(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 410 555 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
07.08.2024 Bulletin 2024/32

(21) Application number: **22875811.6**

(22) Date of filing: **13.09.2022**

(51) International Patent Classification (IPC):
B41J 2/01 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B41J 2/01

(86) International application number:
PCT/JP2022/034195

(87) International publication number:
WO 2023/053939 (06.04.2023 Gazette 2023/14)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **28.09.2021 JP 2021157783**

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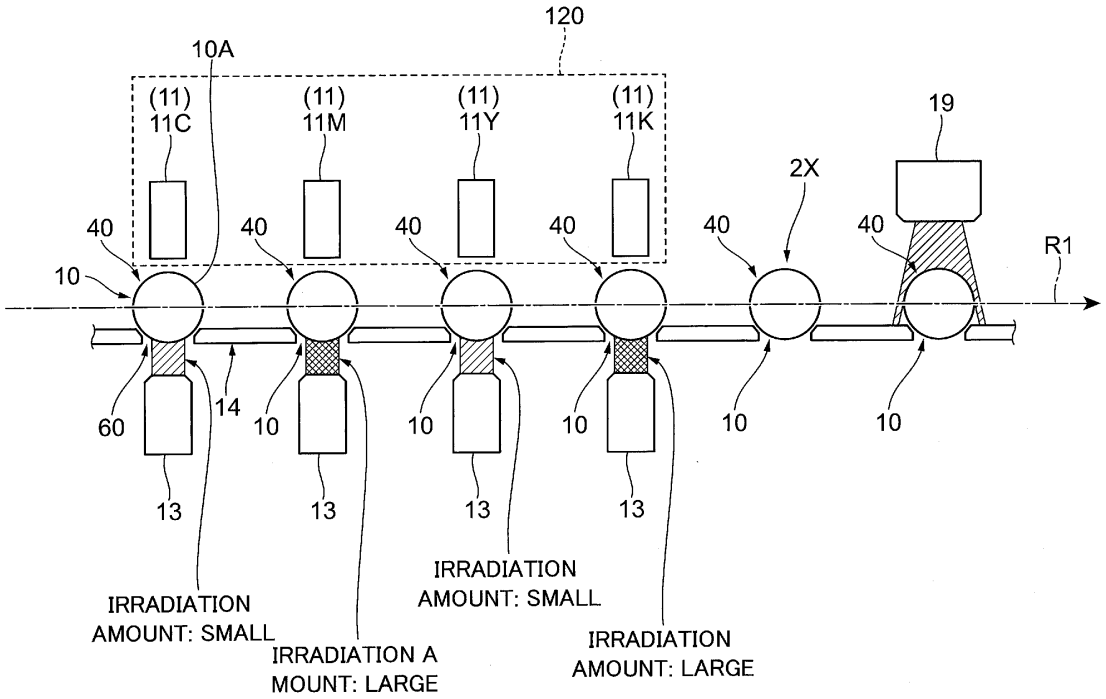
(54) **IMAGE FORMATION DEVICE**

(57) The amount of ultraviolet light irradiated by the light sources 13 provided corresponding to the magenta inkjet head 11M and the black inkjet head 11K is larger than the amount of ultraviolet light irradiated by the light sources 13 provided corresponding to the cyan inkjet head 11C and the yellow inkjet head 11Y.

FIG.2



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Description

Technical Field

[0001] The present invention relates to an image formation device.

Background Art

[0002] Patent document 1 discloses a process in which a white layer is formed on the surface of a can body by a white inkjet head, followed by irradiation of ultraviolet rays thereon by an irradiation lamp.

Citation List

Patent Literature

[0003] Patent Document 1: Japanese Patent Application Laid-Open Publication No.2015-083480

Summary of Invention

Technical Problem

[0004] In forming an image on a can body, an embodiment is considered in which a curing unit is provided for each image forming unit, and each time an image is formed on the can body, the image is cured by irradiating the can body with light such as ultraviolet light.

[0005] Here, if the amount of light irradiation in each of the curing units is the same, the amount of light irradiation to the image that is not intended to be cured may be too much, or conversely, the amount of light irradiation to the image that is intended to be cured may be insufficient.

[0006] The purpose of the present invention is to make it possible to differentiate the amount of light irradiated to an image for each image formed by the image forming units.

Solution to Problem

[0007] The image formation device to which the present invention is applied is an image formation device including: plural image forming units configured to form an image on a can body, and a curing unit provided corresponding to each of the plural image forming units, the curing unit being configured to irradiate a can body on which the image has been formed by the image forming units with light to cure the image, wherein an irradiation amount of light irradiated to the can body by one curing unit included in plural curing units is different from an irradiation amount of light irradiated to the can body by an other curing unit included in the plural curing units.

[0008] Here, the irradiation amount of light irradiated to the can body by the one curing unit may be different from the irradiation amount of light irradiated to the can body by the other curing unit by differentiating an irradiating time to irradiate the can body with light by the one curing unit from an irradiating time to irradiate the can body with light by the other curing unit.

[0009] In addition, the irradiation amount of light irradiated to the can body by the one curing unit may be different from the irradiation amount of light irradiated to the can body by the other curing unit by differentiating an output when irradiating the can body with light by the one curing unit from an output when irradiating the can body with light by the other curing unit.

[0010] In addition, the plural image forming units may include an image forming unit configured to form an image including a character image on the can body and an image forming unit configured to form an image without a character image on the can body, and the irradiation amount of light by the curing unit provided corresponding to the image forming unit configured to form the image including the character image may be larger than the irradiation amount of light by the curing unit provided corresponding to the image forming unit configured to form the image without the character image.

[0011] In addition, an irradiation of light to the can body by the curing unit provided corresponding to the image forming unit configured to form the image including the character image may be performed prior to an irradiation of light to the can body by the curing unit provided corresponding to the image forming unit configured to form the image without the character image.

[0012] In addition, the image forming unit and the curing unit provided corresponding to the image forming unit may be provided in plural pairs, and processing by each pair may be performed in order, and among light irradiations to the can body that are performed in order, the irradiation of light by the curing unit provided corresponding to the image forming unit configured to form the image including the character image may be performed first.

[0013] In addition, the irradiation amount of light to the can body by the curing unit provided corresponding to the image forming unit configured to form a black image on the can body may be larger than the irradiation amount of light to the can body by the curing unit provided corresponding to the image forming unit configured to form an image of a color other than black on the can body.

[0014] In addition, an irradiation of light to the can body by the curing unit provided corresponding to the image forming unit configured to form the black image may be performed prior to an irradiation of light to the can body by the curing unit provided corresponding to the image forming unit configured to form the image of a color other than black.

[0015] In addition, the image forming unit and the curing unit provided corresponding to the image forming unit may be provided in plural pairs, and processing by each pair may be performed in order, and among light irradiations to the can body that are performed in order, the irradiation of light by the curing unit provided corresponding to the image forming unit configured to form the black

image may be performed first.

[0016] In addition, the image formation device may further include a blocking section which is positioned at a facing position when the can body is not positioned at the facing position of the curing unit and configured to block the light from the curing unit.

[0017] In addition, the blocking section may be provided to move in conjunction with the can body which is moving, and the blocking section may be positioned at the facing position when the can body is not positioned at the facing position, and may be positioned at a point displaced from the facing position when the can body is positioned at the facing position.

[0018] In addition, the curing unit may be arranged at an opposite side of an installation side of the image forming unit across the can body arranged at a facing position of the image forming unit.

[0019] In addition, the image formation device may further include a blocking section which is positioned between the image forming unit and the curing unit when the can body is not positioned as the facing position of the image forming unit, and may be configured to block light going from the curing unit to the image forming unit.

Advantageous Effects of Invention

[0020] According to the present invention, it is possible to differentiate the amount of light irradiated to an image for each image formed by the image forming units.

Brief Description of Drawings

[0021]

FIG. 1 shows a top view of an image formation device.

FIG. 2 shows a diagram of the image forming section viewed from a direction indicated by an arrow II in FIG. 1.

FIG. 3 illustrates a state when the can body moves from the state shown in FIG. 2 and the can body is positioned between the stopping points.

FIG. 4 illustrates an example of an image formed by the image forming section.

FIG. 5 illustrates another example of the configuration of the image forming section.

FIG. 6 illustrates another example of the configuration of the image forming section.

FIG. 7 illustrates another example of an image formed on the can body.

FIGS. 8A to 8D illustrate other examples of images formed on the can body.

FIG. 9 illustrates another example of an image formed on the can body.

FIGS. 10A to 10D illustrate other examples of images formed on the can body.

FIG. 11 illustrate another example of an image formed on the can body.

FIGS. 12A to 12D illustrate other examples of images formed on the can body.

Description of Embodiment

[0022] Hereinafter, an exemplary embodiment according to the present invention will be described with reference to attached drawings.

[0023] FIG. 1 shows a top view of an image formation device 1 according to the exemplary embodiment.

[0024] The image formation device 1 of the exemplary embodiment is provided with a can body supply section 510 to which can body 10 is supplied. In the can body supply section 510, the can body 10 is attached (supplied) to a support member 20 that supports the can body 10.

[0025] The support member 20 is formed in a cylindrical shape, and the support member 20 is inserted into the cylindrical can body 10, thereby the can body 10 is attached to the support member 20.

[0026] The image formation device 1 is provided with a can body discharge section 520 where the can body 10 after an image has been formed is discharged.

[0027] In the can body discharge section 520, the can body 10 is removed from the support member 20 as well as the can body 10 is discharged to an outside of the image formation device 1.

[0028] In the exemplary embodiment, a can body moving mechanism 100 is provided as an example of a can body moving unit for moving the can body 10.

[0029] The can body moving mechanism 100 moves the can body 10 so that the can body 10 moves around a predetermined center 30.

[0030] The can body moving mechanism 100 stops the can body 10 at each of plural stopping points 40. More specifically, the can body 10 is stopped below each of plural inkjet heads 11 (details will be described later).

[0031] In the exemplary embodiment, a disk-shaped rotating member 110 that rotates with the center 30 as the center of rotation is provided as the can body moving mechanism 100.

[0032] In the exemplary embodiment, plural support members 20 (can bodies 10) are supported by this rotating member 110.

[0033] More specifically, in the exemplary embodiment, connecting members 117 are provided to connect the rotating member 110 and the support members 20, and the support members 20 are supported by the rotating member 110 via the connecting member 117.

[0034] Each of the connecting members 117 protrudes from an outer circumferential surface 110A of the rotating member 110 toward an outer direction in a radial direction of the rotating member 110. The connecting members 117 are arranged radially around the center 30.

[0035] In the exemplary embodiment, the support member 20 is attached to an end of each of these connection members 117, and further, the can bodies 10 are supported by the support members 20 in the exemplary

embodiment.

[0036] The plural support members 20 (can bodies 10) are arranged in line in a circumferential direction of the rotating member 110 as shown in FIG. 1. The plural support members 20 (can bodies 10) are arranged radially around the center 30.

[0037] The can body moving mechanism 100 is provided with a first motor M1 that rotates the rotating member 110. Furthermore, in the exemplary embodiment, a second motor (not shown) is provided corresponding to each of the support members 20 and rotates the support members 20 (can bodies 10) in the circumferential direction.

[0038] The second motor is housed, for example, inside the connecting member 117. The second motor may, for example, be provided inside the rotating member 110. When the second motor is provided inside the rotating member 110, a rotational drive force is transmitted from the second motor provided inside the rotating member 110 to the support member 20 via a drive force transmission member such as a gear, for example.

[0039] In the exemplary embodiment, a control device 60 that controls each section of the image formation device 1 is provided.

[0040] The control device 60 controls the rotation of the first motor M1, thereby the rotating member 110 rotates intermittently. In the exemplary embodiment, the intermittent rotation of the rotating member 110 repeatedly moves the can body 10 and stops the can body 10 at the stopping points 40.

[0041] As a result, in the exemplary embodiment, the can body 10 stops below each of the inkjet heads 11 described below.

[0042] In the exemplary embodiment, when the second motor is driven and the can body 10 is positioned at least below the inkjet head 11, the support member 20 is rotated.

[0043] As a result, when the image is formed by the inkjet head 11, the can body 10 rotates in a circumferential direction and the image is formed over an entire circumference of the can body 10.

[0044] In the exemplary embodiment, as the rotating member 110 rotates, the can body 10 (support member 20) moves along a predetermined circular route R1 (hereinafter referred to as "a can body movement route R1"). In other words, in the exemplary embodiment, the can body 10 moves around the center 30 as the rotating member 110 rotates.

[0045] Here, in the exemplary embodiment, "the can body 10 moves along the circular route" does not mean that the can body 10 moves along the entire circumference of the circular route, but mean that the can body 10 moves along at least a part of the circular route.

[0046] In a movement direction of the can body 10, an image forming section 120 is provided at a downstream side of the can body supply section 510. In the image forming section 120, an image formation is performed on the can body 10.

