IMAGE FORMING DEVICE AND IMAGE FORMING METHOD

FIELD

Embodiments described herein relate generally to an image forming device and an image forming method.

BACKGROUND

Nowadays, if a company or a government agency requests a customer to write a document, a document in which supplementary information such as a writing method is described may be used. In this case, the customer can accurately write the document while looking at the supplementary information. However, the supplementary information is not needed after writing the document is completed. Accordingly, there is a problem in which easiness in viewing the document is impaired due to existence of unnecessary information.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an external view illustrating an entire configuration example of an image forming device according to an embodiment.

FIG. 2 is a diagram illustrating a specific example of an internal configuration of the image forming device according to the embodiment.

FIG. 3 is a block diagram illustrating a configuration of image formation processing of the image forming device according to the embodiment.

FIG. 4 is a block diagram illustrating a functional configuration of an image formation processing unit, an image processing unit, and a system control unit according to the embodiment.

FIG. 5 is a diagram illustrating a specific example of a read target which is processed by the embodiment and is surrounded by a circle drawn by a marker pen.

FIG. 6 is a diagram illustrating a specific example in a case of being copied in a mixed print reproduction mode according to the embodiment.

FIG. 7 is a diagram illustrating a specific example in a case of being decolored by decoloring erasure reproduction processing.

FIG. 8 is a diagram illustrating a specific example when a designated region is selected by using a control panel in the embodiment.

FIG. 9 is a flowchart illustrating a flow of processing of the image forming device according to the embodiment.

FIG. 10 is a flowchart illustrating a flow of the processing of the image forming device according to the embodiment.

DETAILED DESCRIPTION

An image forming device according to one embodiment includes an input unit, a first image forming unit, a second image forming unit, and an image formation processing unit. The input unit inputs image data whose at least one region is designated. The first image forming unit forms an image on an image forming medium using a decoloring material. The second image forming unit forms an image on an image forming medium using a non-decoloring material. The image formation processing unit instructs one of the first image forming unit and the second image forming unit to form an image of the image data in an inside of a designated region and instructs the other to form an image of the image data in an outside of the designated region.

Hereinafter, an image forming device 100 according to the embodiment will be described with reference to the drawings. FIG. 1 is an external view illustrating an entire configuration example of the image forming device 100 according to the embodiment. The image forming device 100 is an image forming device such as a complex machine. The image forming device 100 includes a display 110, a control panel 120, an image formation processing unit 130, an image forming medium containing unit 140, and an image reading unit 150. The image formation processing unit 130 of the image forming device 100 fixes a toner image.

The image forming device 100 forms an image on an image forming medium, using developing agency such as toner. Toner is divided into non-decoloring toner which cannot be decolored, and decoloring toner which can be decolored after an image is formed. Known decoloring toner or non-decoloring toner which is disclosed in USP9134668 can be used for the toner. The image forming medium is, for example, paper or label paper.

The image forming device 100 according to the embodiment forms an image at any one image output mode which is selected from a decoloring print reproduction mode, a normal print reproduction mode, and a mixed print reproduction mode. The image forming medium forms an image using entire decoloring toner in the decoloring print reproduction mode. The image forming medium forms an image using entire non-decoloring toner in the normal print reproduction mode. The image forming medium forms an image in each inside or outside of a designated region of a page by switching the decoloring toner and the non-decoloring toner in the mixed print reproduction mode. The designated region is a place where a user wants to form an image using the decoloring toner, in an image data which is read. The toner which is used in the inside of the designated region is different from the toner which is used in the outside of the designated region. For example, an image is formed in the inside of the designated region using the decoloring toner, and an image formed in the outside of the designated region using the non-decoloring toner. If a decoloring erasure reproduction mode is selected, the image forming device 100 performs decoloring erasure reproduction processing. The image forming device 100 decolors a region where an image is formed by the decoloring erasure reproduction processing using the decoloring toner. Specifically, a user manually feeds or sets in a cassette (not illustrated) for erasure the image forming medium in which an image is formed by using the decoloring toner. As the image forming device 100 performs the decoloring erasure reproduction processing, a region in which an image is formed by using decoloring toner is decolored.

The display 110 is an image display device such as a liquid crystal display or an electro luminescence (EL) display. The display 110 displays various types of information on the image forming device 100.

The control panel 120 has a plurality of buttons. The control panel 120 receives manipulation of a user. The control panel 120 outputs a signal according to the manipulation which is performed by the user to a control unit of the image forming device 100. The display 110 and the control panel 120 may be configured by one touch panel. The control panel 120 is an aspect of a manipulation unit.

