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(54) HEATING DEVICE, FIXING DEVICE, AND IMAGE FORMING APPARATUS

HEIZVORRICHTUNG, FIXIERVORRICHTUNG UND BILDERZEUGUNGSVORRICHTUNG

DISPOSITIF DE CHAUFFAGE, DISPOSITIF DE FIXATION ET APPAREIL DE FORMATION D'IMAGES

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(73) Proprietor: **Ricoh Company, Ltd.**
Tokyo 143-8555 (JP)

(72) Inventor: **SAITOH, Seiji**
Tokyo 143-8555 (JP)

(74) Representative: **J A Kemp LLP**
80 Turnmill Street
London EC1M 5QU (GB)

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Description

BACKGROUND

Technical Field

[0001] Embodiments of the present disclosure generally relate to a heating device, a fixing device, and an image forming apparatus. In particular, the embodiments of the present disclosure relate to a heating device, a fixing device with the heating device for fixing a toner image on a recording medium, and an image forming apparatus with the fixing device for forming an image on a recording medium.

Description of the Related Art

[0002] An image forming apparatus such as a copier, a printer, a facsimile machine, and a multi-functional apparatus including at least two functions of the copier, printer, facsimile machine includes a fixing device that is one of heating devices and conveys a recording medium such as a sheet on which an unfixed image is formed to a fixing nip formed between a fixing belt as a heating belt and a pressure rotator, heat the recording medium, and fix the unfixed image onto the recording medium.

[0003] One type of the fixing devices includes a heater such as a halogen heater arranged in a width direction of the fixing belt, a nip formation pad, a support to support the nip formation pad, and a reflector to reflect heat from the heater toward the nip formation pad, which are inside a loop formed by the fixing belt. In this fixing device, the support and the reflector are disposed between the fixing belt and the heater. The heater does not directly heat the fixing belt. The heater heats the fixing belt via the nip formation pad so that the temperature of the fixing belt reaches a fixing temperature to fix an unfixed image onto the recording medium.

[0004] However, in such a configuration, belt support components that support both ends of the fixing belt draw heat from end portions of the fixing belt, and a length of the heater tends to be insufficient to heat the end portions. Because of these reasons, it is difficult to increase the temperature at the end portions of the fixing belt. Therefore, this configuration may need much time until starting a fixing operation or cause fixing failure at an end portion of the recording medium having the largest width of the recording media used in the fixing device.

[0005] To solve this problem, for example, JP2015-191189-A discloses the configuration in which heater sheets are disposed on end guides that support both ends of the fixing belt in a width direction in addition to a heater arranged along the width direction of the fixing belt. The heater sheets increase the amount of heat to heat the ends of the fixing belt.

[0006] However, the fixing device having additional heaters at the ends of the heating belt in the width direction as described in JP2015-191189-A has a problem that heating efficiency is poor because the end guides draw heat.

[0007] EP 3 629 097 A1, US 2015/277315 A1, US 2011/020018 A1, US 2017/031277 A1 and US 2014/212189 A1 disclose fixing devices. US 2017/248882 A1 and JP H05 127550 A disclose heating devices.

SUMMARY

[0008] It is a general object of the present disclosure to provide an improved and useful heating device in which the above-mentioned problem is eliminated. The invention is defined by the claims. In order to achieve the above-mentioned object, there is provided a heating device according to claim 1. Advantageous embodiments are defined by the dependent claims.

[0009] Advantageously, the hating device includes an endless heating belt, a pressing member configured to press an outer surface of the heating belt, a nip formation pad disposed inside a loop of the heating belt and configured to contact the pressing member via the heating belt to form a nip, a heater disposed inside the loop of the heating belt and configured to heat the heating belt, a reflector disposed inside the loop of the heating belt and configured to reflect heat from the heater, and a support disposed inside the loop of the heating belt and configured to support the nip formation pad. The reflector has an opening disposed opposite a first portion of the heating belt other than a second portion of the heating belt facing the nip formation pad in a circumferential direction of the heating belt. The opening of the reflector is disposed at a position, in a width direction of the heating belt, corresponding to an end of a recording medium having a largest width in recording media that the heating device handles. The support has an opening disposed the first portion of the heating belt. The opening of the support is disposed at a position, in the width direction of the heating belt, corresponding to the end of the recording medium having the largest width in the recording media that the heating device handles.