[0047] The image forming section 120 is provided with plural inkjet heads 11. These inkjet heads 11, which are an example of image forming units, are provided corresponding to each of the stopping points 40 and form images on the can body 10 positioned at the stopping points 40. As a result, in the exemplary embodiment, an image is formed on an outer surface 10A of the can body 10.

[0048] In the exemplary embodiment, ink is ejected from the inkjet head 11 to the can body 10 positioned below, thereby an image is formed on the can body 10.

[0049] In the exemplary embodiment, a so-called inkjet printing method is used to form an image on the can body 10 which is positioned at the stopping point 40 and rotating in the circumferential direction.

[0050] In the exemplary embodiment, inkjet heads 11 for four colors are provided as the inkjet heads 11.

[0051] Specifically, an inkjet head 11C that ejects cyan ink, an inkjet head 11M that ejects magenta ink, an inkjet head 11Y that ejects yellow ink, and an inkjet head 11K that ejects black ink are provided.

[0052] Other inkjet heads 11 that eject inks of colors other than the above four, such as inkjet head 11 that ejects white ink and inkjet head 11 that ejects transparent ink, may also be provided.

[0053] In the exemplary embodiment, the case in which four inkjet heads 11 are provided will be described as an example, however, the number of installed inkjet heads 11 is not particularly limited, thus the inkjet heads 11 with a number other than four may be provided.

[0054] The four inkjet heads 11 of the inkjet heads 11C to 11K form images on the can body 10 using UV-curable ink.

[0055] In other words, these four inkjet heads 11 form images on the can body 10 using photo-curable inks that cure when irradiated with light such as UV light.

[0056] Here, image formation by the inkjet printing method refers to image formation by ejecting ink from the inkjet heads 11 and adhering the ink to the can body 10.

[0057] Known methods can be used for image formation by the inkjet printing method. Specifically, for example, the piezo method, thermal (bubble) method and continuous method or the like can be used.

[0058] FIG. 2 shows a diagram of the image forming section 120 viewed from a direction indicated by an arrow II in FIG. 1. In other words, FIG. 2 shows a view of the image forming section 120 from a lateral direction of the image formation device 1.

[0059] When the image forming section 120 is viewed from the direction indicated by the arrow II in FIG. 1, side surfaces of each of the inkjet heads 11 or the like shown in FIG. 1 can also be seen actually. However, in FIG. 2 shows a state where each of the inkjet heads 11, the can bodies 10, and light sources 13 are viewed from an axial direction.

[0060] In the exemplary embodiment, as shown in FIG. 2, plural light sources 13 are provided as an example of curing units. The light sources 13 are provided corre-

sponding to each of the plural stopping points 40. In other words, the light sources 13 are provided corresponding to each of the plural inkjet heads 11.

[0061] The light source 13 is composed of LED (Light Emitting Diode), for example. The light source 13 may be configured with other than LED.

[0062] The light source 13 irradiates ultraviolet light (light with wavelengths in the ultraviolet region) (hereinafter, referred to as "ultraviolet light"), which is an example of light, onto the can body 10 on which the image has been formed by the inkjet head 11 to cure the image formed on the can body 10.

[0063] In the exemplary embodiment, a light path of the ultraviolet light from the light source 13 to the can body 10 is linear. As a result, in the exemplary embodiment, compared to the case where the ultraviolet light is diffused, energy consumption can be reduced and the ultraviolet light can be prevented from going to areas other than the can body 10.

[0064] The light source 13 is provided on an opposite side of an installation side of the inkjet head 11 across the can body movement route R1 that is the route along which the can body 10 moves.

[0065] In other words, the light source 13 is arranged on the opposite side of the installation side of the inkjet head 11 across the can body 10 that is positioned at a facing position of the inkjet head 11.

[0066] The light source 13 irradiates ultraviolet light, as an example of light, from below to the can body 10 which is stopped at the stopping point 40 and rotating in the circumferential direction. As a result, the image formed on the outer circumferential surface 10A of the can body 10 is cured.

[0067] In the exemplary embodiment, as shown in FIG. 2, a blocking section 14 is provided to block the ultraviolet light from the light source 13.

[0068] The blocking section 14 is arranged between the can bodies 10 adjacent to each other as also shown in FIG. 1. In other words, the blocking section 14 is arranged between the support members 20 adjacent to each other.

[0069] The blocking section 14 is fixed to the rotating member 110 by a connecting member 118 (see FIG. 1). Therefore, in the exemplary embodiment, when the can body 10 moves due to rotation of the rotating member 110, the blocking section 14 also moves. In other words, in the exemplary embodiment, the blocking section 14 moves in conjunction with the can body 10.

[0070] FIG. 3 illustrates a state when the can body 10 moves from the state shown in FIG. 2 and the can body 10 is positioned between the stopping points 40.

[0071] The blocking section 14 in the exemplary embodiment is, as shown in FIG. 3, positioned at a facing position when the can body 10 is not positioned at the facing position of the light source 13. As a result, the light from the light source 13 is blocked by the blocking section 14.

[0072] More specifically, the blocking section 14 is positioned between the inkjet head 11 and the light source 13 when the can body 10 is not positioned at the facing position of the inkjet head 11, and blocks the light going from the light source 13 to the inkjet head 11.

[0073] In the exemplary embodiment, when the can body 10 is not positioned at the stopping point 40, the blocking section 14 is positioned on a route R2 along which the ultraviolet light from the light source 13 is directed to the inkjet head 11 positioned at a facing point of the light source 13.

[0074] As a result, the ultraviolet light from the light source 13 does not reach the inkjet head 11, thereby preventing defects such as ink curing in the inkjet head 11.

[0075] In the exemplary embodiment, the blocking section 14 is composed of a plate-shaped member arranged along a horizontal direction.

[0076] As described above, the blocking section 14 moves in conjunction with the moving can body 10. Specifically, the blocking section 14 is, as described above, fixed to the rotating member 110 (see FIG. 1) to which the can body 10 is fixed, thus the blocking section 14 moves with the can body 10 in conjunction with the can body 10.

[0077] As described above, when the can body 10 is not positioned at the facing position of the inkjet head 11, the blocking section 14 is positioned at the facing position and blocks the ultraviolet light going from the light source 13 to the inkjet head 11.

[0078] On the other hand, as shown in FIG. 2, when the can body 10 is positioned at the facing position of the inkjet head 11, the blocking section 14 is positioned at a point displaced from the facing position. As a result, the irradiation of ultraviolet light from the light source 13 to the can body 10 is performed.

[0079] In the exemplary embodiment, as shown in FIG. 3, the plural blocking sections 14 are provided and provided in a form corresponding to each of the plural inkjet heads 11.

[0080] The light source 13 will be further described by referring to FIG. 2.

[0081] In the exemplary embodiment, plural light sources 13 are provided.

[0082] In the exemplary embodiment, the amount of ultraviolet light irradiated from each of the light sources 13 to the can body 10 is not the same. The amount of ultraviolet light irradiated to the can body 10 by one light source 13 included in the plural light sources 13 is different from the amount of ultraviolet light irradiated to the can body 10 by another light source 13 included in the plural light sources 13.

[0083] Here, images that should not be blurred such as character images or code images such as barcodes may be formed on the can body 10.

[0084] On the other hand, in order to cover a wider area of a bare surface of the can body 10 with the image, a background image or the like may be formed on the can body 10 by being intentionally blurred.

[0085] In this case, it is preferable to increase the amount of ultraviolet light irradiation by the light source 13 provided corresponding to the inkjet head 11 that forms the image not intended to be blurred on the can body 10 (hereinafter referred to as "a first irradiation amount") larger than the amount of ultraviolet light irradiation by the light source 13 provided corresponding to the inkjet head 11 that forms the image on the can body 10 intended to be blurred (hereinafter referred to as " a second irradiation amount).

[0086] As described above, when the amount of ultraviolet light irradiated to the can body 10 by one light source 13 and the amount of ultraviolet light irradiated to the can body 10 by another light source 13 are different, the first irradiation amount can be larger than the second irradiation amount.

[0087] When the first irradiation amount is larger than the second irradiation amount, blur can be suppressed for the image not intended to be blurred such as character images or code images. Moreover, for images such as background images intended to be blurred and expanded, it is possible to secure the expansion of a dot image configuring the image.

[0088] In the specific example shown in FIG. 2, the amount of ultraviolet light irradiated by the light sources 13 provided corresponding to the magenta inkjet head 11M and the black inkjet head 11K is larger than the amount of ultraviolet light irradiated by the light sources 13 provided corresponding to the cyan inkjet head 11C and the yellow inkjet head 11Y.

[0089] In this case, it is possible to suppress the blur from occurring in the images formed by the magenta inkjet head 11M and the black inkjet head 11K.

[0090] In addition, each dot image configuring the image formed by the cyan inkjet printhead 11C and the yellow inkjet printhead 11Y is blurred to be expanded.

[0091] As in the exemplary embodiment, in order to differentiate the amount of ultraviolet light irradiated to the can body 10 by one light source 13 from the amount of ultraviolet light irradiated to the can body 10 by another light source 13, for example, plural light sources 13 with the same output are prepared, and an irradiation time to irradiate the can body 10 with ultraviolet light by one light source 13 and an irradiation time to irradiate the can body 10 with ultraviolet light by another light source 13 are differentiated.

[0092] Specifically, for example, on/off control is performed on the light sources 13 to differentiate the irradiation time of one light source 13 from the irradiation time of another light source 13 so that the amount of ultraviolet light irradiated to the can body 10 by one light source 13 is different from the amount of ultraviolet light irradiated to the can body 10 by another light source 13.

[0093] In this way, when on/off control is performed on the light sources 13, energy consumption is reduced compared to the case where the light sources 13 are kept on all the time.

[0094] For example, a shutter member that can move back and forth may be provided, and by moving the shutter member back and forth on a optical path of the ultraviolet light, the amount of ultraviolet light irradiated to the can body 10 by one light source 13 and the amount of ultraviolet light irradiated to the can body 10 by another light source 13 may be different.

[0095] For example, a slit may be provided to allow the ultraviolet light to pass therethrough, and the width of the slit may be widened or narrowed so that the amount of ultraviolet light irradiated to the can body 10 by one light source 13 is different from the amount of ultraviolet light irradiated to the can body 10 by another light source 13.

[0096] In addition, for example, the distance between the can body movement route R1 and the light sources 13 may be made different for each light source 13, so that the amount of ultraviolet light irradiated to the can body 10 by one light source 13 is different from the amount of ultraviolet light irradiated to the can body 10 by another light source 13.

[0097] For example, in the image formation device 1 in which each of the can bodies 10 moves individually, the amount of ultraviolet light irradiated to the can body 10 by one light source 13 and the amount of ultraviolet light irradiated to the can body 10 by another light source 13 may be different by differentiating a stopping time of the can bodies 10 at the stopping point 40.

[0098] More specifically, for example, in the image formation device 1, plural moving bodies each of which has a drive source and can be moved individually may be provided, and the individual can body 10 may be moved by these moving bodies.

[0099] In this case, by differentiating the stopping time of these moving bodies at the stopping points 40 for each of the stopping points 40, the amount of ultraviolet light irradiated to the can body 10 by one light source 13 can be different from the amount of ultraviolet light irradiated to the can body 10 by another light source 13.

[0100] When the amount of ultraviolet light irradiated to the can body 10 by one light source 13 and the amount of ultraviolet light irradiated to the can body 10 by another light source 13 are to be differentiated, for example, an output when one light source 13 irradiates ultraviolet light to the can body 10 and an output when another light source 13 irradiates ultraviolet light to the can body 10 may be different.

[0101] To differentiate the output when one light source 13 irradiates the can body 10 and the output when another light source 13 irradiates the can body 10, for example, plural types of light sources 13 with different outputs are prepared.

[0102] The light source 13 with a larger output is provided at the stopping points 40 where the amount of ultraviolet light irradiated to the can body 10 is to be increased, while the light source 13 with a smaller output is provided at the stopping points 40 where the amount of ultraviolet light irradiated to the can body 10 is to be decreased.

[0103] In another case, for example, by differentiating

the amount of power supplied to the light source 13 for each light source 13, the amount of ultraviolet light irradiated to the can body 10 by one light source 13 may be different from the amount of ultraviolet light irradiated to the can body 10 by another light source 13.

[0104] Further, in another case, when the amount of ultraviolet light irradiated to the can body 10 by one light source 13 is to be differentiated from the amount of ultraviolet light irradiated to the can body 10 by another light source 13, both of the irradiation time and the output may be different.

[0105] Specifically, for example, the irradiation time and the output when one light source 13 irradiates the can body 10 with ultraviolet light may be different from the irradiation time and the output when another light source 13 irradiates the can body 10 with ultraviolet light.

