) that has a predetermined positional relationship with the specific position **78** which is specified by the position specification unit **65**, and thus broadens the gap between two images **81** that are adjacent to each other.

[0142] More specifically, the display control unit **63** moves both the two images **81** with the specific position **78** in between, in the direction away from the specific position **78**, and thus broadens the gap. It is noted that in this processing example, in this manner, both the two images **81** are moved, but that only one image may be moved.

[0143] Furthermore, in the present embodiment, instead of only an image **81** (hereinafter referred to as an "adjacent image **88**") being moved in the direction away from the specific position **78**, an image **81** that is positioned more downstream than the adjacent image **88** is also moved in the direction away from the specific position **78**.

[0144] Specifically, in the present embodiment, an image **81** that is indicated by a reference character **12**B in FIG. **12**A is the adjacent image **88**, and the adjacent image **88** moves

in a direction that is indicated by an arrow **12**X, which is the direction away from the specific position **78**.

[0145] In the present embodiment, at this time, regarding the direction away from the specific position **78**, an image **81** (an image **81** that is indicated by a reference character **12**Y) (all images **81** that are positioned more downstream than the adjacent image **81**) that is positioned more downstream than the adjacent image **88** is also moved in the direction away from the specific position **78**.

[0146] Accordingly, an amount of movement of the adjacent image **88** is easier to secure than in a case where the image **81** that is positioned downstream than the adjacent image **88** is not moved.

[0147] Thereafter, in the present embodiment, an operation (movement of the selection image **86** by the operator) by the operator is further performed, and, as illustrated in FIG. **12**B, the selection image **86** is positioned in a position in which the broadened gap is positioned. It is noted that, in this example, because only four images **81** is displayed in one row, one image **81** (an image **81** that is indicated by a reference character **12**S in FIG. **12**A) that is positioned to the right, of the above-described two images **81** is moved to the next line (a lower line).

[0148] In the present embodiment, when the operator moves the selection image **86**, a space (a gap) that is a destination to which the selection image **86** is moved is broadened, the selection image **86** is easy to move, and it is difficult for an error in an operation to occur when moving the selection image **86**.

[0149] FIGS. **13**A and **13**B are diagrams, each illustrating any other display processing on the display unit **106**.

[0150] In this processing example, as indicated by a reference character **13**A in FIG. **13**A, the specific position **78** that is specified by the position specification unit **65** is present between an image **81** that is displayed on the display unit **106**, and the rim **106**B of the display unit **106**.

[0151] In other words, in this processing example, it is considered that the operator moves the selection image **86** in such a manner as to be positioned between the rim **106**B of the display unit **106** and the image **81** that is displayed on the display unit **106**.

[0152] In this case, as indicated by an arrow **13**B in FIG. **13**B, the adjacent image **88** that is positioned adjacent to the specific position **78** is moved in the direction away from the specific position **78**. Accordingly, in the same manner as described above, a gap between the adjacent image **88**, which is moved, and the rim **106**B is broadened, the selection image **86** is easy to move to the gap.

[0153] It is noted that in this processing example, in the same manner as described above, an image **81** (an image that is indicated by a reference character **13**C) that is positioned more downstream than the adjacent image **88** is moved in the direction away from the specific position **78**.

[0154] FIG. **14** is a flowchart illustrating a flow for the processing that is described with reference to FIGS. **11**A to **13**B.

[0155] In this processing that is illustrated in FIG. **14**, first, the receiving unit **64** determines whether or not a selection of an image **81** is made by the operator (Step **201**). Then, in a case where the selection of the image **81** is made by the operator, the position specification unit **65** knows the specific position **78** that is a position on the display unit **106**, which is the position of the destination toward which the operator's gaze is directed.

[0156] Subsequently, the position specification unit **65** determines whether the specific position **78** is present between two images **81** or between an image **81** and the rim **106**B (Step **202**).

[0157] Then, in a case where the specific position **78** is present between two images **81** or between an image **81** and the rim **106**B, the display control unit **63** moves the adjacent image **88** that is positioned adjacent to the specific position **78**, and thus broadens a gap that is the destination to which the selection image **86** is moved (Step **203**).

[0158] The foregoing description of the exemplary embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the invention for various embodiments and with the various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

What is claimed is:

1. An information processing apparatus comprising:

a display that displays an overlapping image including a plurality of images which are partially overlapped and are mutually deviated;

a gaze detection unit that detects a gaze of an operator, which is fixed on the overlapping image;

a motion detection unit that detects a specific motion that is made when the operator performs an operation on the overlapping image; and

a display control unit that changes an arrangement of the plurality of images included in the overlapping image in a case where the gaze fixed on the overlapping image is detected and where the specific motion is detected.

2. The information processing apparatus according to claim **1**,

wherein the display control unit increases a deviation between images among the plurality of images included in the overlapping image in a case where the gaze fixed on the overlapping image is detected and where the specific motion is detected.

3. The information processing apparatus according to claim **2**,

wherein each image included in the plurality of images is formed in a rectangular shape having sides, and

the display control unit moves an image included in the plurality of images along a direction in which at least one of the sides extends to increase the deviation between the images.

4. The information processing apparatus according to claim **2**,

wherein each image included in the plurality of images is formed in a rectangular shape, and

the display control unit moves an image included in the plurality of images along a direction of a diagonal of the image included in the plurality of images to increases the deviation between the images.