[0010] According to the present disclosure, each of the support and the reflector has the opening at the position corresponding to the end of the recording medium having the largest width. Such a simple configuration enables the heater to efficiently heat the end of the heating belt via the opening.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The aforementioned and other aspects, features, and advantages of the present disclosure would be better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

FIG. 1 is a schematic diagram illustrating a configuration of an image forming apparatus according to

an embodiment of the present disclosure;
FIG. 2 is a vertical cross-sectional view of a fixing device viewed from a lateral side of the fixing device;
FIG. 3 is a perspective view of the fixing device with the vertical cross-sectional view of the fixing device;
FIG. 4 is a vertical cross-sectional view of the fixing device viewed from a front side of the fixing device;
FIG. 5 is a perspective view of a belt holder;
FIG. 6 is a perspective view of a variation of the belt holder;
FIG. 7 is a vertical cross-sectional view of the fixing device viewed from the lateral side of the fixing device and cut at a position of an opening of a reflector and an opening of a support;
FIG. 8 is a vertical cross-sectional view of the fixing device viewed from the front side of the fixing device;
FIG. 9 is a graph illustrating a temperature distribution in a width direction of the fixing belt;
FIGS. 10A and 10B are partial vertical cross-sectional views to describe direct heating due to a halogen heater through the opening;
FIG. 11 is an explanatory diagram illustrating relation of positions of the opening and high temperature portion of the halogen heater in the width direction;
FIG. 12 is a vertical cross-sectional view of the fixing device viewed from the front side of the fixing device according to another embodiment;
FIG. 13A is a graph illustrating a temperature distribution of the fixing device in FIG. 12 that has the openings having the same width;
FIG. 13B is a graph illustrating a temperature distribution of the fixing device in FIG. 12 that has the openings having different widths; and
FIG. 14 is a perspective view illustrating the fixing device according to yet another embodiment.

[0012] The accompanying drawings are intended to depict embodiments of the present disclosure and should not be interpreted to limit the scope thereof. The accompanying drawings are not to be considered as drawn to scale unless explicitly noted.

DETAILED DESCRIPTION OF EMBODIMENTS

[0013] A description is provided of a construction of the image forming apparatus 1. FIG. 1 is a schematic diagram illustrating a configuration of an image forming apparatus 1 according to an embodiment of the present disclosure. Identical reference numerals are assigned to identical components or equivalents and a description of those components is simplified or omitted.

[0014] As illustrated in FIG. 1, the image forming apparatus 1 includes an image forming device 2 disposed in a center portion of the image forming apparatus 1. The image forming device 2 includes four process units 9Y, 9M, 9C, and 9K removably installed in the image forming apparatus 1. The process units 9Y, 9M, 9C, and 9K have an identical structure except that the process units 9Y, 9M, 9C, and 9K contain developers (e.g., yellow, magenta, cyan, and black toners) in different colors, that is, yellow, magenta, cyan, and black corresponding to color separation components of a color image.

[0015] Each process unit 9 includes a photoconductor drum 10 serving as a rotatable image bearer to bear toner as the developer on the surface of the photoconductor drum 10, a charging roller 11 to uniformly charge the surface of the photoconductor drum 10, and a developing device 12 that includes a developing roller to supply toner to the surface of the photoconductor drum 10.

[0016] Below the process units 9Y, 9C, 9M, and 9K, an exposure device 3 is disposed. The exposure device 3 emits laser light beams based on image data.