[0106] The "irradiation amount" can be obtained by the product of the irradiation time and the output of the light sources 13. It can be said that the amount of the ultraviolet light irradiated to the can body 10 by one light source 13 and the amount of the ultraviolet light irradiated to the can body 10 by another light source 13 are different means a state where this product is different from each other.

[0107] The "irradiation amount" is a concept that also includes zero. When the output or the irradiation time of any one of one light source 13 and another light source 13 is zero and the output or the irradiation time of the other light source 13 is not zero, it can also be said that the amount of ultraviolet light irradiated to the can body 10 by one light source 13 is different from the amount of ultraviolet light of another source 13.

[0108] In the exemplary embodiment, as shown in FIG. 2, in the moving direction of the can body 10, on the downstream side of the image forming section 120, a downstream light source 19 is provided which irradiates ultraviolet light to the can body 10 after the image has been formed by the image forming section 120.

[0109] This downstream light source 19 serves as a light source for finishing. In the exemplary embodiment, the amount of ultraviolet light irradiated by this downstream light source 19 is larger than the amount of ultraviolet light irradiated by each of the light sources 13.

[0110] More specifically, in the exemplary embodiment, the output of the downstream light source 19 is larger than the output of each of the light sources 13, and thus the amount of ultraviolet light irradiated by the downstream light source 19 is larger than the amount of ultraviolet light irradiated by each of the light sources 13.

[0111] In the exemplary embodiment, as indicated by a sign 2X in FIG. 2, a stopping point 40 where no light source 13 is provided is provided between the image forming section 120 and the downstream light source 19.

[0112] In other words, between the image forming section 120 and the downstream light source 19, there is a stopping point 40 where ultraviolet light is not irradiated.

[0113] In the exemplary embodiment, there is one stopping point 40 where the light source 13 is not provided, however, there may be two or more.

[0114] After image formation by the image forming section 120 and before the can body 10 reaches the downstream light source 19, there may be a case where the dot image constituting the image on the can body 10 is intentionally blurred to expand the dot image.

[0115] In this case, if there are no stopping points 40 where the light source 13 is not provided, and if ultraviolet light irradiation by the downstream light source 19 is performed immediately after the image is formed, the degree of dot image expansion will be small.

[0116] On the other hand, if there is more than one stopping point 40 where light source 13 is not provided as in the exemplary embodiment, time is secured for the dot image to expand, and the dot image expands more.

[0117] When the downstream light source 19 finishes irradiating the ultraviolet light, the can body 10 moves to the can body discharge section 520 (see FIG. 1).

[0118] In the exemplary embodiment, the can body 10 is removed from the support member 20 at the can body discharge section 520, and the can body 10 is discharged to the outside of the image formation device 1.

[0119] The can body 10 discharged to the outside of the image formation device 1 is sequentially transferred to, for example, a coating process for applying transparent paint to the outer surface 10A of the can body 10 and a heating process for heating the can body 10 coated with the transparent paint.

[0120] When the transparent paint is applied to the outer surface 10A of the can body 10, a protective layer is formed on the outermost layer of the can body 10. The protective layer is cured by heating the can body 10 in the heating process.

[0121] FIG. 4 illustrates an example of an image formed by the image forming section 120.

[0122] In the exemplary embodiment, an image 70 shown in FIG. 4 is formed over the entire outer circumferential surface 10A of the can body 10. Specifically, the image 70 is formed so that a long side 71 of the image 70 shown in FIG. 4 is along the circumferential direction of the can body 10, and a short side 72 of the image 70 shown in FIG. 4 is along the axial direction of the can body 10.

[0123] The image 70 includes a background image 91 that covers a bare surface of the can body 10, a character image 92, and a code image 93 composed of a bar code or the like.

[0124] In the exemplary embodiment, the character image 92 includes a vertical character image 92A in which characters are aligned along the axial direction of the can body 10, a horizontal character image 92B in which characters are aligned along the circumferential direction of the can body 10, and a numeric character image 92C in which characters representing numbers are aligned.

[0125] In the exemplary embodiment, as indicated by a sign 4B in FIG. 4, the background image 91 is composed of cyan ink and yellow ink. The blending ratio of the inks forming the background image 91 is 50% of cyan

and 50% of yellow.

[0126] The vertical character image 92A and horizontal character image 92B in the character image 92 are composed of black ink. The blending ratio of the inks forming the vertical character image 92A and the horizontal character image 92B is 100% of black.

[0127] In the exemplary embodiment, the code image 93 is also composed of black ink. The ratio of the ink that forms the code image 93 is 100% of black.

[0128] In the exemplary embodiment, the numeric character image 92C included in the character image 92 is composed of magenta ink, cyan ink, and black ink. The blending ratio of the inks that form the numeric character image 92C is 80% of magenta, 10% of cyan, and 10% of black.

[0129] In this case, in the exemplary embodiment, the irradiation amount of ultraviolet light at the stopping point 40 where each of the cyan inkjet head 11C, magenta inkjet head 11M, yellow inkjet head 11Y, and black inkjet head 11K are arranged is 75%, 100%, 25%, and 100%, respectively, as indicated by a sign 4D.

[0130] Here, each of these irradiation amounts is the irradiation amount when the amount of ultraviolet light from the light source 13 corresponding to the black ink whose irradiation amount is the highest is 100%.

[0131] As described above, in the exemplary embodiment, for the background image 91, there is a desire to reduce the irradiation amount of ultraviolet light and intentionally blur the ink.

[0132] Therefore, in the exemplary embodiment, for the yellow ink that constitutes the background image 91, the amount of ultraviolet light irradiation is reduced to 25% as shown in the sign 4D.

[0133] For cyan which constitutes the background image 91, the irradiation amount of ultraviolet light is not set to 100%, and the irradiation amount is set to 75% which is smaller than 100%.

[0134] Since cyan ink is also used to form the numeric character image 92C, blur is not acceptable so much. Therefore, for cyan ink, the irradiation amount is not as small as 25% which is the irradiation amount for yellow, but is set at 75% which is smaller than 100%.

[0135] Furthermore, in the exemplary embodiment, for magenta and black inks, the irradiation amount of ultraviolet light is increased and set to 100% because magenta and black inks are used to form the vertical character image 92A, the horizontal character image 92B, and the numeric character image 92C, which are examples of the character images 92.

[0136] Since magenta and black are not used to form the background image 91, the irradiation amount of ultraviolet light is increased and is set to 100%.

[0137] In the exemplary embodiment, for black, it is also used to form the code image 93. In order to suppress blur of the code image 93, the irradiation amount of ultraviolet light for black is set to 100%.

[0138] In the exemplary embodiment, the plural inkjet heads 11 (see FIG. 2) include inkjet heads 11 that form images including the character image 92 on the can body 10 and inkjet heads 11 that form images without the character image 92 on the can body 10.

[0139] Specifically, the magenta, black, and cyan inkjet heads 11M, 11K, and 11C are provided as the inkjet heads 11 that form images including character images 92 on the can body 10.

[0140] In addition, the yellow inkjet head 11Y is provided as the inkjet head 11 that forms images without the character image 92 on the can body 10.

[0141] In the exemplary embodiment, the irradiation amount of ultraviolet light by the light source 13 provided corresponding to each of the magenta, black, and cyan inkjet heads 11M, 11K, and 11C which form images including the character image 92 is larger than the irradiation amount of ultraviolet light by the light source 13 provided corresponding to the yellow inkjet head 11Y that forms images without the character image 92.

[0142] Specifically, the irradiation amount of ultraviolet light by the light source 13 provided corresponding to each of the magenta, black, and cyan inkjet heads 11M, 11K, and 11C which form images including the character image 92 is 100%, 100%, and 75%, respectively, as indicated by the sign 4D in FIG. 4.

[0143] On the other hand, the irradiation amount of ultraviolet light by the light source 13 provided corresponding to the yellow inkjet head 11Y which forms images without the character image 92 is 25%.

[0144] In the exemplary embodiment, the black inkjet head 11K is provided as the inkjet head 11 that forms the image including the code image 93 on the can body 10.

[0145] In this processing example, cyan, magenta, and yellow inkjet heads 11C, 11M, and 11Y are provided as the inkjet heads 11 that form images without codes on the can body 10.

[0146] In the exemplary embodiment, the irradiation amount of ultraviolet light by the light source 13 provided corresponding to the black inkjet head 11K which forms the image including the code image 93 is 100%, while the irradiation amount of ultraviolet light by the light source 13 provided corresponding to the cyan and yellow inkjet head 11C and 11Y which form the image without the code image 93 is 75% and 25% respectively.

[0147] That is, the irradiation amount of ultraviolet light irradiated by the light source 13 provided corresponding to the black inkjet head 11K which forms the image including the code image 93 is larger than the irradiation amount of ultraviolet light irradiated by the light source 13 provided corresponding to the cyan and yellow inkjet heads 11C and 11Y which form the image without the code image 93.

[0148] In the exemplary embodiment, the irradiation amount of ultraviolet light irradiated to the can body 10 by the light source 13 provided corresponding to the inkjet head 11K which forms black images is larger than the irradiation amount of ultraviolet light irradiated to the can body 10 by the light source 13 provided corresponding

to the inkjet heads 11C and 11Y which form cyan and yellow images on the can body 10, which are colors other than black.

[0149] Specifically, the irradiation amount of ultraviolet light irradiated to the can body 10 by the light source 13 provided corresponding to the inkjet head 11K that forms the black image is 100%.

[0150] On the other hand, the irradiation amount of ultraviolet light irradiated to the can body 10 by the light source 13 provided corresponding to the inkjet heads 11C and 11Y which form cyan and yellow images on the can body 10 is 75% and 25%, respectively.

[0151] In forming the character image 92 and code image 93, at least black ink is often used.

[0152] Therefore, if the irradiation amount of ultraviolet light by the light source 13 provided corresponding to the inkjet head 11K that forms the black image on the can body 10 is increased more than the irradiation amount of ultraviolet light by the light source 13 provided corresponding to the inkjet head 11 that forms images of colors other than black on the can body 10, the blur of the character image 92 and code image 93 can be suppressed.

[0153] FIG. 5 illustrates another example of the configuration of the image forming section 120.

[0154] In this configuration example, in the movement direction of the can body 10, the black inkjet head 11K is positioned second from the downstream side and the yellow inkjet head 11Y is positioned at the most downstream side.

[0155] In this configuration example, the irradiation of ultraviolet light to the can body 10 by the light source 13 provided corresponding to the black inkjet head 11K which forms images including the character image 92 and the code image 93 is performed prior to the irradiation of ultraviolet light to the can body 10 by the yellow inkjet head 11Y which forms images without the character image 92 and the code image 93.

[0156] In the above example, since the yellow is used to form the background image 91, it is preferable to reduce the amount of ultraviolet light irradiation to the image formed by this yellow ink.

[0157] In this case, as shown in FIG. 2, if the yellow inkjet head 11Y is positioned upstream from the black inkjet head 11K, when the formed yellow image reaches the black inkjet head 11K, the amount of ultraviolet light irradiation to the yellow image increases thus the curing of the yellow image is accelerated.

[0158] More specifically, when it is intended to expand the dot images constituting the yellow image over a longer period of time, if a light source 13 with a higher irradiation amount corresponding to the black inkjet head 11K is provided immediately downstream of the yellow inkjet head 11Y as shown in FIG. 2, this light source 13 accelerates the curing of the dot images that constitute the yellow image.

[0159] In contrast, as shown in FIG. 5, if the black inkjet head 11K is positioned upstream from the yellow inkjet head 11Y, the yellow image is not be affected by the light source 13 provided corresponding to the black inkjet head 11K.

[0160] In other words, in the configuration example shown in FIG. 5, the irradiation of ultraviolet light to the can body 10 by the light source 13 provided corresponding to the inkjet head 11K that forms a black image is performed prior to the irradiation of ultraviolet light to the can body 10 by the light source 13 provided corresponding to the inkjet head 11Y that forms a yellow image, which is an example of a color other than black.

[0161] As a result, the irradiation of ultraviolet light to the yellow image is suppressed, thus the expansion of the dot images constituting the yellow image is easily ensured.

[0162] FIG. 6 shows another example of the configuration of the image forming section 120. In this configuration example, the black inkjet head 11K is positioned at the most upstream.

[0163] In the exemplary embodiment, the inkjet head 11 and the light source 13 provided corresponding to the inkjet head 11 are provided in plural pairs, and processing by each pair is performed in order.

[0164] In this configuration example shown in FIG. 6, among the ultraviolet light irradiations to the can body 10 that are performed in order, the ultraviolet light irradiation by the light source 13 provided corresponding to the inkjet head 11K that forms the black image is performed first.

[0165] In other words, in this configuration example shown in FIG. 6, among the ultraviolet light irradiations to the can body 10 that are performed in order, the ultraviolet light irradiation by the light source 13 provided corresponding to the black inkjet head 11K which forms the image including the character image 92 is performed first.

