United States Patent	12384146
Kind Code	B2
Date of Patent	August 12, 2025
Inventor(s)	Ogawa; Katsuya

Printing system, method of controlling printing system, and storage medium

Abstract

In an image processing apparatus according to the present disclosure, a printing system includes a movement detection unit that detects scanning, which is movement in a first direction, and an operation of making a line break, which is movement in a second direction crossing the first direction, of a printing apparatus main body that includes a printing unit that performs printing on a printing medium. The printing system further includes a notification unit that selectively makes first notification that prompts scanning along with printing by the printing unit, second notification that prompts scanning along with no printing by the printing unit, and third notification that prompts the operation of making a line break, in accordance with a detection result of the printing unit.

Inventors: **Ogawa; Katsuya (Kanagawa, JP)**

Applicant: **CANON KABUSHIKI KAISHA** (Tokyo, JP)

Family ID: **1000008747769**

Assignee: **Canon Kabushiki Kaisha (Tokyo, JP)**

Appl. No.: **18/770744**

Filed: **July 12, 2024**

Prior Publication Data

Document Identifier	Publication Date
US 20240359457 A1	Oct. 31, 2024

Foreign Application Priority Data

JP	2021-125889	Jul. 30, 2021

Related U.S. Application Data

continuation parent-doc US 17874415 20220727 US 12064963 child-doc US 18770744

Publication Classification

Int. Cl.: **B41J3/36** (20060101); **B41J2/045** (20060101); **H04N1/107** (20060101)

U.S. Cl.:

CPC **B41J2/04508** (20130101); **B41J2/04586** (20130101); **B41J3/36** (20130101); **H04N1/107** (20130101);

Field of Classification Search

CPC: B41J (2/04508); B41J (2/04586); B41J (3/36); H04N (1/107)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
5561500	12/1995	Ohzeki	N/A	N/A
5729785	12/1997	Sakaizawa	N/A	N/A
9944089	12/2017	Tanaka	N/A	N/A
10308014	12/2018	Watanabe	N/A	N/A
10377157	12/2018	Suzuki	N/A	N/A
10611141	12/2019	Shinohara	N/A	N/A
10742828	12/2019	Ogawa	N/A	N/A
2008/0075512	12/2007	Gates	N/A	N/A
2016/0339720	12/2015	Tanaka	N/A	N/A
2018/0170080	12/2017	Suzuki	N/A	B41J 25/001
2018/0354257	12/2017	Watanabe	N/A	N/A
2019/0091997	12/2018	Shinohara	N/A	B41J 2/0458
2019/0092056	12/2018	Hirotani	N/A	N/A

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
212353299	12/2020	CN	N/A
10353875	12/2003	DE	N/A
1452490	12/2003	EP	B41J 2/161
H06-297776	12/1993	JP	N/A
2016-215472	12/2015	JP	N/A
2018-065291	12/2017	JP	N/A
2018-099825	12/2017	JP	N/A
2019-003336	12/2018	JP	N/A
2019-059182	12/2018	JP	N/A
2019055557	12/2018	JP	B41J 2/21

OTHER PUBLICATIONS

Feb. 25, 2025 Japanese Official Action in Japanese Patent Appln. No. 2021-125889. cited by applicant
Jun. 3, 2025 Japanese Official Action in Japanese Patent Appln. No. 2021-125889. cited by applicant

---

Primary Examiner: Ameh; Yaovi M

Attorney, Agent or Firm: Venable LLP

Background/Summary

(1) This application is a continuation of application Ser. No. 17/874,415 filed Jul. 27, 2022.

BACKGROUND OF THE INVENTION
Field of the Invention
(1) The present disclosure relates to a printing system, a method of controlling the printing system, and a storage medium and, specifically, relates to a printing system that performs printing with a user performing scanning manually.
Description of the Related Art
(2) Today, there has been known a printing apparatus that performs printing on a printing medium with a user manually scanning a main body unit of the printing apparatus. The manual scanning type printing apparatus is called a handheld printing apparatus or the like. In a case of the handheld printing apparatus, it is up to the user to decide from which position on the printing medium to start printing. For this reason, the handheld printing apparatus has flexibility that it is possible to print an image in any position on the printing medium, but at the same time, it is difficult to perform printing accurately in a predetermined printing position on the printing medium. The handheld printing apparatus is provided with a head unit in a bottom portion facing the printing medium to perform the printing onto the printing medium. For this reason, it is difficult for the user to accurately align the position of the head unit and the printing start position of the printing medium, and this causes a reduction in the accuracy of printing an image.
(3) Japanese Patent Laid-Open No. 2018-99825 discloses a technique of aligning the positions of a printing medium and a printing apparatus by providing a marker for the aligning in an end portion of a housing of the handheld printing apparatus to guide the user to an optimum printing start position.
SUMMARY OF THE INVENTION
(4) The handheld printing apparatus disclosed in Japanese Patent Laid-Open No. 2018-99825 is intended for the user to form an image on the printing medium by one scanning. On the other hand, there has been desired improvement in the operability of a printing apparatus that prints an image by repeating scanning of and making a line break by the printing apparatus.
(5) An object of the present disclosure is to improve the operability of a printing apparatus main body that prints an image while performing scanning and making a line break on a printing medium.
(6) The present disclosure is a printing system, including: a printing apparatus main body that includes a printing unit that performs printing on a printing medium; a movement detection unit that detects scanning, which is movement of the printing apparatus main body in a first direction, and an operation of making a line break, which is movement in a second direction crossing the first direction; and a notification unit that selectively makes first notification that prompts scanning along with printing by the printing unit, second notification that prompts scanning along with no