[0017] Above the image forming device 2, a transfer device 4 is disposed. The transfer device 4 includes, e.g., a drive roller 14, driven rollers 15 and 27, an intermediate transfer belt 16, a belt cleaning unit 280, and four primary transfer rollers 17. The intermediate transfer belt 16 is an endless belt rotatably stretched around the drive roller 14, the driven roller 15, and the like. Each of the four primary transfer rollers 17 is disposed opposite the corresponding photoconductor drum 10 in each of the process units 9Y, 9C, 9M, and 9K via the intermediate transfer belt 16. At the different positions, the primary transfer rollers 17 press against an inner circumferential surface of the intermediate transfer belt 16. Thus, primary transfer nips are formed at positions at which the photoconductor drums 10 contact respective pressed portions of the intermediate transfer belt 16 pressed by the primary transfer rollers 17.

[0018] The drive roller 14 rotates the intermediate transfer belt 16. In addition, the transfer device 4 includes a secondary-transfer roller 18 disposed opposite the drive roller 14 via the intermediate transfer belt 16. The secondary-transfer roller 18 is pressed against an outer circumferential surface of the intermediate transfer belt 16, and thus a secondary-transfer nip is formed between the secondary-transfer roller 18 and the intermediate transfer belt 16.

[0019] A sheet feeder 5 is disposed in a lower portion of the image forming apparatus 1. The sheet feeder 5 includes a sheet tray 19, which contain sheets P as recording media, and a sheet feeding roller 20 to send out the sheet P from the sheet tray 19.

[0020] The sheets P are conveyed along a conveyance passage 6 from the sheet feeder 5 toward a sheet ejector 8. Conveyance roller pairs including a registration roller pair 21 are disposed along the conveyance passage 6.

[0021] A fixing device 7 as a heating device is disposed downstream from a secondary transfer nip in the sheet conveyance direction. The fixing device 7 includes a fixing belt 22 as a heating belt heated by a heater and a pressure roller 23 as a pressure member to press the fixing belt 22.

[0022] The sheet ejector 8 is disposed at an extreme downstream side of the conveyance passage 6 in the image forming apparatus 1. The sheet ejector 8 includes

an ejection roller pair 24 and an output tray 25. The ejection roller pair 24 ejects the sheets P onto the output tray 25 disposed atop a housing of the image forming apparatus 1. Thus, the sheets P lie stacked on the output tray 25.

[0023] In an upper portion of the image forming apparatus 1, removable toner bottles 29Y, 29C, 29M, and 29K are disposed. The toner bottles 29Y, 29C, 29M, and 29K are filled with fresh toner of yellow, cyan, magenta, and black, respectively. A toner supply tube is interposed between each of the toner bottles 29Y, 29C, 29M, and 29K and the corresponding developing device 12. The fresh toner is supplied from each of the toner bottles 29Y, 29C, 29M, and 29K to the corresponding developing device 12 through the toner supply tube.

[0024] Next, a description is given of a basic operation of the image forming apparatus 1 with reference to FIG. 1.

[0025] As the image forming apparatus 1 receives a print job and starts an image forming operation, the exposure device 3 emits laser light beams onto the outer circumferential surfaces of the photoconductor drums 10 of the process units 9Y, 9M, 9C, and 9K according to image data, thus forming electrostatic latent images on the photoconductor drums 10. The image data used to expose the respective photoconductor drums 10 by the exposure device 3 is monochrome image data produced by decomposing a desired full color image into yellow, magenta, cyan, and black image data. After the exposure device 3 forms the electrostatic latent images on the photoconductor drums 10, the drum-shaped developing rollers of the developing devices 12 supply yellow, magenta, cyan, and black toners stored in the developing devices 12 to the electrostatic latent images, rendering visible the electrostatic latent images as developed visible images, that is, yellow, magenta, cyan, and black toner images, respectively.

[0026] In the transfer device 4, the intermediate transfer belt 16 moves along with rotation of the drive roller 14 in a direction indicated by arrow A in FIG. 1. A power supply applies a constant voltage or a constant current control voltage having a polarity opposite a polarity of the toner to each primary transfer roller 17. As a result, a transfer electric field is formed at the primary transfer nip. The yellow, magenta, cyan, and black toner images are primarily transferred from the photoconductor drums 10 onto the intermediate transfer belt 16 successively at the primary transfer nips such that the yellow, magenta, cyan, and black toner images are superimposed on a same position on the intermediate transfer belt 16.