[0166] In the exemplary embodiment described in FIG. 4, the amount of ultraviolet light irradiated by the light source 13 provided corresponding to the black inkjet head 11K is the largest.

[0167] In the configuration example shown in FIG. 6, the light source 13 with the largest irradiation amount is arranged at the most upstream side in the movement direction of the can body 10, so that the ultraviolet light irradiation by this light source 13 is performed first.

[0168] As a result, the images such as yellow images and cyan images which require less ultraviolet light irradiation than black images are not affected by the light source 13 provided corresponding to the black inkjet head 11K.

[0169] In the configuration example shown in FIG. 6, the inkjet head 11 and the light source 13 are arranged in order from the one with the largest amount of ultraviolet light irradiation by light source 13.

[0170] In the exemplary embodiment shown in FIG. 4, as indicated by the sign 4D, the amount of ultraviolet light irradiation is in the order of black, magenta, cyan, yellow, or magenta, black, cyan, yellow.

[0171] In this case, for example, as shown in FIG. 6, it is preferable that the inkjet head 11 and the light source 13 provided corresponding to the inkjet head 11 be pro-

vided in the order of black, magenta, cyan, and yellow from upstream to downstream in the movement direction of the can body 10.

[0172] Alternatively, although illustration is omitted, it is preferable that the inkjet head 11 and the light sources 13 provided corresponding to the inkjet head 11 be provided in the order of magenta, black, cyan, and yellow.

[0173] In this case, when two light sources 13 adjacent to each other in the movement direction of the can body 10 are compared, the amount of irradiation by the light source 13 that performs irradiation first is larger than the amount of irradiation by the light source 13 that performs irradiation later. Or, the amount of irradiation by the light source 13 that performs irradiation first is equal to the amount of irradiation by the light source 13 that performs irradiation later.

[0174] FIG. 7 and FIGS. 8A to 8D illustrate another example of an image formed on the can body 10.

[0175] FIG. 7 shows a state of the image 70 after the image formation on the can body 10 by the image forming section 120 is completed. In other words, FIG. 7 shows the state of the image 70 after the inks of the four colors have been placed on the can body 10.

[0176] The image 70 shown in FIG. 7 has a clear outline of each component of the image.

[0177] FIGS. 8A to 8D show an image formed by the cyan inkjet head 11C, an image formed by the black inkjet head 11K, an image formed by the magenta inkjet head 11M, and an image formed by the yellow inkjet head 11Y, respectively.

[0178] In other words, the images shown in FIGS. 8A to 8D are images formed based on an image data of each color obtained by a color separation process of original image data of the images shown in FIG. 7.

[0179] In each of FIG. 7 and FIGS. 8A to 8D, areas with darker shading are areas where the image density is larger and more ink is deposited.

[0180] In this processing example, as indicated by a sign 8X in FIG. 8, the amount of ultraviolet light irradiation by the light source 13 is 75%, 100%, 75%, and 50% for cyan, black, magenta, and yellow, respectively.

[0181] In this processing example, the character image 92 positioned at a portion indicated by a sign 7A in FIG. 7 is formed mainly by black ink, as shown in FIG. 8B. Furthermore, this character image 92 positioned at the portion indicated by the sign 7A in FIG.7 is small and fine.

[0182] Therefore, in this processing example, as indicated by a sign 8X in FIG. 8, the amount of ultraviolet light irradiation by the light source 13 corresponding to black is set to 100%.

[0183] In this processing example, as shown in FIG. 7, the character image 92 indicating "KOBE BAYSIDE" is formed. In this processing example, as shown in FIGS. 8A and 8C, the character image 92 is formed mainly with cyan ink and magenta ink.

[0184] As shown in FIGS 8A and 8C, cyan ink and magenta ink are also used to form the background image 91 (see FIG. 7).

[0185] Therefore, in this processing example, the amount of ultraviolet light irradiated by the light source 13 corresponding to cyan and magenta is 75%, as indicated by the sign 8X in FIG. 8.

[0186] On the other hand, as shown in FIG. 8D, yellow ink is not often used to form the character image 92. Therefore, the amount of ultraviolet light irradiation by the light source 13 corresponding to yellow is set to 50%, as indicated by the sign 8X in FIG. 8.

[0187] FIG. 9 and FIGS. 10A to 10D illustrate other examples of images formed on the can body 10.

[0188] In FIG. 9, similarly to above, the state of the image 70 is shown after the image is formed by the image forming section 120. In other words, FIG. 9 shows the state of the image 70 after the four colors of ink have been placed on the can body 10.

[0189] In this image 70 shown in FIG. 9, the background image 91 exists on the upper side, a crisp image such as an image of a building exists on the lower side, and the text image 92 exists on the left side.

[0190] FIGS. 10A to 10D show, similarly to above, an image formed by the cyan inkjet head 11C, an image formed by the black inkjet head 11K, an image formed by the magenta inkjet head 11M, and an image formed by the yellow inkjet head 11Y, respectively.

[0191] In other words, FIGS. 10A to 10D show images formed based on image data obtained by color separation similarly to above.

[0192] In this processing example, as indicated by the sign 10X in FIG. 10, the amount of ultraviolet irradiation by the light source 13 is set to 25%, 100%, 75%, and 50% for cyan, black, magenta, and yellow, respectively.

[0193] In this processing example, black ink is used to form the character image 92 positioned at the portion indicated by a sign 9A in FIG. 9, as shown in FIG. 10B. The shading in the area indicated by a sign 10B in FIG. 10B is light, and the black ink is not often used to form the background image 91 (see FIG. 9).

[0194] Therefore, in this example, as indicated by the sign 10X in FIG. 10, the amount of ultraviolet light irradiated by the light source 13 corresponding to the black color is set to 100%.

[0195] In this processing example, as shown by a sign 10E in FIGS. 10A and 10C, cyan and magenta inks are also used to form the character image 92 (see the sign 9A in FIG. 9). The cyan and magenta inks are also used to form the background image 91 (see FIG. 9).

[0196] Therefore, in this processing example, as indicated by the sign 10X in FIG. 10, the amount of ultraviolet light irradiated by the light source 13 corresponding to cyan is set to 25%, and the amount of ultraviolet light irradiated by the light source 13 corresponding to magenta is set to 75%.

[0197] The reason why the amount of ultraviolet light irradiation by light source 13 corresponding to magenta is set to 75% instead of 25% is to accelerate curing of the magenta image.

[0198] In this processing example, as shown in FIG.

10C, a large amount of magenta ink is used in the lower part of the image to be formed. Therefore, in order to accelerate curing of this ink, the amount of ultraviolet light irradiated by the light source 13 corresponding to magenta is set to 75%.

[0199] On the other hand, as shown in FIG. 10D, for yellow, the amount of ink used to form the character image 92 (see the sign 9A in FIG. 9) is less than the amount of ink for black ink. Therefore, similarly to above, the amount of ultraviolet light irradiation is reduced for yellow.

[0200] In this processing example, a large amount of yellow ink is used in the lower part of the image shown in FIG. 10D. Therefore, in this processing example, the amount of ultraviolet light irradiated by the light source 13 corresponding to yellow is set to 50% in order to accelerate curing of the lower portion.

[0201] FIG. 11 and FIGS. 12A to 12D show another example of an image formed on the can body 10.

[0202] FIG. 11 shows, similarly to above, the state of the image 70 after the image is formed by the image forming section 120. In other words, FIG 11 shows the state of the image 70 after the four colors of ink have been placed on the can body 10.

[0203] The image 70 shown in FIG. 11 is a halftone image, and in the image 70 shown in FIG. 11, the color of the character image 92 is black.

[0204] FIGS. 12A to 12D show, similarly to above, an image formed by the cyan inkjet head 11C, an image formed by the black inkjet head 11K, an image formed by the magenta inkjet head 11M, an image formed by the yellow inkjet head 11Y, respectively. In other words, FIGS. 12A to 12D show each of the images formed based on the image data obtained by color separation.

[0205] In this processing example, as indicated by a sign 12X in FIG. 12, the amount of ultraviolet light irradiated by the light source 13 is 25%, 100%, 25%, and 25% for cyan, black, magenta, and yellow, respectively.

[0206] In this processing example, as shown in FIG. 12B, a large amount of black ink is used to form the character image 92 such as "Cocktail" shown in FIG. 11. Compared to yellow ink and the like, black ink is not used much to form the background image 91.

[0207] Therefore, in this processing example, as indicated by the sign 12X in FIG. 12, the amount of ultraviolet light irradiated by the light source 13 corresponding to black color is set to 100%.

[0208] In this processing example, the image 70 that is finally formed (the image 70 shown in FIG. 11) is a halftone image and is a light image as a whole. In this case, the density of the image formed by the inks of each color is small.

[0209] In this case, the amount of ink of each color used to form the image 70 decreases, and accordingly, in this processing example, as indicated by the sign 12X in FIG. 12, the amount of ultraviolet light irradiation is set to 25% for each of the inks of colors other than black.

(Others)

[0210] In the above, as an example of a curing unit, the case in which a light source 13 irradiating light of wavelength in the ultraviolet region is provided has been described. However, a light source 13 irradiating light of wavelength other than the ultraviolet region may also be provided as a curing unit.

[0211] If the ink used by the inkjet head 11 to form an image is an ink that can be cured by light of wavelength other than the ultraviolet region, a light source 13 irradiating light of wavelength other than the ultraviolet region is to be provided as a curing unit.

[0212] In the above, the case where the can body 10 moves along the can body movement route R1 having curvature has been described. However, the can body movement route R1 along which the can body 10 moves may be straight and the can body 10 may move along the straight can body movement route R1.

[0213] In the above, the case where the light source 13 is provided on the opposite side of an installation side of the inkjet head 11 across the can body movement route R1 has been described as an example. However, the installation point of the light source 13 is not limited thereto, and the light source 13 may be arranged on the side where the inkjet head 11 is provided.

Reference Signs List

[0214] 1. Image formation device, 10. Can body, 11. Inkjet head, 13. Light source, 14. Blocking section, 92. Character image

Claims

1. An image formation device comprising:

a plurality of image forming units configured to form an image on a can body, and
a curing unit provided corresponding to each of the plurality of image forming units, the curing unit being configured to irradiate a can body on which the image has been formed by the image forming units with light to cure the image,
wherein an irradiation amount of light irradiated to the can body by one curing unit included in a plurality of curing units is different from an irradiation amount of light irradiated to the can body by an other curing unit included in the plurality of curing units.

2. The image formation device according to claim 1, wherein the irradiation amount of light irradiated to the can body by the one curing unit is different from the irradiation amount of light irradiated to the can body by the other curing unit by differentiating an irradiating time to irradiate the can body with light by

the one curing unit from an irradiating time to irradiate the can body with light by the other curing unit.

3. The image formation device according to claim 1, wherein the irradiation amount of light irradiated to the can body by the one curing unit is different from the irradiation amount of light irradiated to the can body by the other curing unit by differentiating an output when irradiating the can body with light by the one curing unit from an output when irradiating the can body with light by the other curing unit.

4. The image formation device according to claim 1, wherein the plurality of image forming units includes an image forming unit configured to form an image including a character image on the can body and an image forming unit configured to form an image without a character image on the can body, and
the irradiation amount of light by the curing unit provided corresponding to the image forming unit configured to form the image including the character image is larger than the irradiation amount of light by the curing unit provided corresponding to the image forming unit configured to form the image without the character image.

5. The image formation device according to claim 4, wherein an irradiation of light to the can body by the curing unit provided corresponding to the image forming unit configured to form the image including the character image is performed prior to an irradiation of light to the can body by the curing unit provided corresponding to the image forming unit configured to form the image without the character image.

6. The image formation device according to claim 4, wherein the image forming unit and the curing unit provided corresponding to the image forming unit are provided in plural pairs, and processing by each pair is performed in order, and
among light irradiations to the can body that are performed in order, the irradiation of light by the curing unit provided corresponding to the image forming unit configured to form the image including the character image is performed first.

7. The image formation device according to claim 1, wherein the irradiation amount of light to the can body by the curing unit provided corresponding to the image forming unit configured to form a black image on the can body is larger than the irradiation amount of light to the can body by the curing unit provided corresponding to the image forming unit configured to form an image of a color other than black on the can body.

8. The image formation device according to claim 7, wherein an irradiation of light to the can body by the curing unit provided corresponding to the image forming unit configured to form the black image is performed prior to an irradiation of light to the can body by the curing unit provided corresponding to the image forming unit configured to form the image of a color other than black.

9. The image formation device according to claim 7, wherein the image forming unit and the curing unit provided corresponding to the image forming unit are provided in plural pairs, and processing by each pair is performed in order, and
among light irradiations to the can body that are performed in order, the irradiation of light by the curing unit provided corresponding to the image forming unit configured to form the black image is performed first.

10. The image formation device according to claim 1, further comprising a blocking section which is positioned at a facing position when the can body is not positioned at the facing position of the curing unit and configured to block the light from the curing unit.