printing by the printing unit, and third notification that prompts the operation of making a line break, in accordance with a detection result of the printing unit.
(7) According to the present disclosure, it is possible to improve the operability of a printing apparatus main body that prints an image while performing scanning and making a line break on a printing medium.
(8) Further features of the present invention will become apparent from the following description of exemplary embodiments with reference to the attached drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) FIGS. **1**A to **1**C are diagrams illustrating a positional relationship between a printing head and a printing medium provided in a printing apparatus;
(2) FIGS. **2**A to **2**C are diagrams illustrating a positional relationship between the printing head and the printing medium provided in the printing apparatus;
(3) FIGS. **3**A and **3**B are diagrams illustrating scanning in a case of printing an image by a conventional handheld printing apparatus;
(4) FIGS. **4**A to **4**C are diagrams illustrating a handheld printing apparatus in the present embodiment;
(5) FIG. **5** is a block diagram illustrating a schematic configuration of a control unit that controls the printing apparatus;
(6) FIG. **6** is a plan view illustrating a configuration of a display unit;
(7) FIG. **7** is a flowchart illustrating processing of setting a state of the printing apparatus;
(8) FIG. **8** is a flowchart illustrating processing of setting a state of the printing apparatus in a case where an operation of making a line break is performed;
(9) FIGS. **9**A and **9**B are diagrams illustrating a scanning range in the printing apparatus of the present embodiment;
(10) FIGS. **10**A to **10**D are diagrams illustrating operations of scanning and making a line break in a first scanning range by the printing apparatus;
(11) FIGS. **11**A to **11**D are diagrams illustrating operations of scanning and making a line break in second and third scanning ranges by the printing apparatus;
(12) FIGS. **12**A and **12**B are diagrams illustrating operations of scanning and making a line break in a fourth scanning range by the printing apparatus;
(13) FIGS. **13**A to **13**D are diagrams illustrating a case where there is no image that should be printed in a scanning range;
(14) FIGS. **14**A to **14**C are diagrams illustrating scanning performed by a conventional printing apparatus in a case where there is an obstacle on a printing medium; and
(15) FIG. **15** is a diagram illustrating an example of scanning performed in the present embodiment in a case where there is an obstacle on a printing medium.
DESCRIPTION OF THE EMBODIMENTS
(16) Next, an embodiment of the present disclosure is described in detail with reference to the drawings. The following embodiment is not intended to limit the present disclosure according to the scope of claims, and not all the combinations of the characteristics described in the present embodiment are necessarily required for the means for solving the problems of the present disclosure.
(17) A handheld printing apparatus in the present embodiment performs printing on a printing medium with a user manually repeating scanning and making a line break by the handheld printing apparatus. In this case, a positional relationship between a printing head and the printing medium provided in the printing apparatus is as illustrated in FIGS. **1**A to **1**C and FIGS. **2**A to **2**C. In the

drawings referred in the present specification, an X direction indicates a scanning direction of a printing head **120** (first direction), an X**1** direction indicates a right direction (first scanning direction), X**2** indicates a left direction opposite to X**1** (second scanning direction), and Y direction indicates a direction of making a line break (second direction), respectively. The scanning direction (X direction) crosses (typically, being orthogonal to) the direction of making a line break (Y direction).

(18) FIGS. **1**A to **1**C illustrate a state in which an image is printed by repeating scanning and making a line break by the printing head **120**. In an example illustrated in FIG. **1**A, scanning and making a line break by the printing head **120** is repeated so as to contain a rectangular region **201** (FIG. **1**B) that is externally in contact with an image **202** to be printed. In each scanning, the printing head **120** ejects ink, and eventually an entire image (image of one page) as illustrated in FIG. **1**C is printed. In the example illustrated in FIG. **1**A, the printing is performed by scanning the printing head **120** over a range that is beyond two end portions of the printing medium. This scanning method is the simplest scanning method.

(19) FIGS. **2**A to **2**C are diagrams illustrating an example of printing an image with a smaller amount of scanning by the printing head **120**. In the present example, scanning ranges **210**, **211**, **212**, and **213** of the printing head **120** for printing the image **202** are minimized, and a line break is made in a position in which each scanning ends. With this, it is possible to print an image with a smaller amount of scanning by the printing head **120**.

(20) In a stationary type printing apparatus that performs printing by conveying the printing medium without moving a printing apparatus main body, the scanning and the making of a line break by the printing head **120** as illustrated in FIGS. **1**A to **1**C and FIGS. **2**A to **2**C can be implemented relatively easily. However, in a conventional handheld printing apparatus, it has been difficult to manually perform the scanning and the making of a line break as illustrated in FIGS. **1**A to **1**C and FIGS. **2**A to **2**C. The reason is described below.

(21) FIG. **3**A illustrates an example in which an image same as that in FIG. **2**C is printed by repeating the scanning and the making of a line break similar to that in FIG. **2**A by using a conventional handheld printing apparatus **10**. Here, the scanning range **210** that is printed by first scanning by the handheld printing apparatus **10** is referred to as a first scanning range. As illustrated in FIG. **3**A, in a case of scanning over the first scanning range **210**, the user cannot correctly determine whether the image formation of the first scanning range **210** is completed. This is because, as illustrated in FIGS. **3**A and **3**C, a printing head **12** is on in a bottom portion of a main body portion of the handheld printing apparatus **10** and the user cannot visually recognize the position of the printing head **12** and correctly determine how much the image has printed. Thus, the user cannot correctly determine whether to make a line break or to continue the scanning at a point at which the printing operation has progressed to some extent.

(22) FIG. **3**B is a diagram illustrating a state in which an image is printed in the third scanning range **212** that is printed by third scanning. As illustrated in FIG. **2**B, the fourth scanning range **213** has a longer width than that of the third scanning range **212**. For this reason, the user needs to make a line break after scanning the printing head **12** to a position that is sufficient to start the scanning in the fourth scanning range **213**. However, as described above, since the user cannot visually recognize the position of the printing head **12**, it is difficult to correctly determine the formation state of the image, and there is a possibility that line break may be made before reaching a position for making a line break. In this case, a desired image cannot be formed because an image that should be printed originally in the third scanning range **212** is printed in the fourth scanning range **213** and also the position of the image that should be printed in the fourth scanning range **213** is shifted.

(23) As described above, in the handheld printing apparatus, the printing head is arranged in the bottom surface portion of the printing apparatus facing the printing medium; for this reason, the user cannot determine a position to make a line break by visually checking the printing head.

Therefore, the conventional handheld printing apparatus **10** has a problem that the user cannot properly recognize the position to make a line break.

(24) In contrast, the handheld printing apparatus in the present embodiment is capable of solving the above-described problem by employing the configuration described below. FIGS. **4**A to **4**C are diagrams illustrating the handheld printing apparatus (hereinafter, simply referred to as a printing apparatus) in the present embodiment, and FIG. **4**A is an exterior perspective view, FIG. **4**B is a bottom view, and FIG. **4**C is a schematic enlarged view of the printing head.

(25) A printing apparatus **100** in the present embodiment includes a printing apparatus main body **100**A forming an outer shell (housing) of the printing apparatus **100** and a display unit **101** provided in a top surface portion of the printing apparatus main body **100**A. The printing apparatus main body **100**A is in a shape that the user can grip by one hand. In a bottom surface portion of the printing apparatus main body **100**A that is a portion facing the printing medium, the printing head **120** as a printing unit and a head position sensor **111** that obtains positional information of the printing apparatus main body **100**A (corresponding to positional information of the printing head **120**). The printing apparatus main body **100**A stores various driving units such as the printing head **120** and the display unit **101** and a control unit that controls the driving unit, and the like. As described later, the head position sensor **111** obtains positional information in the scanning direction (X direction) and positional information in the direction of making a line break (Y direction) of the printing head **120** and is used as a movement detection unit.