The image formation processing unit 130 forms an image on the image forming medium, based on image data which is generated by the image reading unit 150 or image data which is received through a communication path. The image formation processing unit 130 forms an image according to, for example, the following processing. An image forming unit of the image formation processing unit 130 forms an electrostatic latent image on a photosensitive drum, based on the image data. The image forming unit of the image formation processing unit 130 forms a visible image by depositing developing agency on the electrostatic latent image. The toner is a specific example of the developing agency. A transfer unit of the image formation processing unit 130 transfers a visible image onto the image forming medium. A fixing unit of the image formation processing unit 130 fixes the visible image on the image forming medium by heating or pressing the image forming medium. The decoloring toner is an aspect of a decoloring material. The non-decoloring toner is an aspect of a non-decoloring material.

The image forming medium containing unit 140 contains a image forming medium which is used for image formation of the image formation processing unit 130.

The image reading unit 150 reads image data of a read target by using brightness and darkness of light. The image reading unit 150 stores the image data which is read. The image data which is read may be transmitted to other information processing devices through a network. An image corresponding to the image data which is read may be formed on the image forming medium by the image formation processing unit 130. The image data which is read may be displayed on the display 110.

FIG. 2 is a diagram illustrating a specific example of an internal configuration of the image forming device 100 according to the embodiment. The image forming device 100 uses four tandem processes. A medium transfer belt 6 which can move in a direction of an arrow that is illustrated, and four image forming units 7a, 7b, 7c, and 9 which are disposed around the medium transfer belt are provided between the image reading unit 150 and the image forming medium containing unit 140. The image forming units 7a, 7b, and 7c configure a first image forming unit, and the image forming unit 9 configures a second image forming unit. The image forming units 7a, 7b, and 7c form an image by respectively using yellow toner, magenta toner, and cyan toner which has non-decoloring properties. In addition, the image forming unit 9 forms an image by using any one of black toner with non-decoloring properties and blue toner with decoloring properties. The medium transfer belt 6 is interposed between the image forming units 7a, 7b, 7c, and 9 and transfer rollers 10a, 10b, 10c, and 10d which face each other. A second transfer roller 11 which transfers a toner image that is formed on the medium transfer belt 6 by the image forming units 7a, 7b, 7c, and 9 onto paper that is supplied from the image forming medium containing unit 140, is disposed over the image forming unit 9 in a movement direction of the medium transfer belt 6. A fixing device 13 which fixes a toner image to the paper is disposed under the second transfer roller 11 along a travel direction of the paper which is fed from the image forming medium containing unit 140. Configurations of the image forming units 7a, 7b, and 7c are the same as each other except for the toner which is contained in the inside thereof. Accordingly, the configurations of the image forming units 7a, 7b, and 7c will be described by using the image forming unit 7a as an example.

The image forming unit 7a includes a photosensitive drum 21a. A charging unit 23a which charges the photosensitive drum 21a, an exposure device 25a of an LED type which exposes the charged photosensitive drum 21a according to image data, and a developing machine 27a which contains yellow toner with non-decoloring properties and develops an electrostatic latent image that is formed by the exposure device 25a are disposed around the photosensitive drum 21a. Furthermore, the image forming unit 7a includes a cleaning device 28a which removes remaining toner on the photosensitive drum 21a after toner on the photosensitive drum 21a is transferred by the transfer roller 10a.

In the same manner, the image forming unit 7b and 7c respectively include photosensitive drums 21b and 21c, charging units 23b and 23c, exposure devices 25b and 25c, developing machines 27b and 27c, and cleaning devices 28b and 28c. However, toner contained in the developing machine 27b is magenta toner with non-decoloring properties, and toner contained in the developing machine 27c is cyan toner with non-decoloring properties.

The image forming unit 9 includes a photosensitive drum 21d. The photosensitive drum 21d rotates in a direction of an arrow b which is illustrated. A charging unit 23d which charges the photosensitive drum 21d, and an exposure device 25d of an LED type which exposes the charged photosensitive drum 21d according to image data are disposed around the photosensitive drum 21d. In addition, a developing machine 29 and a developing machine 31 are disposed to face the photosensitive drum 21d in a rotation direction of the photosensitive drum 21d under the exposure device 25d. The developing machine 29 contains blue toner with decoloring properties, and the developing machine 31 contains black toner with non-coloring properties. In addition, the developing machine 29 and the developing machine 31 are selectively used for the photosensitive drum 21d, and developing is performed by any one of the developing machines. In addition, the image forming unit 9 includes a cleaning device 28d which removes toner on the photosensitive drum 21d after a toner image formed by the developing machine 29 or the developing machine 31 is transferred onto the medium transfer belt 6 by the transfer rollers 10d.