11. The image formation device according to claim 10, wherein the blocking section is provided to move in conjunction with the can body which is moving, and the blocking section is positioned at the facing position when the can body is not positioned at the facing position, and is positioned at a point displaced from the facing position when the can body is positioned at the facing position.

12. The image formation device according to claim 1, wherein the curing unit is arranged at an opposite side of an installation side of the image forming unit across the can body arranged at a facing position of the image forming unit.

13. The image formation device according to claim 12, further comprising a blocking section which is positioned between the image forming unit and the curing unit when the can body is not positioned as the facing position of the image forming unit, and is configured to block light going from the curing unit to the image forming unit.

FIG.1

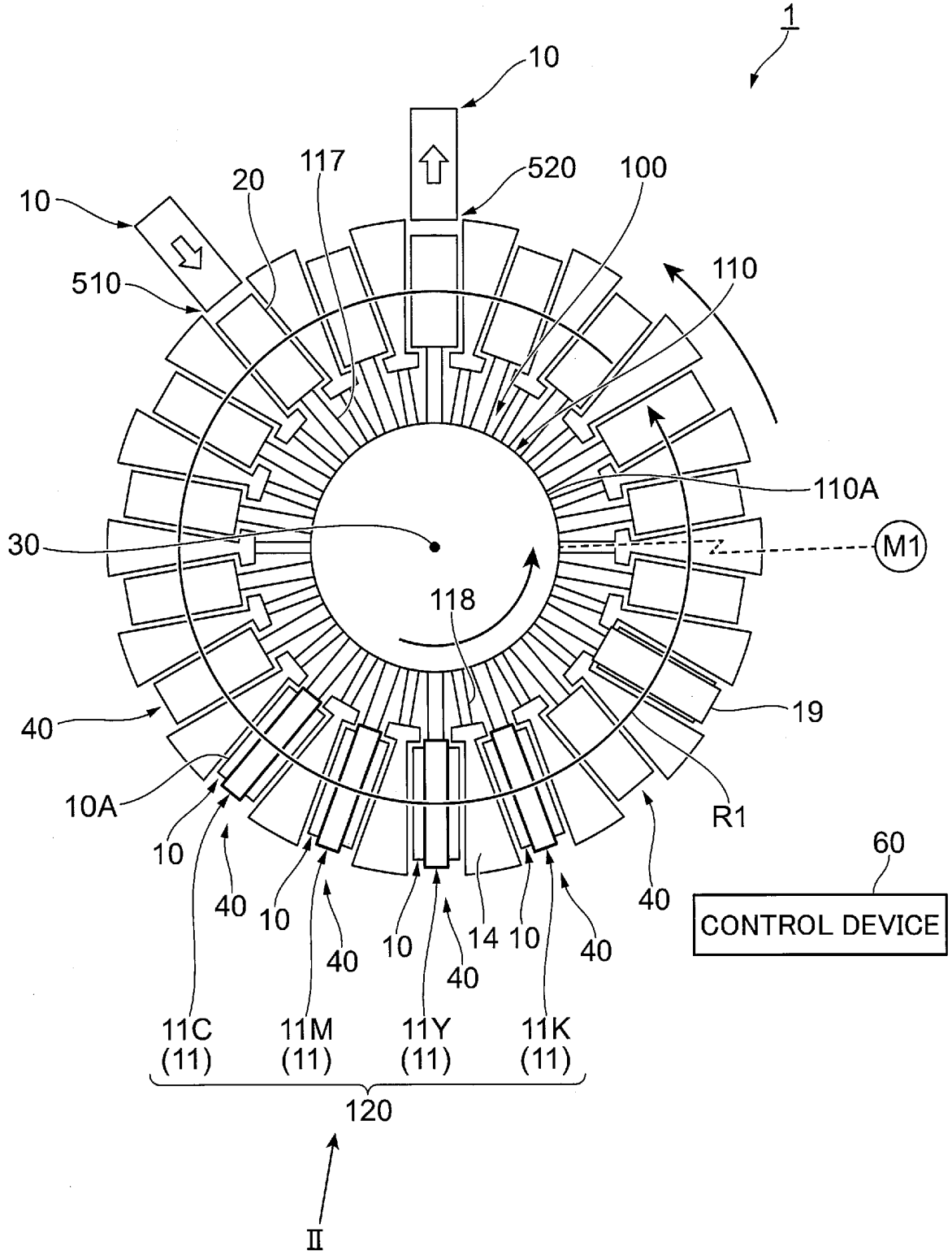
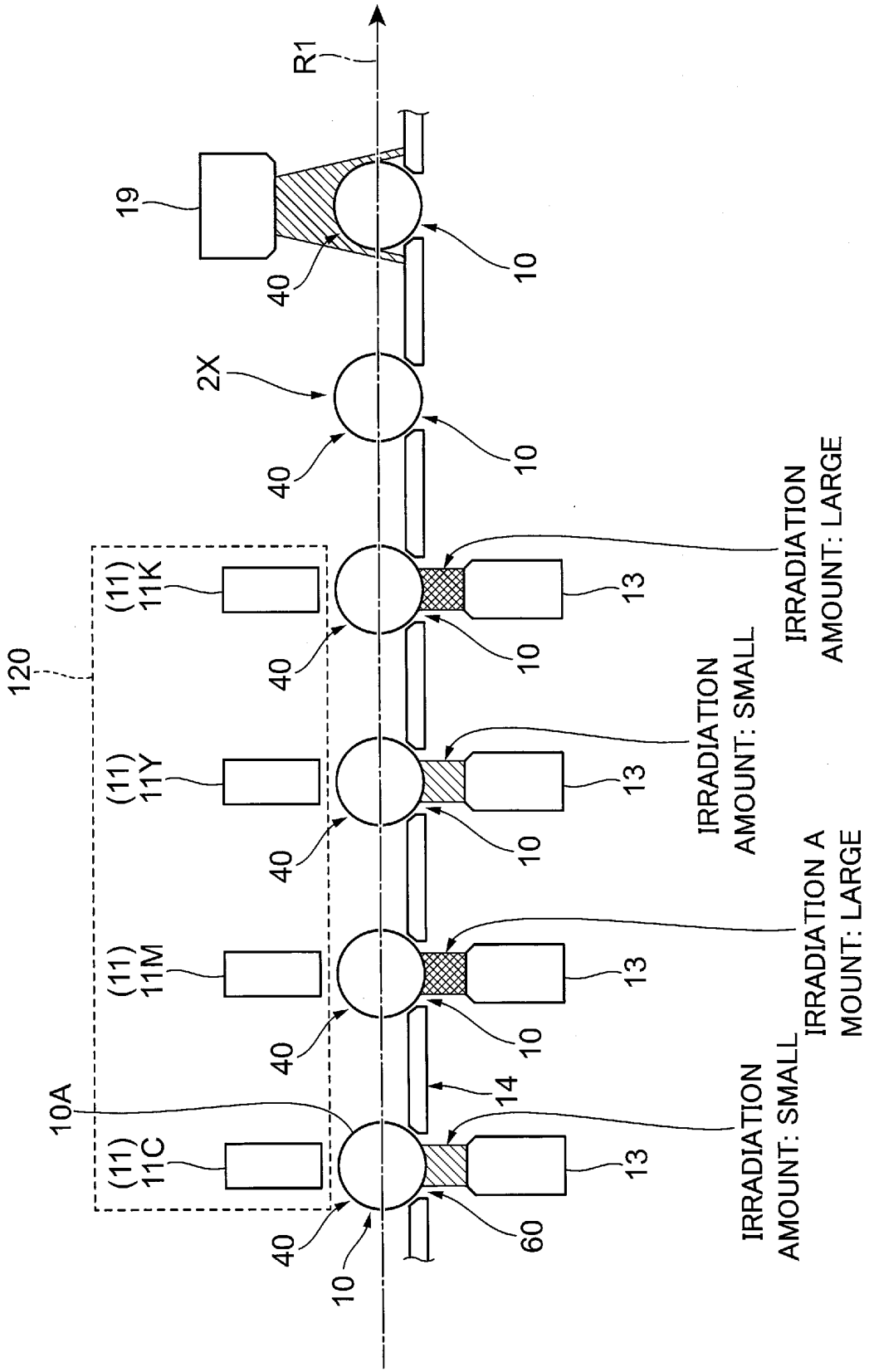

1
10
20
117
520
100
10
510
110
110A
30
M1
118
19
40
10A
R1
60
CONTROL DEVICE
10
40
10
40
10
14
10
40
40
40
11C
(11)
11M
(11)
11Y
(11)
11K
(11)
120
II

FIG.2


R1
19
40
10
2X
40
10
120
(11)
11K
40
10
13
IRRADIATION
AMOUNT: LARGE
(11)
11Y
40
10
13
IRRADIATION
AMOUNT: SMALL
(11)
11M
40
10
13
IRRADIATION A
MOUNT: LARGE
10A
14
(11)
11C
40
10
13
IRRADIATION
AMOUNT: SMALL
60

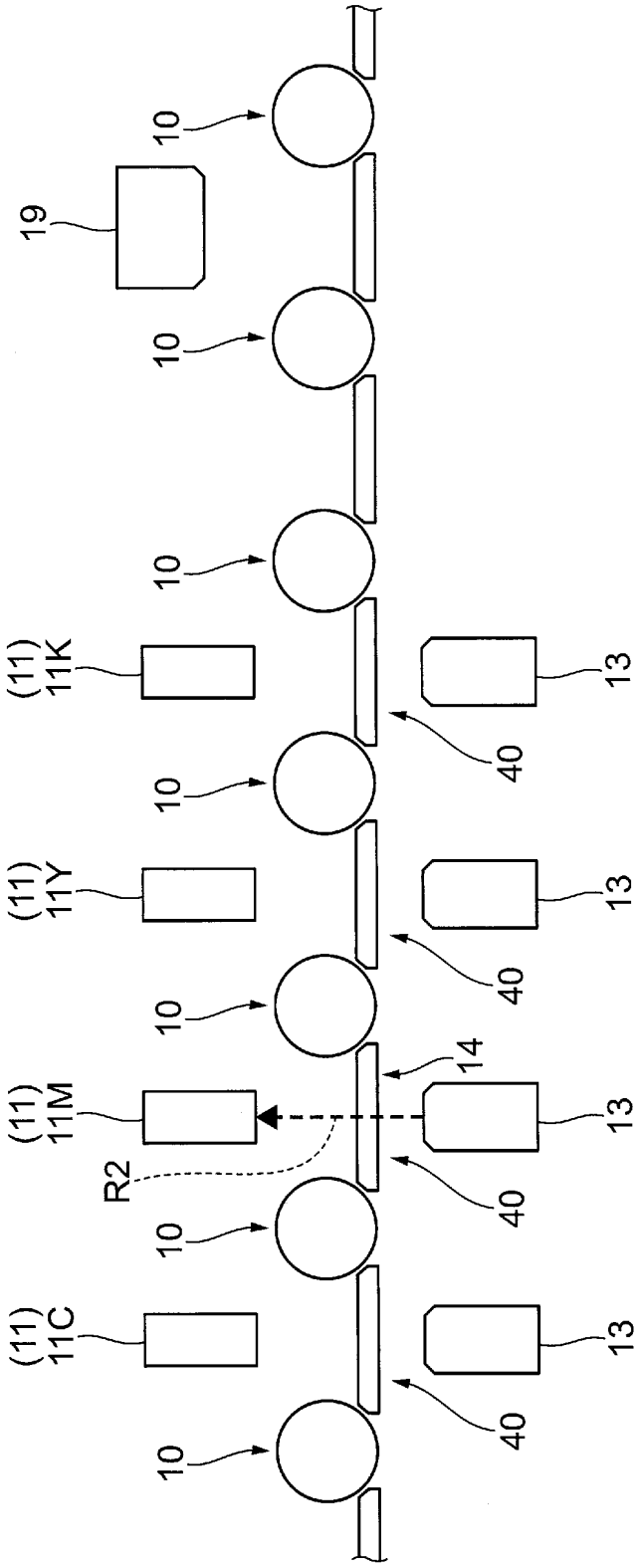
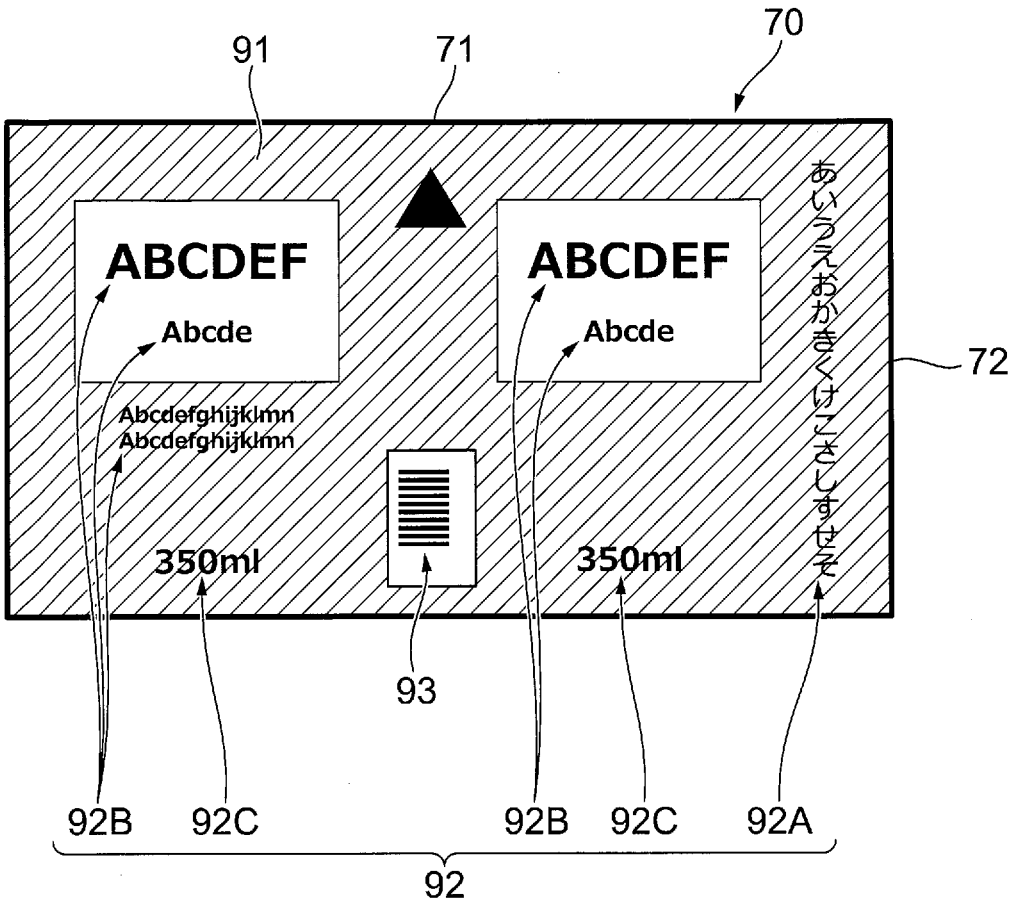