(26) The printing apparatus in the present embodiment is an ink-jet printing type printing apparatus that performs printing by ejecting ink from the printing head **120**. The printing head **120** is provided with an ejection port array **121** in which multiple ejection ports ejecting the ink are arrayed. In FIGS. **4**A to **4**C, for the sake of simple descriptions, only one ejection port array **121** ejecting ink of a predetermined color is illustrated in the printing head **120**; however, in reality, the number of the provided ejection port arrays **121** usually corresponds to the number of colors used for printing. In the printing apparatus **100** in the present embodiment, a printing head employing the ink-jet printing method is exemplified as the printing unit; however, a printing head employing another printing method may be provided as the printing unit. For example, it is also possible to employ a thermal transfer type printing unit or an ink ribbon type printing unit.

(27) The display unit **101** serves as a notification unit that visually notifies of a state of the printing apparatus **100**. With the display state of the display unit **101** being visually recognizable, the user is able to grasp the current state of the printing apparatus. The contents displayed on the display unit **101** are described in detail later with reference to FIG. **6** and the like.

(28) FIG. **5** is a block diagram illustrating a schematic configuration of a control unit **400** that controls the printing apparatus **100**. The control unit **400** includes a CPU **401**, a ROM **405**, a RAM **404**, an image processing accelerator **402**, a data transfer I/F **403**, an image obtainment controller **407**, and the like. The CPU **401** is connected with the display unit **101**, the head position sensor **111**, and the like described above. The CPU **401** serves as a control unit that controls each unit in accordance with a program stored in the ROM **405** and executes processing described later in FIGS. **8**, **9**A, and **9**B. For the processing executed by the CPU **401**, the RAM **404** serves as a working area for temporarily storing data and also stores image data of one scanning and the like.

(29) The image processing accelerator **402** performs predetermined image processing with the CPU **401** on printing data, which is transferred from a not-illustrated host apparatus through the data transfer I/F **403** by the image obtainment controller **407**, and divides the printing data into image data of one scanning. The divided image data is stored into the RAM **404**. The data stored in the RAM **404** includes information on the left end and the right end in each scanning range. In the present embodiment, there is illustrated an example in which the image processing is performed by the printing apparatus **100**; however, a result processed by a personal computer (PC), a smartphone, or the like as the host apparatus may be received as input data together with predetermined printing setting.

(30) The head position sensor **111** is a sensor that detects the position of the printing head **120** in the X direction and the Y direction. In a case where the printing apparatus **100** is in a movement state during the scanning and the making of a line break by the printing apparatus **100**, a movement direction, a movement distance (movement amount), and the like of the printing head **120** are detected, and positional information in the scanning direction (X direction) and positional information in the direction of making a line break (Y direction) of the printing head **120** are sequentially obtained. Based on the positional information of the printing head **120** obtained by the head position sensor **111**, a head controller **406** controls an ink ejection operation of the printing head **120** based on the printing data of one scanning stored in the RAM **404**. The head position sensor **111** used in the present embodiment is a general optical tracking sensor that is used in a mouse and the like. In other words, the head position sensor **111** obtains the positional information of the printing head **120** by irradiating a surface of a target medium with light emitted from a light source such as an LED and a laser to capture an image and observe the surface state of the irradiated portion with an image pickup device every short period of time. As long as the movement amount of the printing head can be measured, an inertial sensor such as an acceleration sensor and a gyroscope sensor may be used. It is also possible to perform the printing with a device for measuring the movement amount being additionally provided outside the printing apparatus **100** to transmit the movement amount of the printing apparatus **100** to the printing apparatus **100** real-time. In this case, it is unnecessary to provide the head position sensor in the printing apparatus **100**.

(31) Based on the positional information obtained from the head position sensor **111**, the CPU **401** determines a later-described state related to the execution of the scanning and the making of a line break by the printing apparatus **100** and drives the display unit **101** provided in the printing apparatus main body **100**A based on the determined result.

(32) FIG. **6** is a plan view illustrating a configuration of the display unit **101**. The display unit **101** includes four elements, which are a first display unit **101***a*, a second display unit **101***b*, a third display unit **101***c*, and a fourth display unit **101***d*. The first display unit **101***a* to the fourth display unit **101***d* selectively make notification of a first state (first notification), notification of a second state (second notification), and notification of a third state (third notification), which are described later, by combination of lighting-up and lighting-out of the first display unit **101***a* to the fourth display unit **101***d*.

(33) The lighting-up of the first display unit **101***a* indicates a state in which the printing is executed once the printing apparatus **100** is slid, and the lighting-out of the first display unit **101***a* indicates a state in which the printing is not executed even if the printing apparatus **100** is slid.

(34) The second display unit **101***b* is a display unit in an arrow shape pointing in the right direction (X**1** direction), and the second display unit **101***b* is lighted up in a case where the scanning of the printing apparatus **100** in the right direction is suggested and is lighted out in a case where the scanning in the right direction is not suggested.

(35) The third display unit **101***c* is a display unit in an arrow shape pointing in the left direction (X**2** direction), and the third display unit **101***c* is lighted up in a case where the scanning of the printing apparatus main body **100**A in the left direction X**2** is suggested and is lighted out in a case where the scanning in the left direction X**2** is not suggested.

(36) The fourth display unit **101***d* is a display unit in an arrow shape pointing in the direction Y of making a line break, and the fourth display unit **101***d* is lighted up in a case where the whole data that should be printed in the current scanning range has printed and the printing apparatus **100** is in a state of waiting for the making of a line break.

(37) Here are described the first state to the third state. The first state is a state in which the printing is executed by the printing head **120** once the printing apparatus **100** is slid in the right direction X**1** or the left direction X**2**. In the first state, the first display unit **101***a* is lighted up, and also either one of the second display unit **101***b* and the third display unit **101***c* is lighted up. The lighting-up second

display unit **101***b* or third display unit **101***c* represents that there is the printing data in the current scanning range. That is, the second display unit **101***b* or the third display unit **101***c* is in display suggesting the scanning in the direction indicated by the lighting-up display unit. In the first state, the fourth display unit **101***d* is lighted out.