5. The information processing apparatus according to claim **2**,

wherein the display control unit moves the plurality of images included in the overlapping image to increase

the deviation between the images among the plurality of images and, in moving each of the plurality of images, moves one or several images in one direction and moves any other image in a direction opposite to the one direction.

6. The information processing apparatus according to claim **2**,

wherein the display displays other images around the overlapping image with gaps between the other images and the overlapping image, and

the display control unit moves the plurality of images included in the overlapping image to increase the deviation between the images among the plurality of images and, in moving the images, moves the image toward a gap other than a smallest gap among the gaps between the overlapping image and each of the other images.

7. The information processing apparatus according to claim **6**,

wherein the display control unit moves the image toward a greatest gap among the gaps between the overlapping image and each of the other images.

8. The information processing apparatus according to claim **1**,

wherein the gaze detection unit detects the gaze of the operator fixed on a specific portion of the overlapping image, and

the display control unit changes the arrangement of the plurality of images in a case where the gaze fixed on the specific portion of the overlapping image is detected and where the specific motion is detected.

9. The information processing apparatus according to claim **8**,

wherein the gaze detection unit detects the gaze of the operator, which is fixed on a place where edge parts of each of the images included in the overlapping image are arranged side by side, and

the display control unit changes the arrangement of the plurality of images in a case where the gaze fixed on the place where the edge parts are arranged side by side and where the specific motion is detected.

10. The information processing apparatus according to claim **9**,

wherein the display control unit changes the arrangement of the plurality of images in a manner that a gap between the edge parts which are adjacent to each other is broadened.

11. The information processing apparatus according to claim **1**,

wherein the motion detection unit detects an operator's motion of causing an operation tool or a finger of the operator to approach the overlapping image or a motion of causing a pointer, which is displayed on the display, to approach the overlapping image.

12. The information processing apparatus according to claim **11**,

wherein the display control unit performs changing of the arrangement of the plurality of images before the operation tool or the finger reaches the overlapping image, and performs changing of the arrangement of the plurality of images before the pointer reaches the overlapping image.

13. An information processing apparatus comprising:

a display that displays a plurality of images;

a receiving unit that receives a selection of an image on the display by an operator;

a specification unit that specifies a position on the display, the position being a position of a destination toward which a gaze of the operator who makes the selection of the image is directed; and

a display control unit that moves an image which has a predetermined positional relationship with the position that is specified by the specification unit, among the plurality of images.

14. The information processing apparatus according to claim **13**,

wherein the display control unit moves at least an image positioned adjacent to a specific position that is the position specified by the specification unit, in a direction away from the specific position.

15. The information processing apparatus according to claim **14**,

wherein the display control unit moves the image positioned adjacent to the specific position in the direction away from the specific position to broaden a gap between two images that are adjacent to each other with the specific position in between.

16. The information processing apparatus according to claim **15**,

wherein the display control unit moves both the two images positioned adjacent to each other with the specific position in between in the direction away from the specific position to broaden the gap.

17. The information processing apparatus according to claim **14**,

wherein the display control unit moves the image positioned adjacent to the specific position in the direction away from the specific position, and moves an image that is positioned on a downstream side than the image in the direction away from the specific position, in the direction away from the specific position.

18. The information processing apparatus according to claim **13**,

wherein the display has a display screen on which the plurality of images are displayed, and a rim that surrounds the display screen, and

in a case where a specific position that is the position specified by the specification unit is present between an image displayed on the display and the rim, the display control unit moves the image in the direction away from the specific position to broaden a gap between the image and the rim.

19. An image forming apparatus comprising:

an image forming unit that performs image formation on a recording material;

a display that displays an overlapping image including a plurality of images which are partially overlapped and are mutually deviated;

a gaze detection unit that detects a gaze of an operator, which is fixed on the overlapping image;

a motion detection unit that detects a specific motion that is made when the operator performs an operation on the overlapping image; and

a display control unit that changes an arrangement of the plurality of images included in the overlapping image

in a case where the gaze fixed on the overlapping image is detected and where the specific motion is detected.

20. An image forming apparatus comprising:

an image forming unit that performs image formation on a recording material;

a display that displays a plurality of images;

a receiving unit that receives a selection of an image on the display by an operator;

a specification unit that specifies a position on the display, the position being a position of a destination toward which a gaze of the operator who makes the selection of the image is directed; and

a display control unit that moves an image which has a predetermined positional relationship with a position that is specified by the specification unit, among the plurality of images.

21. A non-transitory computer readable medium storing a program for causing a computer to execute a process, the process comprising:

detecting a gaze of an operator, which is fixed on an overlapping image that is displayed on a display, the overlapping image including a plurality of images which are partially overlapped and are mutually deviated;

detecting a specific motion that is made when the operator performs an operation on the overlapping image; and

changing an arrangement of the plurality of images included in the overlapping image in a case where the gaze fixed on the overlapping image is detected and where the specific motion is detected.

22. A non-transitory computer readable medium storing a program for causing a computer to execute a process, the process comprising:

receiving a selection from among a plurality of images displayed on a display by an operator:

specifying a position on the display, the position being a position of a destination toward which a gaze of the operator who makes the selection of an image is directed; and

moving an image that has a predetermined positional relationship with the position that is specified, among the plurality of images.

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