10
19
10
10
(11)
11K
10
13
40
(11)
11Y
10
13
40
14
(11)
11M
R2
10
13
40
(11)
11C
10
13
40

FIG.3

FIG.4



4B

BACKGROUND IMAGE 91: CYAN 50 %, YELLOW 50 %
VERTICAL CHARACTER IMAGE 92A: BLACK 100 %
HORIZONTAL CHARACTER IMAGE 92B: BLACK 100 %
NUMERIC CHARACTER IMAGE 92C: MAGENTA 80 %, CYAN 10 %, BLACK 10 %
CODE IMAGE 93: BLACK 100 %

4D

IRRADIATION AMOUNT

CYAN 75 %, MAGENTA 100 %, YELLOW 25 %, BLACK 100 %

FIG.5

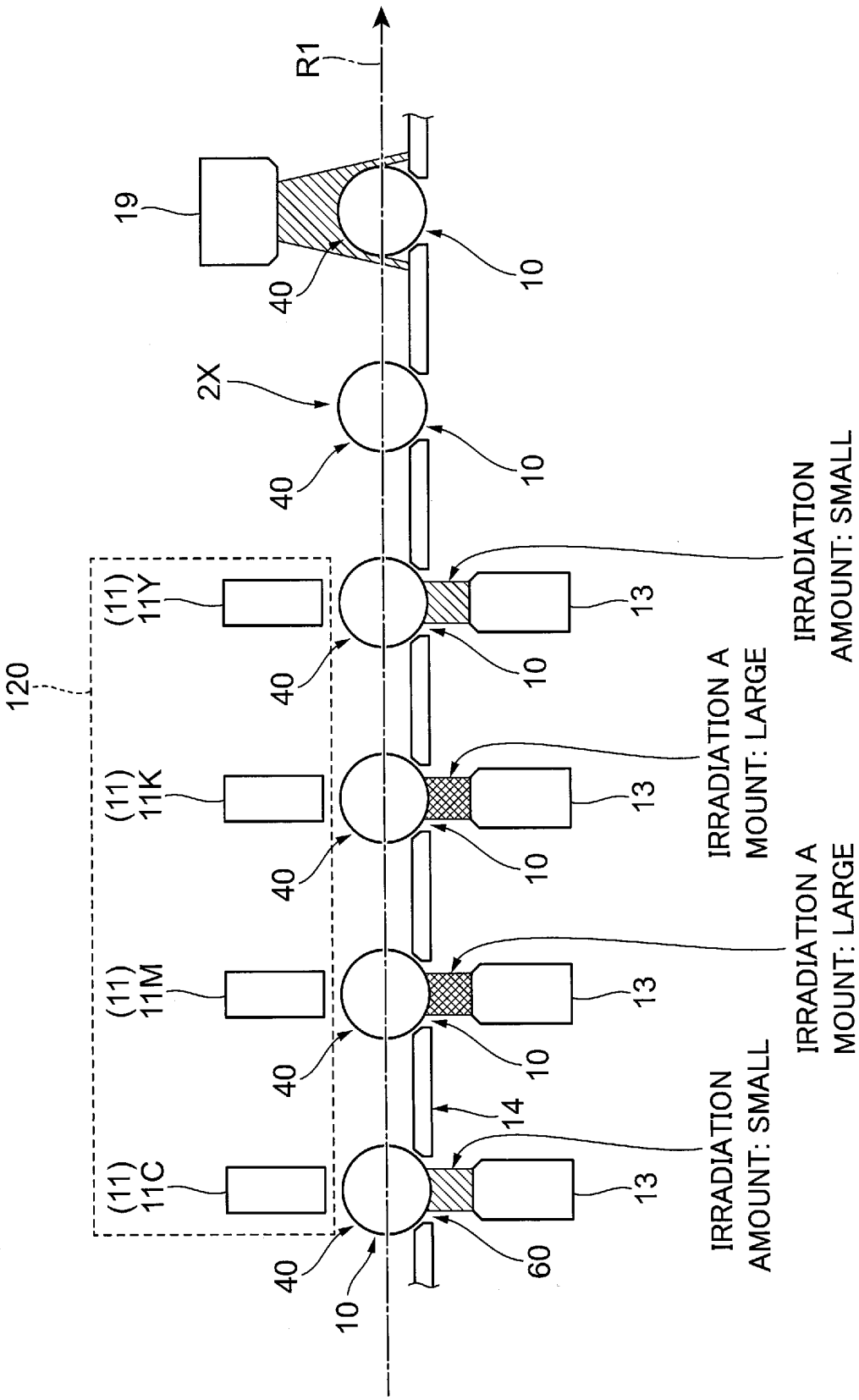
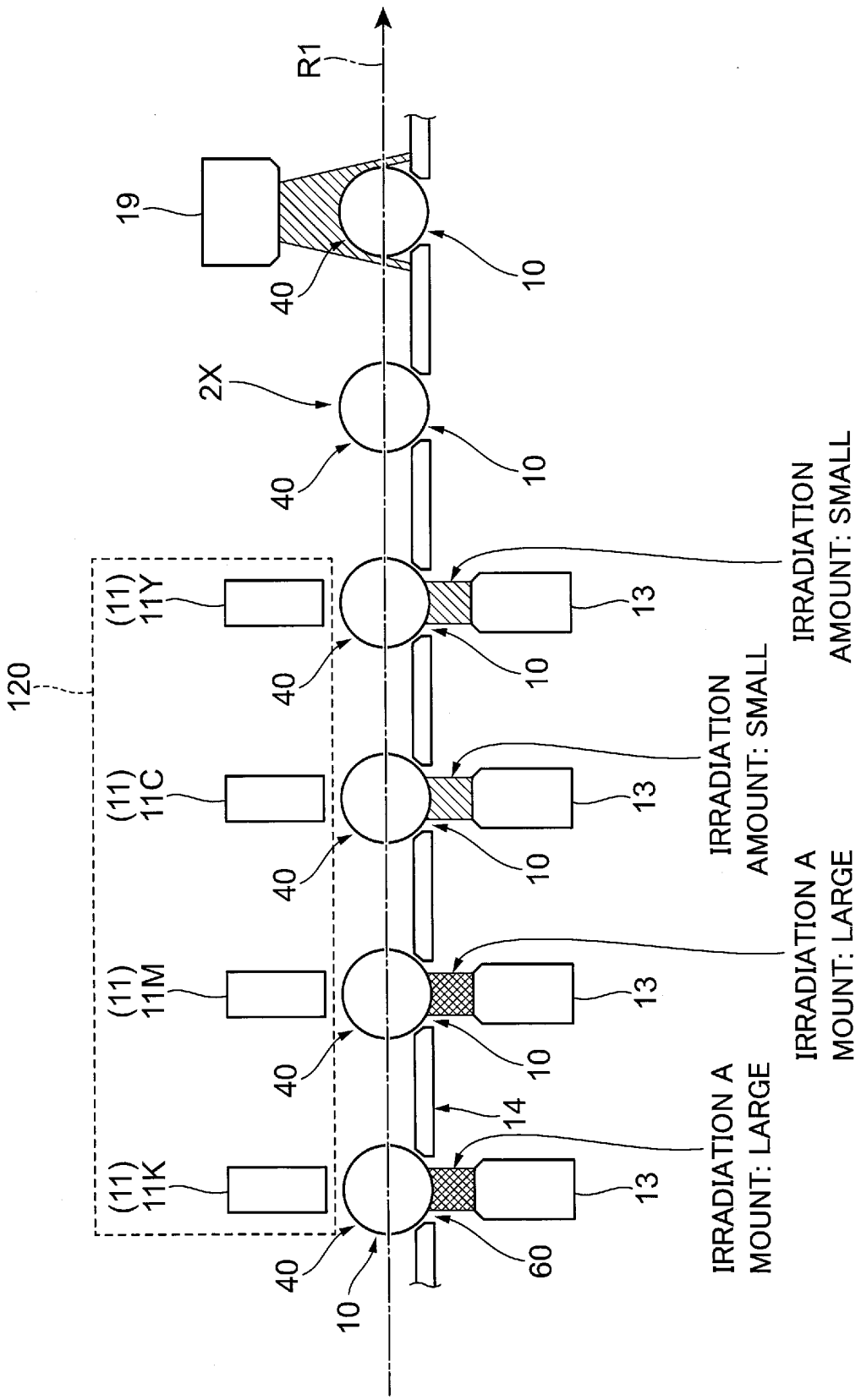

R1
19
40
10
2X
40
10
120
(11)
11Y
40
10
13
IRRADIATION
AMOUNT: SMALL
(11)
11K
40
10
13
IRRADIATION A
MOUNT: LARGE
(11)
11M
40
10
13
IRRADIATION A
MOUNT: LARGE
14
(11)
11C
40
10
13
IRRADIATION
AMOUNT: SMALL
60

FIG.6


R1
19
40
10
2X
40
10
120
(11)
11Y
40
10
13
IRRADIATION
AMOUNT: SMALL
(11)
11C
40
10
13
IRRADIATION
AMOUNT: SMALL
(11)
11M
40
10
13
IRRADIATION A
MOUNT: LARGE
14
(11)
11K
40
10
60
13
IRRADIATION A
MOUNT: LARGE