(38) The second state is a state in which mainly the printing head is positioned inside the left and right ends of the printing data. In the state, unless the printing head **120** is moved to the outside the left and right ends of the current scanning range, the printing head **120** does not perform the printing operation. For example, the second state is a case where the printing apparatus **100** is positioned in the next scanning range as a result of making a line break. In the second state, the first display unit **101***a* is lighted out, and either one of the second display unit **101***b* and the third display unit **101***c* is lighted up. In other words, the second display unit **101***b* or the third display unit **101***c* that instructs an image end portion in a position closer to the current position of the printing apparatus **100** is lighted up. For example, in a case where the right end of the image expressed by the printing data is closer to the current printing apparatus **100** than the left end portion is, the second display unit **101***b* is lighted up, and in a case where the left end of the image is closer than the right end is, the third display unit **101***c* is lighted up. In the second state, the fourth display unit **101***d* is lighted out.

(39) The third state is a state in which the printing of the current scanning range is completed and waiting for the making of a line break. In the third state, it is possible to scan the printing apparatus **100** in the right direction (X**1** direction) and the left direction (X**2** direction) before a line break is made. However, the printing operation is not performed until a line break is made, and the third state is continued. In the third state, the first display unit **101***a* is lighted out, and the other display units (the second display unit **101***b*, the third display unit **101***c*, and the fourth display unit **101***d*) are lighted up.

(40) In the present embodiment, the display unit **101** includes the four elements, which are the first display unit **101***a* to the fourth display unit **101***d*. However, as long as it is possible to distinguish the first state to the third state, another form of notification may be applied. For example, it is also possible to perform state display by changing the color of an LED, state display using a liquid crystal display, notification of a state by sound from a sound output unit, notification by vibration, and the like. It is also possible to employ a mode in which no display unit is mounted in the printing apparatus main body **100**A and the first state to the third state are transmitted to an external apparatus such as a smartphone or a personal computer to notify of the state by the external apparatus. That is, the present embodiment may be executed by a system including the printing apparatus main body **100**A and an external apparatus including a display unit for notification of the first state to the third state. In the present disclosure, either of the configuration in which the printing apparatus **100** includes the display unit for notification and the configuration in which an external apparatus different from the printing apparatus **100** includes the display unit for notification may be applied; for this reason, both the configurations are referred to as a printing system. As an example of the printing system, the configuration in which the printing apparatus **100** includes the display unit for notification is described below for example.

(41) FIG. **7** is a flowchart illustrating processing by the printing apparatus **100** to set the state (the first state, the second state, and the third state) of the printing apparatus **100** based on the positional information in the X direction from the head position sensor **111**. The processing illustrated in FIG. **7** is executed by the CPU **401**. In the flowcharts in FIGS. **7** and **8** referred in the following descriptions, S marked on each processing number means a step.

(42) The CPU **401** obtains the current positional information of the printing head **120** in the scanning direction (X direction) based on the positional information received from the head position sensor **111**. Then, based on the current positional information, in S**600**, the CPU **401** determines whether the current state of the printing apparatus **100** is the first state, the second state, or the third state. If it is determined that the current state of the printing apparatus **100** is the first

state (printable state), in S**601**, the CPU **401** obtains the current position (X position) of the printing head **120** in the scanning direction (X direction) based on the positional information from the head position sensor **111**. Thereafter, in S**602**, the CPU **401** determines whether the printing head **120** is positioned outside the left end or the right end of the image that should be formed in the current scanning range. If it is determined that the printing head **120** is positioned outside the end portion of the image, the whole printing data in the current scanning range has printed; accordingly, the CPU **401** switches the state of the current printing apparatus **100** from the first state to the third state (line break waiting state) (S**603**).

(43) In S**602**, if it is determined that the printing apparatus **100** is not positioned outside the end portion of the image, in S**604**, the CPU **401** repeats the processing of S**600** to S**602** while continuing the first state (printable state). Once the printing head **120** is positioned outside the image that should be formed in the current scanning range, the CPU **401** switches the current state of the printing apparatus **100** from the first state (printable state) to the third state (line break waiting state) (S**603**).

(44) In S**600**, if it is determined that the current state of the printing apparatus **100** is in the second state (printing preparation state), in S**605**, the CPU **401** obtains the current X position of the printing head **120**. Additionally, the CPU **401** determines whether the printing head **120** is positioned outside the image that should be formed in the current scanning range. If it is determined that the printing head **120** is positioned outside the image, the CPU **401** switches the state of the current printing apparatus **100** from the second state to the first state (printable state) (S**607**).

(45) In S**600**, if the CPU **401** determines that the current state of the printing apparatus **100** is in the third state (line break waiting state), the position of the printing apparatus **100** is not changed until a line break is made. Accordingly, even if the X position of the printing apparatus **100** is updated in any way, the third state (line break waiting state) is continued (S**609**).

(46) FIG. **8** is a flowchart illustrating processing to set the state (the first state, the second state, and the third state) of the printing apparatus **100** in a case where the printing apparatus **100** is moved from the scanning range in the direction of making a line break (second direction (Y direction)). The processing illustrated in FIG. **8** is executed by the CPU **401**.

(47) Once the printing apparatus **100** is moved by the user in the direction of making a line break (Y direction) and the positional information indicating a change in the position in the Y direction is received from the head position sensor **111**, in S**700**, the CPU **401** obtains the current position of the printing head **120** in the X direction. Thereafter, in S**701**, the CPU **401** determines whether there is the printing data of the image that should be printed in the scanning range after a line break is made. In this process, if it is determined that there is no printing data of the image that should be printed in the scanning range after a line break is made, the CPU **401** continues the third state (line break waiting state) in S**705** to wait for a line break to be made additionally.

(48) On the other hand, in S**701**, if it is determined that there is the printing data of the image that should be printed in the scanning range after a line break is made, the CPU **401** determines whether the X position of the printing head **120** is outside the left end or the right end of the printing data (S**702**). If the X position of the printing head **120** is outside the left end or the right end of the printing data, it is possible to start the printing in the scanning range after a line break is made; for this reason, in S**703**, the CPU **401** switches the state of the printing apparatus **100** from the third state to the first state. If the X position of the printing head **120** is inside the left end or the right end of the printing data, the printing head **120** once needs to be moved to the outside the left end or the right end of the image. For this reason, if the determination result in S**702** is NO, in S**704**, the CPU **401** switches the printing apparatus **100** to the second state.