FIG. 3 is a block diagram illustrating a configuration of image formation processing of the image forming device 100 according to the embodiment. The image forming device 100 includes the display 110, the control panel 120, the image formation processing unit 130, the image reading unit 150, an image processing unit 160, a system control unit 170, a user setting information management unit 180, an external interface unit 190, and an input and output device 200.

The image processing unit 160 sets parameter information for read image data in advance according to control of the system control unit 170, and performs image processing according to each processing. The parameter information is used for forming an image with a high image quality using the read image data. The parameter information is set for each non-decoloring toner or each decoloring toner. For example, the parameter information is set data which is processed by resolution and gradation processing so as to provide image quality suitable for each toner which is used. In the image data, a region in which non-decoloring toner is used is referred to as a non-decoloring data region. In the image data, a region in which decoloring toner is used is referred to as a decoloring data region.

The system control unit 170 receives a control signal, thereby, controlling operations of each unit of the image forming device 100. The system control unit 170 is configured by a device including, for example, a central processing unit (CPU) and a random access memory (RAM).

The user setting information management unit 180 is configured by using a storage device such as a magnetic hard disk device or a semiconductor memory device. The user setting information management unit 180 stores a designated region which is selected from the read image data by a user. The user setting information management unit 180 may be configured by a RAM.

The external interface unit 190 is an interface which communicates with the input and output device 200. The external interface unit 190 transmits image data which is read by the image reading unit 150 to the input and output device 200. The external interface unit 190 receives image data from the input and output device 200. The external interface unit 190 is, for example, a network connector.

The input and output device 200 communicates with the image forming device 100. The input and output device 200 is an information processing device such as a personal computer or a smartphone. The input and output device 200 is an aspect of an external input and output device.

FIG. 4 is a block diagram illustrating a functional configuration of the image formation processing unit 130, the image processing unit 160, and the system control unit 170 according to the embodiment. The image formation processing unit 130 includes an image formation processing unit 131 for non-decoloring toner and an image formation processing unit 132 for decoloring toner. The image processing unit 160 includes a drawing detection unit 161 and a high image quality processing unit 162. The system control unit 170 includes a page memory 171, an auxiliary storage unit 172, and a central processing unit 173.

The image formation processing unit 131 for non-decoloring toner forms a predetermined region of image data as an image, using the non-decoloring toner. According to the present embodiment, a region in which an image is formed by the image formation processing unit 131 for non-decoloring toner is a region other than the designated region. The image formation processing unit 131 for non-decoloring toner is an aspect of the second image forming unit.

The image formation processing unit 132 for decoloring toner forms a predetermined region of the image data as an image, using the decoloring toner. According to the present embodiment, a region in which an image is formed by the image formation processing unit 132 for decoloring toner is within the designated region. The image formation processing unit 132 for decoloring toner is an aspect of the first image forming unit.

The drawing detection unit 161 detects a region in which drawing is performed by using a writing instrument from the read image data. The writing instrument is, for example, a marker pen. A user designates a region that the user wants to decolor by using a color of a marker pen or the like which can be detected. In the present embodiment, the drawing detection unit 161 determines that the inside of a region surrounded by a circle drawn by the marker pen is the inside of the designated region, and determines that the outside of the region surrounded by a circle drawn by the marker pen is the outside of the designated region. The image formation processing unit 130 forms an image by using decoloring toner in the inside of the designated region, and forms an image by using non-decoloring toner in the outside of the designated region.

The high image quality processing unit 162 sets the parameter information in each inside and each outside of the designated regions of the image data, and performs high image quality processing suitable for each designated region. The high image quality processing unit 162 generates image data with high image quality by performing each processing, based on parameter information suitable for a non-decoloring data region in which non-decoloring toner is used and a decoloring data region in which decoloring toner is used, using, for example, sharpness and g correction. The high image quality processing unit 162 outputs the image data to which processing suitable for each designated region is performed to the image formation processing unit 130 according to the designated region. The high image quality processing unit 162 is an aspect of the image formation processing unit.