[0027] On the other hand, as the image forming operation starts, the sheet feeding roller 20 of the sheet feeder 5 disposed in the lower portion of the image forming apparatus 1 is driven and rotated to feed a sheet P from the sheet tray 19 toward the registration roller pair 21 through the conveyance passage 6. The registration roller pair 21 conveys the sheet P sent to the conveyance passage 6 by the sheet feeding roller 20 to the secondary-transfer nip formed between the secondary-transfer roller 18 and the intermediate transfer belt 16 supported by the drive roller 14, timed to coincide with the superimposed toner image on the intermediate transfer belt 16. At this time, a transfer voltage having a polarity opposite the toner charge polarity of the toner image formed on the surface of the intermediate transfer belt 16 is applied to the sheet P and the transfer electric field is generated in the secondary transfer nip. Due to the transfer electric field generated in the secondary transfer nip, the toner images formed on the intermediate transfer belt 16 are collectively transferred onto the sheet P.

[0028] The sheet P bearing the full color toner image is conveyed to the fixing device 7 where the fixing belt 22 and the pressure roller 23 fix the full color toner image on the sheet P under heat and pressure. The sheet P bearing the full color toner image is separated from the fixing belt 22 and conveyed by the conveyance roller pair to the sheet ejector 8. The ejection roller pair 24 of the sheet ejector 8 ejects the sheet P onto the output tray 25.

[0029] The above describes the image forming operation of the image forming apparatus 1 to form the full color toner image on the sheet P. Alternatively, the image forming apparatus 1 may form a monochrome toner image by using any one of the four process units 9Y, 9M, 9C, and 9K or may form a bicolor toner image or a tricolor toner image by using two or three of the process units 9Y, 9M, 9C, and 9K.

[0030] As illustrated in FIG. 2, the fixing device 7 includes the fixing belt 22, the pressure roller 23, a halogen heater 31 as a heater, a nip formation pad 32, a stay 33 as a support, and a reflector 34. In the following description, the width direction of the fixing belt 22 is an axial direction of the pressure roller 23 and a longitudinal direction of the pressure roller 23. The width direction of the fixing belt 22 is also a direction perpendicular to a sheet surface of FIG. 2 and the direction indicated by a double-headed arrow F in FIGS. 3 and 4, which is simply referred to the width direction. The halogen heater 31, the nip formation pad 32, the stay 33, and the reflector 34 are disposed in parallel to the width direction of the fixing belt 22 as illustrated in FIGS. 3 and 4. Hereinafter, about these members, the direction parallel to the width direction of the fixing belt 22 is referred to as the longitudinal direction of these members (for example, the longitudinal direction of the reflector 34).

[0031] As illustrated in FIG. 2, the fixing belt 22 is a cylindrical fixing member to fix an unfixed image T to the sheet P and is disposed on the side of the sheet P on which the unfixed image T is held. The fixing belt 22 in the present embodiment is an endless belt or film, including a base layer formed on an inner side of the fixing belt 22 and made of a metal such as nickel and stainless steel (SUS) or a resin such as polyimide, and a release layer formed on the outer side of the fixing belt 22 and made of tetrafluoroethylene-perfluoroalkylvinylether copolymer (PFA), polytetrafluoroethylene (PTFE), or the like. Optionally, an elastic layer made of rubber such as silicone rubber, silicone rubber foam, and fluoro rubber may

be interposed between the base layer and the release layer. While the fixing belt 22 and the pressure roller 23 press the unfixed toner image against the sheet P to fix the toner image onto the sheet P, the elastic layer having a thickness of about 100 micrometers elastically deforms to absorb slight surface asperities of the fixing belt 22, preventing variation in gloss of the toner image on the sheet P. In the present embodiment, the fixing belt 22 is thin and has a small loop diameter to decrease the thermal capacity of the fixing belt 22. For example, the base layer of the fixing belt 22 has a thickness of from 20 μm to 50 μm and the release layer has a thickness of from 10 μm to 50 μm. Thus, the fixing belt 22 has a total thickness not greater than 1 mm. When the fixing belt 22 includes the elastic layer, the thickness of the elastic layer may be set to 100 to 300 μm. In order to further decrease the thermal capacity of the fixing belt 22, the fixing belt 22 may have the total thickness not greater than 0.20 mm and preferably not greater than 0.16 mm. In the present embodiment, the fixing belt 22 may have a loop diameter from 20 to 40 mm and preferably 30 mm or less.