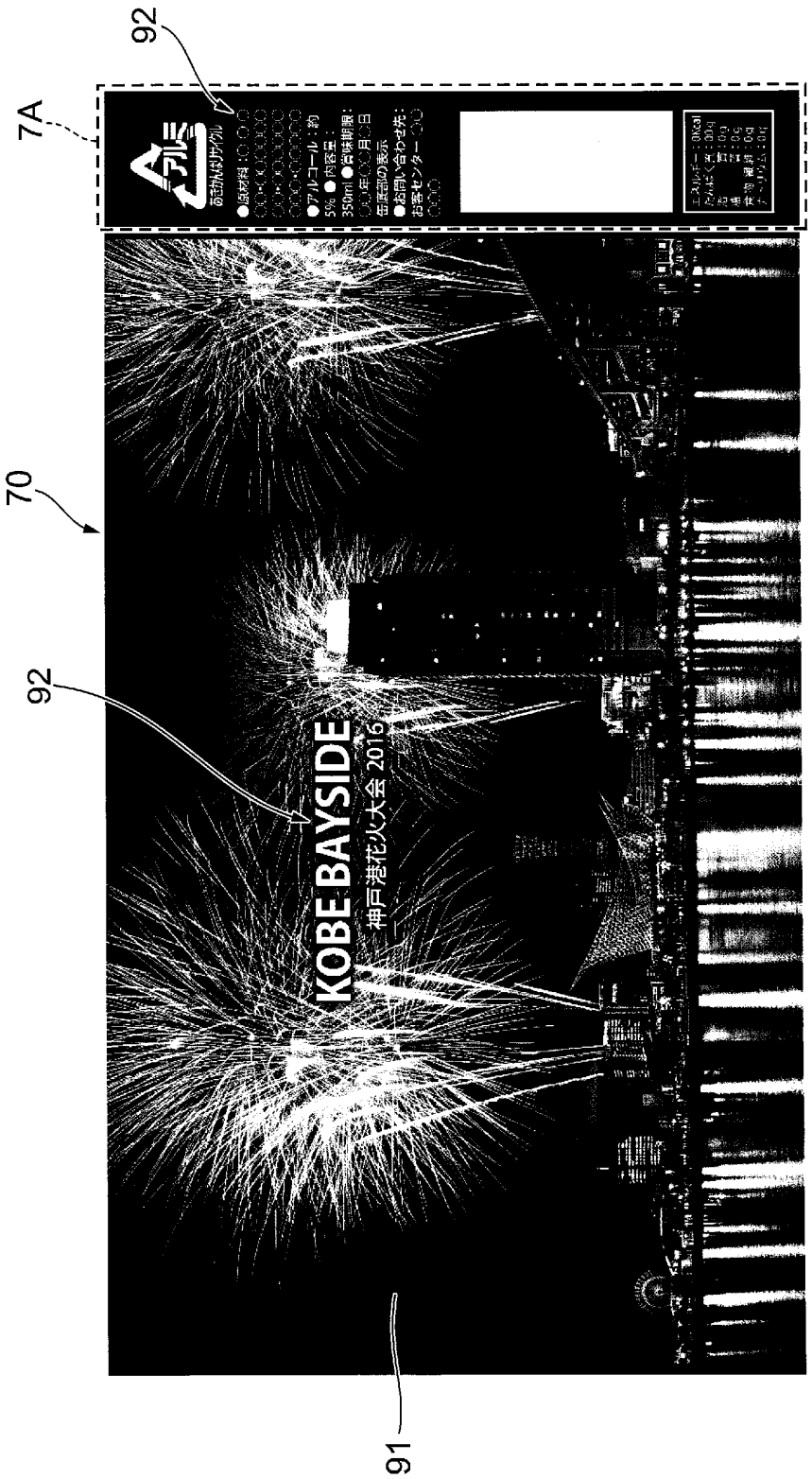


FIG.7

FIG.8

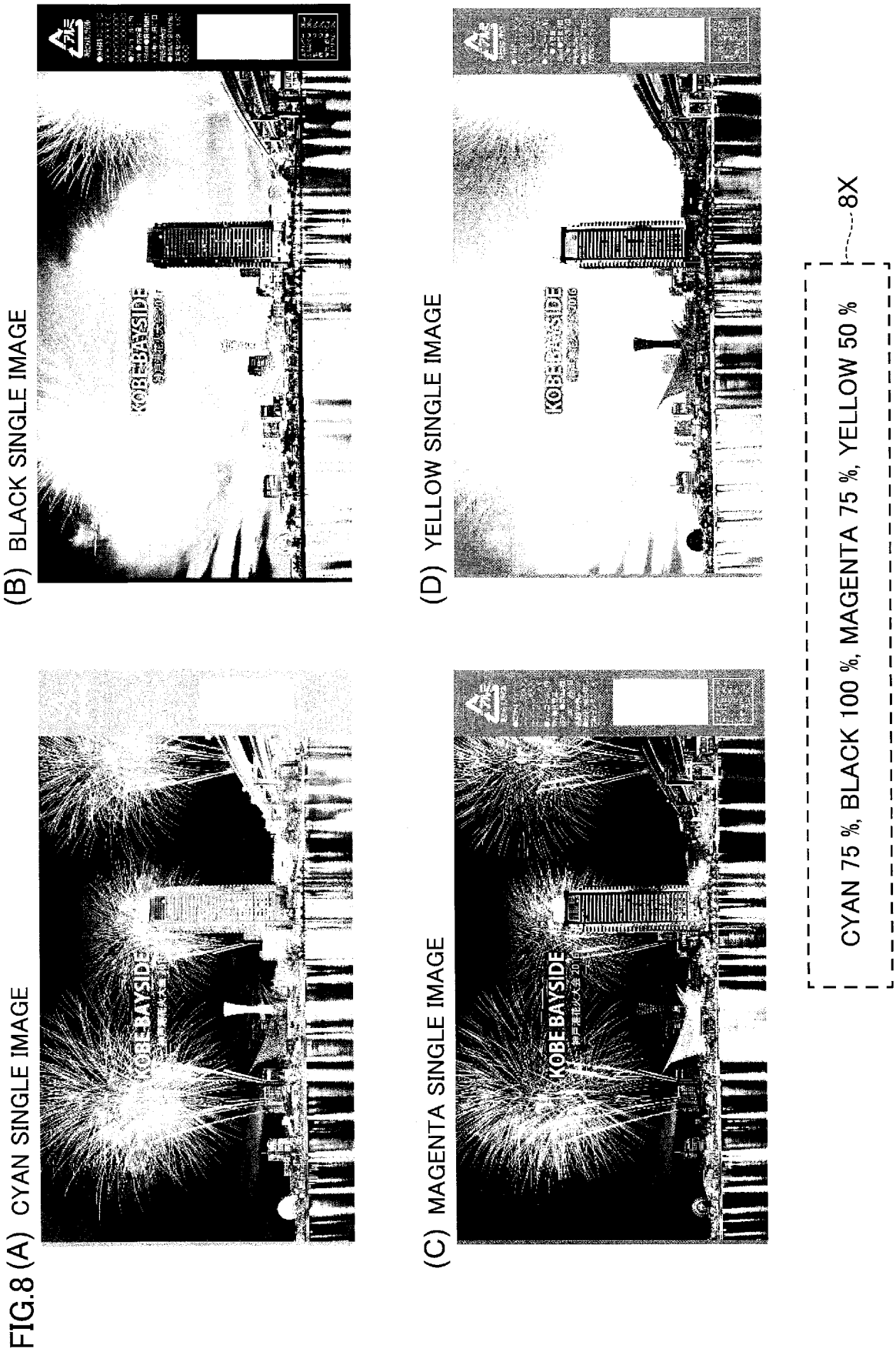

(A) CYAN SINGLE IMAGE
(B) BLACK SINGLE IMAGE
(C) MAGENTA SINGLE IMAGE
(D) YELLOW SINGLE IMAGE
CYAN 75 %, BLACK 100 %, MAGENTA 75 %, YELLOW 50 %
8X

FIG.9

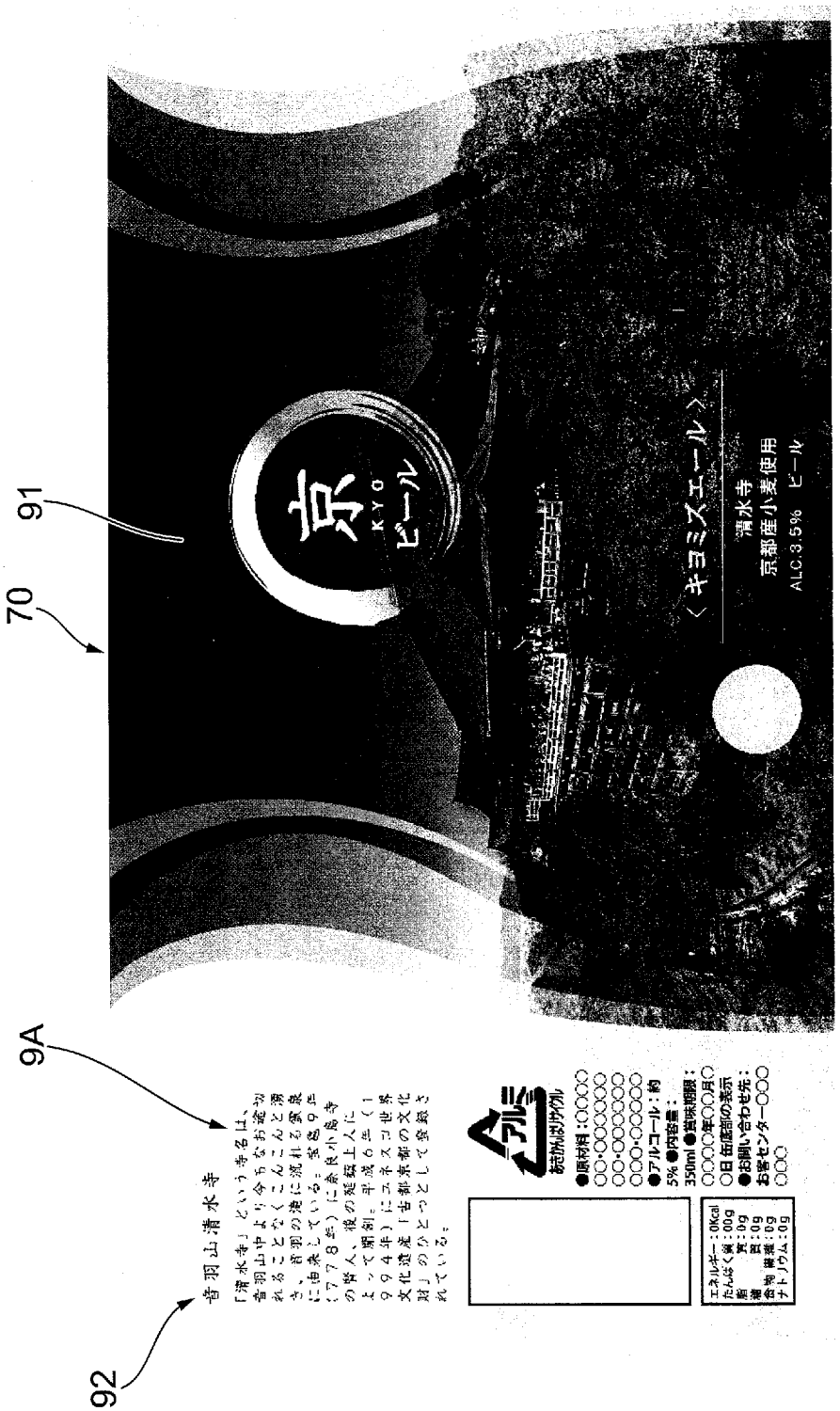

91
70
9A
92
京
KYO
ビール
〈キヨミズエール〉
清水寺
京都産小麦使用
ALC.3.5% ビール
アルミ缶
リサイクル
●原材料：○○○○
○○・○○○○
○○・○○○○
○○・○○○○
●アルコール：約
5%●内容量：
350ml●賞味期限：
○○○○年○○月○
○日 缶底部の表示
●お問い合わせ先：
お客センター○○○
○○○
エネルギー：0Kcal
たんぱく質：0.0g
脂質：0g
炭水化物：0g
食塩相当量：0g
プリン体：0mg
音羽山清水寺
「清水寺」という寺名は、
音羽山中より今もなお途切
れることなくこんこんと湧
き、音羽の滝に流れる霊泉
に由来している。宝亀9年
（778年）に奈良小鳥寺
の僧人、賢の延鎮上人に
よって開創。平成6年（1
994年）にユネスコ世界
文化遺産「古都京都の文化
財」のひとつとして登録さ
れている。