(49) FIGS. **9**A and **9**B are diagrams illustrating multiple scanning ranges in a case where an image is printed by scanning the printing apparatus **100** of the present embodiment multiple times. The image **202** printed on a printing medium **200** is divided into multiple scanning ranges in accordance

with a length L of the ejection port array **121** of the printing head **120** of the printing apparatus **100** to be printed. In an example illustrated in FIG. **9**, there is illustrated an example in which the image that should be printed is divided into the first to the fourth scanning ranges **210** to **213**. Each scanning range has a rectangular shape as indicated by a broken line in FIG. **9**, and a length of the printing apparatus **100** in the direction of making a line break (Y direction) orthogonal to the scanning direction (X direction) is the same as the length of the ejection port array **121** of the printing head **120**. In a case where an ejection port near an end portion within the ejection port array **121** is not used, the length of each scanning range in the Y direction is determined based on the length not including the ejection port.

(50) In a case where the printing apparatus **100** starts the printing operation, the printing data of the image that should be printed in each of the first to the fourth scanning ranges **210** to **213** and the positional information of the left and right ends of each printing data are stored into the RAM **404**. Based on the stored printing data and positional information of the left and right ends, the printing head **120** starts printing the image sequentially in each scanning range. The process of printing the image using the printing apparatus **100** that is exemplified in FIG. **9** is described below with reference to FIGS. **10**A to **12**B.

(51) FIGS. **10**A to **10**D are diagrams illustrating the process from printing the image in the first scanning range **210** by one scanning by the printing apparatus **100** to making a line break. FIGS. **11**A to **11**D are diagrams illustrating the process of printing the image in the second scanning range **211** by second scanning by the printing apparatus **100**, making a line break, and thereafter forming the third scanning range **212**. FIGS. **12**A and **12**B are diagrams illustrating the process from the state illustrated in FIG. **11**D to making a line break and then printing in the fourth scanning range **213**.

(52) FIG. **10**A illustrates a state before the printing is started. In this state, the printing apparatus **100** is positioned outside the end portion of the first scanning range **210** and there is the image data of the image that should be printed in the first scanning range **210**. Thus, the printing apparatus **100** is in the first state in which the printing apparatus **100** is able to perform the printing by scanning. In the example in FIG. **10**A, since the printing apparatus **100** is positioned outside the left end of the first scanning range **210**; accordingly, in the display unit **101**, the first display unit **101***a* and the second display unit **101***b* prompting the scanning rightward are lighted up. The user starts the scanning in the right direction (X**1** direction) in accordance with the lighting-up first display unit **101***a* and second display unit **101***b*.

(53) Once the printing apparatus **100** in the first state is slid in the right direction (first direction), the ink is ejected from the ejection port array **121** of the printing head **120** in accordance with the printing data, and as illustrated in FIG. **10**B, the image is printed in the first scanning range **210**. With the printing apparatus **100** being slid in the right direction, the X position of the printing head **120** is sequentially updated based on the positional information from the head position sensor **111**. Then, until the printing head **120** passes through the right end of the first scanning range **210**, the first state is maintained as illustrated in S**604** in FIG. **7**, and the lighting-up state of the first display unit **101***a* and the second display unit **101***b* is maintained.

(54) Subsequently, as illustrated in FIG. **10**C, once the printing of the image into the first scanning range **210** is completed, as indicated in S**603** in FIG. **7**, the state of the printing apparatus **100** is switched to the third state. The third state is a line break waiting state in which no printing is executed even if the printing apparatus **100** is moved to the right and left and waiting for the operation of making a line break. Simultaneously with the switching to the third state, in the display unit **101**, the first display unit **101***a* is lighted out, and the second display unit **101***b*, the third display unit **101***c*, and the fourth display unit **101***d* are lighted up. With the lighting-up of the second to the fourth display units **101***b* to **101***d* in the display unit **101**, the user recognizes that the printing of the image that should be printed in the first scanning range **210** by the printing apparatus **100** is completed and it is in the line break waiting state (third state).

(55) Next, the user makes a line break by moving the printing apparatus **100** in the Y direction (third direction). Along with the movement of the printing apparatus **100** in the Y direction while making a line break, the Y position of the printing head **120** is sequentially updated based on the positional information from the head position sensor **111**. Once the printing head **120** of the printing apparatus **100** is moved to the line break position outside the right end of the second scanning range **211**, the printing apparatus **100** is switched to the printable state (first state) in accordance with the flowchart in FIG. **8**. Simultaneously with the switching of the printing apparatus **100** to the first state, the second display unit **101***b* and fourth display unit **101***d*, which were lighted up until then, are lighted out, and on the other hand, the first display unit **101***a* is newly lighted up while the third display unit **101***c* maintains the lighting-up state. With such a change in the lighting-up state of the display unit **101**, the user recognizes that the printing apparatus **100** reaches the line break position and it is in a state in which the printing into the second scanning range **211** is possible (first state).
(56) Thereafter, in accordance with the display of the display unit **101**, the user prints the image into the second scanning range **211** by moving the printing apparatus **100** in the left direction (X**2** direction) as illustrated in FIG. **11**A. Along with the movement in the left direction, the X position of the printing head **120** is sequentially updated based on the positional information from the head position sensor **111**. Once the printing of the image in the second scanning range **211** by the printing head **120** is completed, the printing apparatus **100** is switched to the line break waiting state (third state), and in the display unit **101**, the first display unit **101***a* is lighted out, and the second to the fourth display units **101***b* to **101***d* are lighted up. FIG. **11**A illustrates a state in which the printing of the image is completed in a middle position in the second scanning range **211**.
(57) Subsequently, in accordance with the display of the display unit **101**, the user moves the printing apparatus **100** in the Y direction to make a line break to enter the third scanning range as illustrated in FIG. **11**B. Once the printing apparatus **100** is moved to the line break position, the printing apparatus **100** is switched to the printing preparation state (second state) based on the positional information from the head position sensor **111**. In other words, in the example illustrated in FIG. **11**B, the position of the printing head **120** after a line break is made is positioned inside the left and right ends of the third scanning range **212**. Thus, in accordance with the flowchart in FIG. **8**, the printing apparatus **100** is switched to the printing preparation state (second state). The printing preparation state is a state in which no printing is performed even if the printing apparatus **100** is slid.
(58) Simultaneously with the switching of the printing apparatus **100** to the printing preparation state, the display unit **101** is switched from the display indicating the line break waiting state illustrated in FIG. **11**A to the display illustrated in FIG. **11**B. Specifically, it is a state in which, out of the second to the fourth display units **101***b* to **101***d* that are lighted up in the line break waiting state illustrated in FIG. **11**A, the third display unit **101***c* and the fourth display unit **101***d* are lighted out, and only the second display unit **101***b* is lighted up. Accordingly, the user is able to complete the making a line break easily and properly by moving the printing apparatus **100** in the Y direction until the display of the display unit **101** is switched.
(59) In the example illustrated in FIG. **11**B, the distance in the X direction from the left end of the second scanning range **211** to the printing head **120** is shorter than the distance in the X direction from the right end of the second scanning range **211** to the printing head **120**. For this reason, with the first display unit **101***a* being lighted up, the user is guided to perform the scanning toward the right end in the second scanning range. However, in the printing preparation state, the user is not necessarily follow the display of the display unit **101**. The printing apparatus **100** may be moved toward the left end of the third scanning range **212**. Regardless of whether the printing apparatus **100** is moved toward either of the left end and the right end, the position of the printing head **120** is updated based on the positional information from the head position sensor **111**, and the state of the printing apparatus **100** is switched in accordance with the flowchart in FIG. **8** based on the updated