The page memory 171 is configured by using a volatile storage device such as a RAM. The page memory 171 temporarily stores the read image data and data that a central processing unit 173 is processing. For example, the page memory 171 registers program data that the central processing unit 173 executes.

The auxiliary storage unit 172 is configured by using a storage device such as a magnetic hard disk device or a semiconductor memory device. The auxiliary storage unit 172 stores a control program that the central processing unit 173 uses to control each function, control data, and various types of data. The auxiliary storage unit 172 stores, for example, an image read processing program of the image forming device 100.

The central processing unit 173 is configured by using a processing device such as a CPU. The central processing unit 173 controls the entire functional units of the image forming device 100. The central processing unit 173 functions as a designated region generation unit 174 by executing, for example, a designated region generation program.

The designated region generation unit 174 generates designated region data from a detected region using the drawing detection unit 161. The designated region data has information for identifying the inside of the designated region and the outside of the designated region in the image data. In addition, the designated region generation unit 174 generates designated region data by using a region which is designated to the image data by a user through the control panel 120. The designated region generation unit 174 is an aspect of an input unit.

FIG. 5 is a diagram illustrating a specific example of a read target which is processed by the embodiment and is surrounded by a circle drawn by a marker pen. 300 of FIG. 5 denotes entirety of the read target. 300 of FIG. 5 includes 301 of FIG. 5, 302 of FIG. 5, 303 of FIG. 5, and 304 of FIG. 5 which are regions surrounded by a circle that a user draws by using the marker pen. When copying 300 of FIG. 5, the user selects the mixed print reproduction mode through the control panel 120. In this case, an image is formed by the decoloring toner in the insides of 301 of FIG. 5, 302 of FIG. 5, 303 of FIG. 5, and 304 of FIG. 5 which are regions surrounded by circles drawn by the marker pen, and an image is formed by non-decoloring toner in regions other than the insides thereof. Actually, an image is not formed in frame borders of 301 of FIG. 5, 302 of FIG. 5, 303 of FIG. 5, and 304 of FIG. 5.

FIG. 6 is a diagram illustrating a specific example in a case of being copied in the mixed print reproduction mode according to the embodiment. 310 of FIG. 6 denotes entirety of the copied read target. 310 of FIG. 6 includes 311 of FIG. 6, 312 of FIG. 6, 313 of FIG. 6, and 314 of FIG. 6 in which images are formed by non-decoloring toner. If the image forming device 100 performs decoloring erasure reproduction processing for 310 of FIG. 6, the insides of 311 of FIG. 6, 312 of FIG. 6, 313 of FIG. 6, and 314 of FIG. 6 which are regions where images are formed by the decoloring toner are decolored. Actually, an image is not formed in frame borders of 311 of FIG. 6, 312 of FIG. 6, 313 of FIG. 6, and 314 of FIG. 6.

FIG. 7 is a diagram illustrating a specific example in a case of being decolored by the decoloring erasure reproduction processing. 320 of FIG. 7 denotes entirety of the decolored read target. 320 of FIG. 7 includes 321 of FIG. 7, 322 of FIG. 7, 323 of FIG. 7, and 324 of FIG. 7 which are decolored. Actually, an image is not formed in frame borders of 321 of FIG. 7, 322 of FIG. 7, 323 of FIG. 7, and 324 of FIG. 7.

FIG. 8 is a diagram illustrating a specific example when the designated region is selected by using the control panel in the embodiment. The display 110 displays a designated region selection image display unit 111 of FIG. 8, a region selection button 112 of FIG. 8, an expansion button 113 of FIG. 8, and a contraction button 114 of FIG. 8. The control panel 120 includes a manipulation unit 121 of FIG. 8 and a print start button 122 of FIG. 8.

A thumbnail image of the read image data is displayed on the designated region selection image display unit 111. The region selection button 112 to the contraction button 114 can be manipulated by a user. The user manipulates the manipulation unit 121 and selects the region selection button 112 to the contraction button 114. For example, if the user selects the region selection button 112, an arbitrary region can be selected from the thumbnail image. A specific region of the thumbnail image is selected as the user manipulates the manipulation unit 121. For example, if the user selects the expansion button 113, a predetermined place of the thumbnail region is expanded to be displayed. The predetermined place of the thumbnail image is selected as the user manipulates the manipulation unit 121. For example, if the user selects the contraction button 114, a predetermined place of the thumbnail image is contracted to be displayed. The predetermined place of the thumbnail image may be selected as the user manipulates the manipulation unit 121. In addition, the user can also select an arbitrary region by performing click designation of a diagonal region on the thumbnail image of the designated region selection image display unit 111 using a finger or the like. After the region is selected, the user selects the print start button 122 of FIG. 8, and thereby, printing can be performed. At this time, the inside of the region which is selected in the thumbnail image becomes the inside of the designated region, and is printed by using the decoloring toner. The embodiment illustrated in FIG. 8 is just one specific example. Accordingly, the embodiment may be configured by an aspect different from that of FIG. 8.