FIG.10

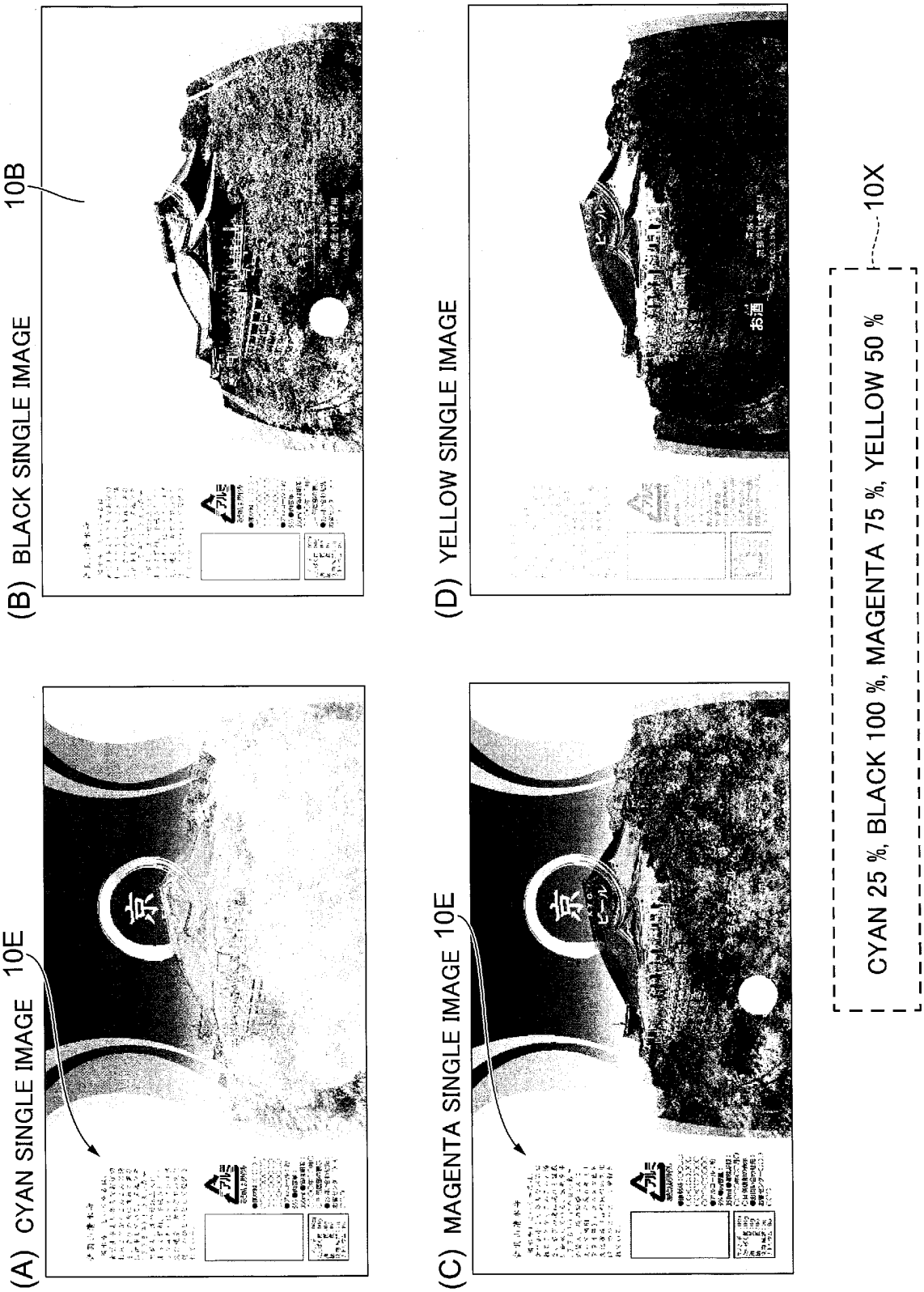

(A) CYAN SINGLE IMAGE
10E
(B) BLACK SINGLE IMAGE
10B
(C) MAGENTA SINGLE IMAGE
10E
(D) YELLOW SINGLE IMAGE
CYAN 25 %, BLACK 100 %, MAGENTA 75 %, YELLOW 50 %
10X

FIG.11

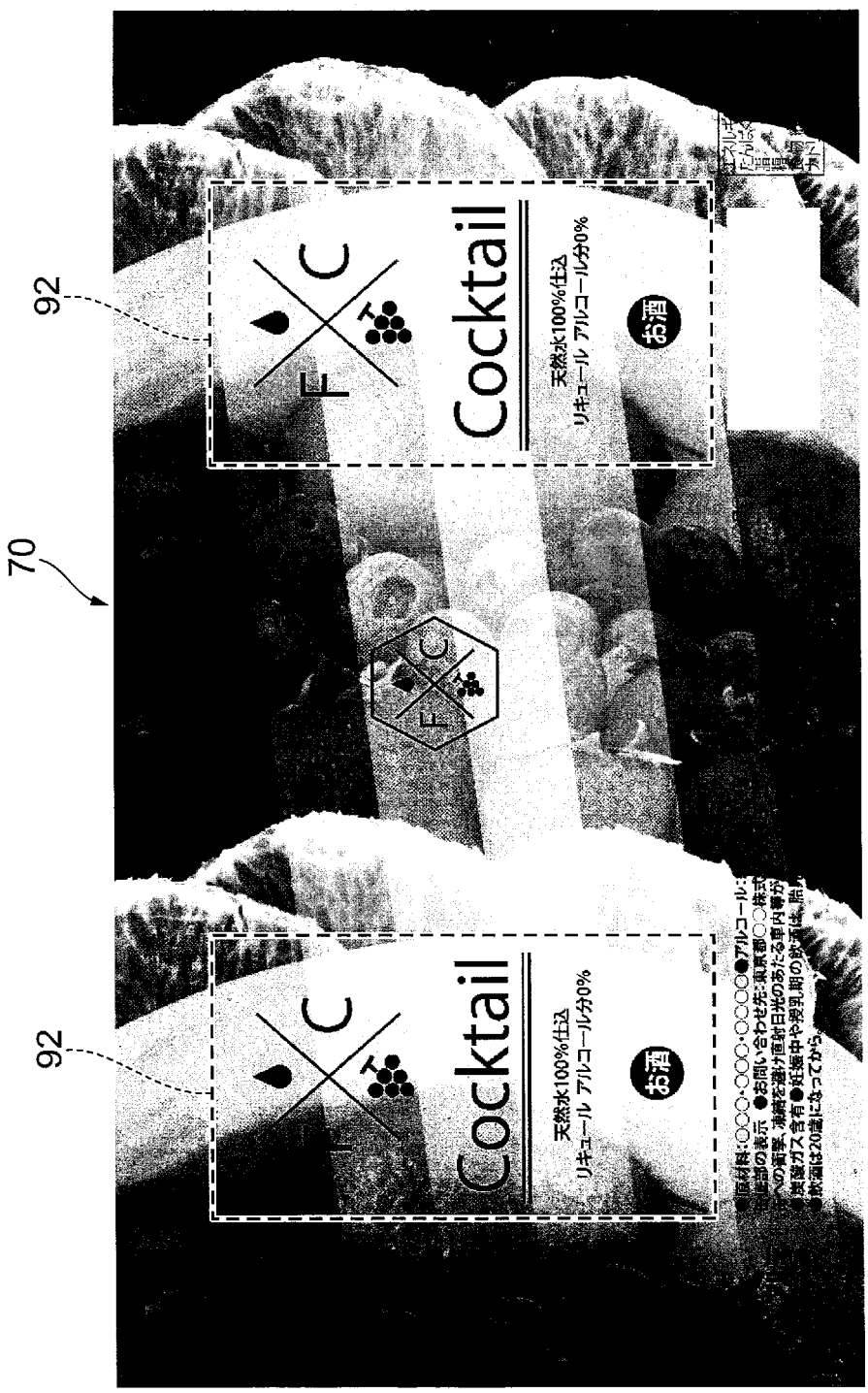
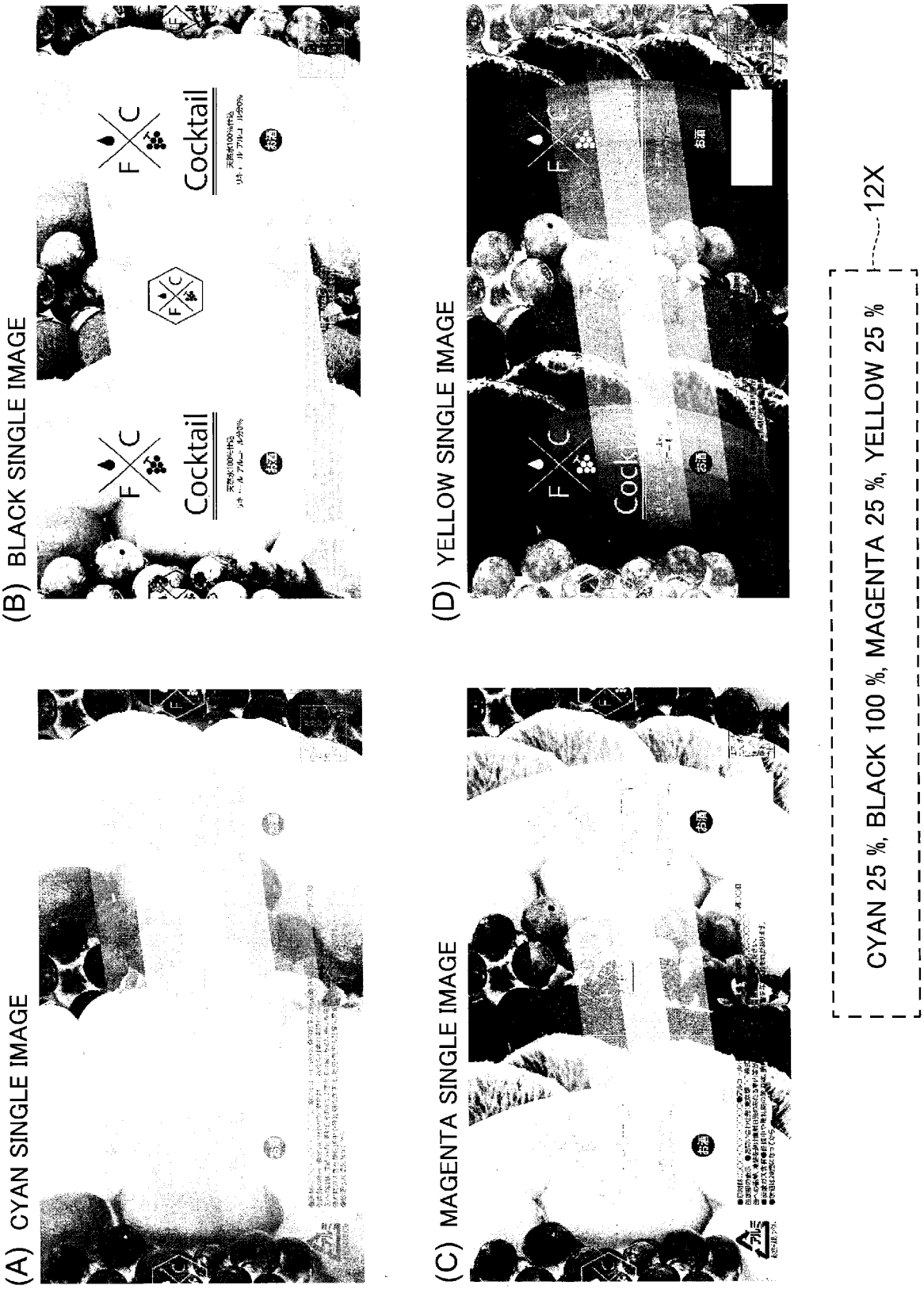

92
70
92
Cocktail
天然水100%仕込
リキュール アルコール分0%
お酒
Cocktail
天然水100%仕込
リキュール アルコール分0%
お酒

FIG.12


(A) CYAN SINGLE IMAGE
(B) BLACK SINGLE IMAGE
(C) MAGENTA SINGLE IMAGE
(D) YELLOW SINGLE IMAGE
CYAN 25 %, BLACK 100 %, MAGENTA 25 %, YELLOW 25 %
12X

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2022/034195

A. CLASSIFICATION OF SUBJECT MATTER

B41J 2/01(2006.01)i
FI: B41J2/01 129; B41J2/01 301; B41J2/01 109

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B41J2/01-2/215

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2022
Registered utility model specifications of Japan 1996-2022
Published registered utility model applications of Japan 1994-2022

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2015/111358 A1 (SHOWA ALUMINUM CAN CORP.) 30 July 2015 (2015-07-30) paragraphs [0008]-[0036], fig. 1-5	1-4, 7
A	entire text, all drawings	5-6, 8-13
Y	JP 2004-009483 A (CANON INC.) 15 January 2004 (2004-01-15) paragraphs [0081]-[0091], fig. 8	1-4
Y	JP 2013-169670 A (SEIKO EPSON CORP.) 02 September 2013 (2013-09-02) paragraphs [0011]-[0033], fig. 1-3	1, 4
Y	JP 2011-084031 A (SEIKO EPSON CORP.) 28 April 2011 (2011-04-28) paragraphs [0047]-[0049], [0084], fig. 2-3	1-3, 7
A	JP 2010-143200 A (DAIWA CAN CO., LTD.) 01 July 2010 (2010-07-01) entire text, all drawings	1
A	JP 2007-290399 A (FUJIFILM CORP.) 08 November 2007 (2007-11-08) entire text, all drawings	1-3

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 November 2022	**06 December 2022**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2022/034195

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E, A	WO 2022/080065 A1 (SHOWA ALUMINUM CAN CORP.) 21 November 2022 (2022-11-21) entire text, all drawings	1-13

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2022/034195

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2015/111358 A1	30 July 2015	JP 2015-157471 A paragraphs [0008]-[0036], fig. 1-5	
JP 2004-009483 A	15 January 2004	(Family: none)	
JP 2013-169670 A	02 September 2013	(Family: none)	
JP 2011-084031 A	28 April 2011	(Family: none)	
JP 2010-143200 A	01 July 2010	(Family: none)	
JP 2007-290399 A	08 November 2007	(Family: none)	
WO 2022/080065 A1	21 November 2022	JP 2022-63702 A entire text, all drawings	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2015083480 A **[0003]**