position.
(60) Next, the user moves the printing apparatus **100** toward the right end or the left end of the third scanning range **212**. FIG. **11**C illustrates a state in which the printing apparatus **100** is slid toward the right end of the third scanning range **212** in accordance with guiding by the display unit **101**. Once the printing head **120** of the printing apparatus **100** goes beyond the right end of the third scanning range **212** by the scanning, the display unit **101** switches the printing apparatus **100** to the printable state (first state) in accordance with the flowchart in FIG. **8**. Simultaneously with the switching of the printing apparatus **100** to the first state, in the display unit **101**, the second display unit **101***b* is lighted out and the first display unit **101***a* and the third display unit **101***c* are lighted up so as to guide the user to perform the scanning in the left direction.
(61) In this process, in accordance with the display of the display unit **101**, the user scans the printing apparatus **100** in the left direction (X**2** direction) as illustrated in FIG. **11**D. That is, the printing apparatus **100** is slid from the right end toward the left end of the third scanning range **212**. In this process, since the printing apparatus **100** is in the first state, the printing apparatus **100** prints the image in the third scanning range **212**. Once the printing apparatus **100** goes beyond the left end of the third scanning range **212**, the printing apparatus **100** is switched to the line break waiting state (third state) in accordance with the flowchart in FIG. **8**. In this process, in the display unit **101**, the first display unit **101***a*, which is lighted up in the first state, is lighted out, and the second to the fourth display units **101***b* to **101***d* are lighted up. With the display, the user recognizes that the printing of the image is completed with the printing head **120** going beyond the end portion of the third scanning range **212** and it is switched to the line break waiting state.
(62) Thereafter, the user makes a line break by moving the printing apparatus **100** in the Y direction. Also in the operation of making a line break, the user may move the printing apparatus **100** in the Y direction until the display of the display unit **101** is switched from the state in FIG. **11**D to the position illustrated in FIG. **12**A. That is, the printing apparatus **100** may be moved in the Y direction until reaching a state in which, out of the second to the fourth display units **101***b* to **101***d* that are lighted up in the line break waiting state in FIG. **11**D, the third and the fourth display units **101***c* and **101***d* are lighted out and the first and the second display units **101***a* and **101***b* are lighted up. In the operation of making a line break, the printing head **120** is positioned outside the end portion of the fourth scanning range **213**. In the fourth scanning range **213**, there is the printing data of the image that should be printed. Thus, in accordance with the flowchart in FIG. **8**, the state of the printing apparatus **100** is switched to the first state (printable state).
(63) In this process, in accordance with the guiding by the second display unit **101***b*, the user scans the printing apparatus **100** in the right direction. With the scanning, the image is printed in the fourth scanning range **213** as illustrated in FIG. **12**B. As described above, the printing on the printing medium **200** is all completed. Once the printing is completed, as illustrated in FIG. **12**B, the first to the fourth display units **101***a* to **101***d* in the display unit **101** are all lighted out; accordingly, the user can visually recognize the completion of the printing. That is, in the display unit **101**, in addition to the above-described first to third notification, fourth notification representing that the printing is all completed is made.
(64) In the above descriptions, an example in which there is the printing data of the image that should be printed in each of the scanning ranges **210** to **213** is described as an example. However, as illustrated in FIGS. **13**A to **13**D, the multiple scanning ranges may include a scanning range in which there is no image that should be printed. In a case of forming such an image, with the conventional printing apparatus that has no control function nor display unit of the present embodiment, the user is forced to determine whether to perform scanning or making a line break in the second scanning range **211** after the printing and the making of a line break in the first scanning range **210**.
(65) In contrast, in the present embodiment, it is possible to progress the printing operation with no hesitation in accordance with the display of the display unit **101** even for the image as illustrated in

FIGS. **13**A to **13**D. First, the user performs the printing by the scanning in the first scanning range as with FIG. **10**A and thereafter makes a line break in accordance with the display of the display unit **101**. At this point, the CPU **401** of the printing apparatus **100** determines whether there is the printing data in the next scanning range (in this case, the second scanning range **211**) in S**701** in the flowchart in FIG. **8**. If there is no printing data in the second scanning range **211**, in S**705**, the state of the printing apparatus **100** is switched to the line break waiting state (third state) again, and the second to the fourth display units **101***b* to **101***d* in the display unit **101** are lighted up. With the display of the display unit **101**, the user recognizes that it is necessary to make a line break further. Subsequently, once the user makes a line break again, there is found the data in the third scanning range **212**; accordingly, the state of the printing apparatus **100** is switched to the first state (printable state) by the processing of S**703** in the flowchart in FIG. **8**. The user can recognize the change in the state from the display of the display unit **101**. Thereafter, in accordance with the display of the display unit **101**, the user scans the printing apparatus **100** in the left direction to print the image into the third scanning range **212** as illustrated in FIG. **13**D. The printing into the fourth scanning range **213** is performed as with FIG. **12**B. Thus, in the present embodiment, even in a case where there is a blank in a single image, the user is able to properly perform the scanning and the making of a line break by the printing apparatus **100** with no hesitation.

(66) From the nature thereof, the handheld printing apparatus is able to eject the ink and print the image by scanning on a surface of any type of medium. For this reason, for example, it is considered that the handheld printing apparatus is used to print an image onto a surface of a box or a workpiece. In this case, there is a possibility that the printing medium is not in a complete rectangular. For example, in a case of forming an image as illustrated in FIGS. **14**A and **14**B, in a case of scanning the printing apparatus **100** so as to contain a rectangular region with which the image is simply and externally in contact as illustrated in FIG. **14**C, the scanning may not be made due to the prevention by an obstacle OB. To the contrary, the scanning may not be made due to a lack in the printing medium. Accordingly, it is difficult for the user to perform the scanning and the making of a line break properly.