FIG. 9 and FIG. 10 are flowcharts illustrating a flow of processing of the image forming device 100 according to the embodiment. The image forming device 100 operates in a standby state (ACT101). The control panel 120 of the image forming device 100 receives an image output mode from a user (ACT102). The system control unit 170 determines whether or not the received image output mode is a normal print reproduction mode (ACT103). If the normal print reproduction mode is selected (ACT103: YES), the image processing unit 160 sets the parameter information and performs image processing such that the entire region of the read image data becomes a non-decoloring data region in which an image is formed by non-decoloring toner (ACT104). If the normal print reproduction mode is not selected (ACT103: NO), the system control unit 170 determines whether or not the received image output mode is a decoloring print reproduction mode (ACT105). If the decoloring print reproduction mode is selected (ACT105: YES), the image processing unit 160 sets the parameter information and performs the image processing such that the entire region of the read image data is suitable for a decoloring data region in which an image is formed by decoloring toner (ACT106). If the decoloring print reproduction mode is not selected (ACT105: NO), the system control unit 170 determines whether or not the received image output mode is a mixed print reproduction mode (ACT107). If the mixed print reproduction mode is not selected (ACT107: NO), the processing returns to ACT102. If the mixed print reproduction mode is selected (ACT107: YES), the system control unit 170 of the image forming device 100 determines whether or not the control panel 120 receives a region which is designated by a marker pen (ACT108). If there is the region which is designated by the marker pen (ACT108: YES), the drawing detection unit 161 detects the designated region surrounded by a circle drawn by the marker pen (ACT109). The drawing detection unit 161 stores the read image data in the page memory 171 (ACT110). The designated region generation unit 174 generates designated region data of a pixel unit in a page from the designated region surrounded by the circle drawn by the marker pen (ACT111). Meanwhile, if the designated region surrounded by the circle drawn by the marker pen is not selected (ACT108: NO), the drawing detection unit 161 stores the read image data in the page memory 171 (ACT112). The display 110 displays a thumbnail image of the read image data (ACT113). The user selects an arbitrary designated region by manipulating the control panel 120. The designated region is stored in the user setting information management unit 180 (ACT114). The designated region generation unit 174 generates the designated region data of a pixel unit in a page from the selected designated region (ACT115).

The high image quality processing unit 162 reads the image data from the page memory 171 (ACT116).

The high image quality processing unit 162 performs image processing according to each processing based on the parameter information suitable for each inside and each outside of the designated region of the image data, based on the generated designated region data. The high image quality processing unit 162 generates image data with high image quality by performing each processing, based on the parameter information suitable for the non-decoloring data region in which the non-decoloring toner is used and the decoloring data region in which the decoloring toner is used, using, for example, sharpness and g correction (ACT117). The image processing unit 160 outputs the image data after the image formation processing unit 130 performs the image processing according to the designated region data which is designated on a pixel unit basis (ACT118). It is determined whether or not the image data which is output is in the decoloring data region (ACT119). If the image data which is output is in the decoloring data region (ACT119: YES), the image formation processing unit 132 for decoloring toner performs image formation processing based on the image data (ACT120). If the image data which is output is not in the decoloring data region (ACT119: NO), the image formation processing unit 131 for non-decoloring toner performs the image formation processing based on the image data (ACT121). Subsequently, the system control unit 170 determines whether or not the page ends (ACT122). If the page ends (ACT122: YES), the image forming device 100 ends the processing. If the page does not end ((ACT122: NO), the image forming device 100 returns to the processing of ACT119.

As the user draws a circle surrounding unnecessary information using the marker pen, the image forming device 100 having the aforementioned configuration can form an image in the inside of the surrounded region using the decoloring toner. Accordingly, the surrounded region can be decolored after the image is formed, and thus, it is possible to prevent easiness in viewing the document from being impaired due to existence of unnecessary information.