(67) However, according to the present embodiment, as illustrated in FIG. **15**, the display unit **101** makes instructions to properly perform the making of a line break and the scanning while avoiding an obstacle. In accordance with the contents on the display of the display unit **101**, the user is able to properly perform the printing also on a printing medium that is not rectangular. The procedure of the scanning and the making of a line break in a case of printing the image illustrated in FIG. **15** by the printing apparatus **100** of the present embodiment is described below.

(68) In a case of printing the image illustrated in FIG. **15**, the user prints the image into the first scanning range **210** by scanning the printing apparatus **100** in the X**1** direction in accordance with the lighting-up of the first display unit **101***a* and the second display unit **101***b* of the printing apparatus **100**. Once reaching the end portion of the first scanning range **210**, the display of the display unit **101** is switched to the lighting-up of the second to the fourth display units **101***b* to **101***d* to prompt the user to make a line break. In this process, the user moves the printing apparatus **100** in the Y direction in accordance with the display of the display unit **101**, and stops the printing apparatus **100** at a point at which the display is switched to the display of only the second display unit **101***b*. With this, the printing apparatus **100** makes a line break to enter the second scanning range **211**. With the line break, the printing head **120** of the printing apparatus **100** is positioned within the second scanning range. For this reason, the display unit **101** of the printing apparatus **100** is switched to the display indicating the printing preparation state (second state). In this process, only the second display unit **101***b* is lighted up.

(69) Thereafter, the user moves the printing apparatus **100** in the X**1** direction in accordance with the display of the display unit **101** (lighting-up of the second display unit **101***b*). Since the scanning is performed in the printing preparation state, no printing operation is executed. At a point at which the printing head **120** of the printing apparatus **100** goes beyond the right end of the second

scanning range **211**, the display of the display unit **101** is switched to the display indicating the printable state (the first display unit **101***a* and the third display unit **101***c* are lighted up). Next, in accordance with the display of the display unit **101**, the user scans the printing apparatus **100** in the X**2** direction to print the image into the second scanning range **211**. Once the printing head **120** of the printing apparatus **100** is moved to the outside the left end of the second scanning range **211**, the display unit **101** is switched to the display indicating the line break waiting state. In other words, the first display unit **101***a* is lighted out, and the second to the fourth display units **101***b* to **101***d* are lighted up.

(70) Thereafter, in accordance with the display of the display unit **101**, the user makes a line break by moving the printing apparatus **100** in the Y direction. Once the printing apparatus **100** reaches the line break position, the display of the display unit **101** is switched to the display indicating the printable state. In this process, the first display unit **101***a* and the second display unit **101***b* are lighted up. Accordingly, in accordance with the display of the display unit **101**, the user moves the printing apparatus **100** in the X**1** direction to print the image into the third scanning range **212**. Once the printing of the image is completed, the first to the fourth display units **101***a* to **101***d* are all lighted out to make the user recognize that the printing operation is completed.

(71) As described above, according to the present embodiment, with the printing apparatus **100** being moved in accordance with the display of the display unit **101**, it is possible to properly perform the scanning and the making of a line break and to improve the operability of the handheld printing apparatus **100**.

(72) In the above-described embodiment, there is described an example in which the printing is performed with completely no overlapping of the scanning ranges **210** to **213** with each other; however, it is not limited thereto. As long as the data to be printed by one scanning and the positional information of the left and right ends and the top and bottom ends of the data are definite, it is also possible to perform the printing while partially overlapping the scanning ranges with each other.

Other Embodiments

(73) In the above-described embodiment, an example in which the operation of making a line break performed between scanning and scanning is performed with the user moving the printing apparatus while checking the display of the display unit **101**; however, it is also possible to perform the operation of making a line break by a mechanism for making a line break provided in the printing apparatus. For example, as the mechanism for making a line break, there may be considered a mechanism in which, with an instruction by the user to make a line break, the printing apparatus main body including the printing head is raised to be away from the printing medium, and after a predetermined amount of movement in a direction crossing the ejection port array of the printing head (typically, an orthogonal direction (Y direction)), the printing apparatus main body is lowered to the printing medium. For the movement of the printing apparatus main body, operation force by the user may be a driving source, or a power source such as a motor may be used. For the detection whether a line break is made by the mechanism for making a line break, a dedicated detection unit may be provided, or positional information from the above-described head position sensor may be used. In any case, the CPU **401** executes the processing of the flowchart illustrated in FIG. **8** based on information indicating that the operation of making a line break by the mechanism for making a line break is executed. With this, it is possible to perform processing similar to that of the above-described embodiment.

(74) With a use of the above-described mechanism for making a line break, it is possible to avoid a contact between the printing apparatus and the printing medium during the operation of making a line break in the scanning range of an image, and it is possible to suppress a damage of the printing image. Additionally, with a use of the mechanism for making a line break, it is possible to correctly make a line break by a constant amount, and thus it is possible to improve the operability of the handheld printing apparatus. In a case of using a power source such as a motor as the mechanism

for making a line break, it is also effective to provide a lock unit to prevent the execution of the operation of making a line break in a case where the user makes an instruction to make a line break in a state other than the line break waiting state (third state). With this, it is possible to prevent the making of a line break due to an incorrect operation by user, and the operability is further improved.

(75) In the above-described embodiment, there is described an example in which the position of the printing apparatus **100** is determined and the display control is performed in the printing apparatus **100**; however, it is not limited to the example. For example, the position of the printing apparatus **100** may be transmitted real-time to an external apparatus. The control illustrated in FIGS. **7** and **8** may be performed by the external apparatus. As a control result, each state may be transmitted from the external apparatus to the printing apparatus **100**, and the printing apparatus **100** may perform a display control in accordance with the transmitted state. Otherwise, the external apparatus may directly perform the display control itself of the printing apparatus **100**.

(76) Embodiment(s) of the present invention can also be realized by a computer of a system or apparatus that reads out and executes computer executable instructions (e.g., one or more programs) printed on a storage medium (which may also be referred to more fully as a 'non-transitory computer-readable storage medium') to perform the functions of one or more of the above-described embodiment(s) and/or that includes one or more circuits (e.g., application specific integrated circuit (ASIC)) for performing the functions of one or more of the above-described embodiment(s), and by a method performed by the computer of the system or apparatus by, for example, reading out and executing the computer executable instructions from the storage medium to perform the functions of one or more of the above-described embodiment(s) and/or controlling the one or more circuits to perform the functions of one or more of the above-described embodiment(s). The computer may comprise one or more processors (e.g., central processing unit (CPU), micro processing unit (MPU)) and may include a network of separate computers or separate processors to read out and execute the computer executable instructions. The computer executable instructions may be provided to the computer, for example, from a network or the storage medium. The storage medium may include, for example, one or more of a hard disk, a random-access memory (RAM), a read only memory (ROM), a storage of distributed computing systems, an optical disk (such as a compact disc (CD), digital versatile disc (DVD), or Blu-ray Disc (BD)™), a flash memory device, a memory card, and the like.

(77) While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

(78) This application claims the benefit of Japanese Patent Application No. 2021-125889 filed Jul. 30, 2021, which is hereby incorporated by reference herein in its entirety.

Claims

1. A printing apparatus comprising: a printing unit configured to perform printing; and a notification unit including (1) a first display unit configured to notify that printing using the printing unit can be performed by moving the printing apparatus along a first direction, (2) a second display unit configured to notify that the printing apparatus should be moved in one direction along the first direction, (3) a third display unit configured to notify that the printing apparatus should be moved in another direction along the first direction and opposite to the one direction, and (4) a fourth display unit configured to notify that the printing apparatus should be moved along a second direction different from the first direction, wherein after the printing apparatus is moved along the second direction, the notification unit causes either the second display unit or the third display unit to notify based on a position of an end of an image to be printed,

wherein the notification unit notifies a selected one of a state that the printing apparatus is in from among: (1) a first state in which printing using the printing unit can be performed by moving the printing apparatus along the first direction, (2) a second state in which printing using the printing unit cannot be performed by moving the printing apparatus along the first direction, and (3) a third state in which the printing apparatus can be moved along the second direction, and wherein the notification unit selectively makes notification of the first to third states with respective combinations of display states of the first display unit, the second display unit, the third display unit, and the fourth display unit.

2. The printing apparatus according to claim 1, wherein the notification unit causes whichever one of the second display unit and the third display unit that is closer to the end of the image at a current position of the printing apparatus to notify.

3. The printing apparatus according to claim 1, further comprising a movement detection unit configured to detect movement along the first direction of the printing apparatus, wherein the printing unit performs printing based on a detection result of the movement detection unit.

4. The printing apparatus according to claim 1, further comprising a movement detection unit configured to detect movement along the first direction of the printing apparatus and movement along the second direction of the printing apparatus, wherein the notification unit selectively makes notification of the first to third states in accordance with a position along the first direction of the printing apparatus in each of (a) a case where moving of the printing apparatus along the first direction is detected by the movement detection unit and (b) a case where moving of the printing apparatus along the second direction is detected by the movement detection unit.

5. The printing apparatus according to claim 1, wherein the notification unit makes notification of the first state by lighting-up the first display unit, lighting-up the second display unit or the third display unit, and lighting-out the fourth display unit, wherein the notification unit makes notification of the second state by lighting-out the first display unit or the fourth display unit, and lighting-up the second display unit or the third display unit, and wherein the notification unit makes notification of the third state by lighting-out the first display unit, and lighting-up the second display unit, the third display unit, and the fourth display units.

6. The printing apparatus according to claim 3, wherein the movement detection unit detects a movement amount of the printing apparatus along the first direction and a movement amount of the printing apparatus along the second direction, and detects execution of the operation of making a line break at a point at which the movement amount of the printing apparatus along the second direction reaches a predetermined amount.

7. The printing apparatus according to claim 6, wherein at the point at which the movement amount of the printing apparatus along the second direction reaches the predetermined amount, the notification unit is switched from notifying using the third display unit to notifying using the first display unit or the second display unit, so as to notify that the operation of making a line break should be executed.

8. The printing apparatus according to claim 1, further comprising a mechanism for making a line break that moves the printing apparatus along the second direction by a predetermined amount.

9. The printing apparatus according to claim 8, wherein the mechanism for making a line break raises the printing apparatus from a printable position in which printing is possible, and thereafter moves the printing apparatus along the second direction by the predetermined amount and lowers the printing apparatus to the printable position again.

10. The printing apparatus according to claim 9, wherein the mechanism for making a line break includes a lock unit that prevents execution of the operation of making a line break while notification using the first display unit or the second display unit is made.

11. The printing apparatus according to claim 1, wherein the notification unit further includes a sound output unit that notifies of a state of the printing apparatus by sound.

12. The printing apparatus according to claim 1, wherein in addition to the notifications of the first

to third states, the notification unit makes notification of a fourth state in which printing is all completed.

13. The printing apparatus according to claim 1, further comprising a reception unit configured to receive image data from an external terminal, wherein the printing unit performs printing according to the image data received by the reception unit.

14. A non-transitory computer-readable storage medium storing a program for causing a computer to perform a method of controlling a printing apparatus, the method comprising the steps of: selectively (1) notifying, using a first display unit, that printing using a printing unit provided in the printing apparatus can be performed by moving the printing apparatus along a first direction, (2) notifying, using a second display unit, that the printing apparatus should be moved in one direction along the first direction, (3) notifying, using a third display unit, that the printing apparatus should be moved in another direction along the first direction and opposite to the one direction, and (4) notifying, using a fourth display unit, that the printing apparatus should be moved along a second direction different from the first direction, wherein after the printing apparatus is moved along the second direction, either the notifying using the second display unit or the notifying using the third display unit is performed based on a position of an end of an image to be printed, and wherein with combinations of display states of the first display unit, the second display unit, the third display unit, and the fourth display unit, it is notified, in the selectively notifying step, in which state the printing apparatus is in among: (1) a first state in which printing using the printing unit can be performed by moving the printing apparatus along the first direction, (2) a second state in which printing using the printing unit cannot be performed by moving the printing apparatus along the first direction, and (3) a third state in which the printing apparatus can be moved along the second direction, and wherein the selectively notifying step selectively makes notification of the first to third states with combinations of display states of the first display unit, the second display unit, the third display unit, and the fourth display unit.

15. A printing apparatus comprising: a printing unit configured to perform printing; a notification unit including (1) a first display unit configured to notify that printing using the printing unit can be performed by moving the printing apparatus along a first direction, (2) a second display unit configured to notify that the printing apparatus should be moved in one direction along the first direction, and (3) a third display unit configured to notify that the printing apparatus should be moved in another direction along the first direction and opposite to the one direction; and a mechanism for making a line break that moves the printing apparatus by a predetermined amount along a second direction different from the first direction, wherein after the printing apparatus is moved along the second direction, the notification unit causes either the second display unit or the third display unit to notify based on a position of an end of an image to be printed, and wherein the mechanism for making a line break raises the printing apparatus from a printable position in which printing is possible and thereafter moves the printing apparatus along the second direction by the predetermined amount and lowers the printing apparatus to the printable position again.