When receiving the image data from the input and output device 200, the image forming device 100 receives the designated region. By configuring in this way, a user does not need to select the designated region from the control panel 120 after the user transmits the image data from the input and output device 200. Accordingly, convenience of the user is increased.

The image forming device 100 may receive the designated region from the user through the control panel 120 after detecting a region that the drawing detection unit 161 draws. By configuring in this way, the user can select a region that he wants to save from an image of a read target

The image forming device 100 according to the present embodiment may provide a configuration such that an image of the inside of the designated region is formed by using non-decoloring toner and an image of the outside of the designated region is formed by using decoloring toner. By configuring in this way, the user can select a region that he wants to remain from an image of a read target.

The drawing detection unit 161 may determine that the inside of a region which is colored by a writing instrument as the inside of the designated region, and may determine that the outside of region which is colored by the writing instrument as the outside of the designated region.

The image forming device 100 according to the present embodiment describes that a marker pen is used as the writing instrument, but may be configured by using other writing instruments such as a ballpoint pen. The image forming device 100 according to the present embodiment describes that toner is used as developing agency, but may be configured by using other developing agency such as ink.

While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

WHAT IS CLAIMED IS:

1. An image forming device comprising:

an input unit that inputs image data whose at least one region is designated;

a first image forming unit that forms an image on an image forming medium using a decoloring material;

a second image forming unit that forms an image on an image forming medium using a non-decoloring material; and

an image formation processing unit that instructs one of the first image forming unit and the second image forming unit to form an image of the image data in an inside of a designated region and instructs the other to form an image of the image data in an outside of the designated region.

2. The device according to Claim 1, further comprising:

a drawing detection unit that detects a designated range which is surrounded by a circle that is drawn by a writing instrument in the image forming medium,

wherein the drawing detection unit determines that the designated range is the designated region.

3. The device according to Claim 2, further comprising:

a manipulation unit that receives manipulation which is performed by a user,

wherein, if the manipulation unit receives instruction indicating that the designated region is designated from the image data, the image formation processing unit instructs one of the first image forming unit and the second image forming unit to form an image of the image data in the inside of the designated region and instructs the other to form an image of the image data in the outside of the designated region, according to the instruction and the designated region.

4. The device according to Claim 1, further comprising:

a drawing detection unit that detects a range which is colored by a writing instrument in the image forming medium,

wherein the drawing detection unit determines that the range is the designated region.

5. The device according to Claim 1, further comprising:

a manipulation unit that receives manipulation which is performed by a user,

wherein, if the manipulation unit receives instruction indicating that the designated region is designated from the image data, the image formation processing unit instructs one of the first image forming unit and the second image forming unit to form an image of the image data in the inside of the designated region and instructs the other to form an image of the image data in the outside of the designated region, according to the instruction.

6. The device according to Claim 5, further comprising:

a system processing unit that expands or contracts the image data to display in a display unit, if the manipulation unit receives instruction indicating that the image data is expanded or contracted.

7. The device according to Claim 6, wherein, if the manipulation unit receives instruction indicating that the designated region is cancelled, the system processing unit cancels the designated region to display in the display unit.

8. The device according to Claim 5, further comprising:

an external interface unit that can connect an external input and output device to the image forming device so as to communicate with each other,

wherein the image forming device receives the image data from the external input and output device.

9. The device according to Claim 8,

wherein the external input and output device transmits the designated region to the image forming device, and

wherein, if the designated region is received from the external input and output device, the image formation processing unit instructs one of the first image forming unit and the second image forming unit to form an image of the image data in the inside of the designated region and instructs the other to form an image of the image data in the outside of the designated region.

10. An image forming method comprising:

inputting image data whose at least one region is designated;

performing first image formation in which an image is formed on an image forming medium using a decoloring material;

performing second image formation in which an image is formed on an image forming medium using a non-decoloring material; and

instructing image formation of the image data in an inside of a designated region in one of the first image formation and the second image formation, and instructing image formation of the image data in an outside of the designated region in the other image formation.

ABSTRACT

According to one embodiment, an image forming device includes an input unit, a first image forming unit, a second image forming unit, and an image formation processing unit. The input unit inputs image data whose at least one region is designated. The first image forming unit forms an image on an image forming medium using a decoloring material. The second image forming unit forms an image on an image forming medium using a non-decoloring material. The image formation processing unit instructs one of the first image forming unit and the second image forming unit to form an image of the image data in an inside of a designated region and instructs the other to form an image of the image data in an outside of the designated region.