[0032] The pressure roller 23 is an opposed member disposed opposite an outer circumferential surface of the fixing belt 22. The pressure roller 23 includes a cored bar; an elastic layer coating the cored bar and being made of silicone rubber foam, fluoro rubber, or the like; and a release layer coating the elastic layer and being made of PFA, PTFE, or the like. According to the present embodiment, the pressure roller 23 is a solid roller. Alternatively, the pressure roller 23 may be a hollow roller. When the pressure roller 23 is a hollow roller, a heater such as a halogen heater may be disposed inside the pressure roller 23. The elastic layer of the pressure roller 23 may be made of solid rubber. Alternatively, if no heater is disposed inside the pressure roller 23, the elastic layer of the pressure roller 23 is preferably made of sponge rubber to enhance thermal insulation of the pressure roller 23. Such a configuration reduces heat conduction from the fixing belt 22 to the pressure roller 23 and improves heating efficiency of the fixing belt 22.

[0033] A driver disposed inside the image forming apparatus 1 drives and rotates the pressure roller 23 in the direction indicated by arrow A in FIG. 2. The rotation of the pressure roller 23 drives the fixing belt 22 to rotate in a direction indicated by arrow B in FIG. 2 (hereinafter, belt rotation direction B) due to frictional force therebetween. After the toner image is transferred onto the sheet P, the sheet P bearing the unfixed toner image T is conveyed to a nip N (a fixing nip N) between the fixing belt 22 and the pressure roller 23. The rotating fixing belt 22 and the rotating pressure roller 23 conveys the sheet P, and the sheet P passes through the nip N. When the sheet P passes through the fixing nip N, heat and pressure applied to the sheet P fix the unfixed toner image T to the sheet P.

[0034] The pressure roller 23 and the fixing belt 22 are configured to be able to contact and separate each other. If the sheet is jammed in the nip N, separating the pressure roller 23 and the fixing belt 22 from each other and opening the nip N enables the jammed sheet to be removed. The pressure roller 23 and the fixing belt 22 may be configured so that one is fixed and the other is movable to be able to contact and separate from each other, or both the pressure roller 23 and the fixing belt 22 may be configured to move, thereby alternatively contacting and separating from each other.

[0035] The halogen heater 31 is a heater disposed inside the loop of the fixing belt 22 to emit infrared light, and radiant heat from the halogen heater 31 heats the fixing belt 22 from the inside. Alternatively, instead of the halogen heater 31, a carbon heater, a ceramic heater or the like may be employed as the heater. In the present embodiment, one halogen heater 31 is disposed in the loop of the fixing belt 22, but a plurality of halogen heaters 31 having different heat generation areas may be used according to the width of the sheet.

[0036] The nip formation pad 32 sandwiches the fixing belt 22 together with the pressure roller 23, to form the fixing nip N. Specifically, the nip formation pad 32 is disposed inside the loop of the fixing belt 22 and extends in the longitudinal direction thereof parallel to the width direction of the fixing belt 22. The nip formation pad 32 has a planar nip formation portion 32a that is in contact with an inner circumferential surface of the fixing belt 22 and a pair of bent portions 32b that are bent from both end portions of the nip formation portion 32a in a belt rotation direction B to the opposite side to the pressure roller 23. A pressing member such as a spring presses the pressure roller 23 against the nip formation pad 32, which causes the pressure roller 23 to contact the fixing belt 22 and form the fixing nip N between the pressure roller 23 and the fixing belt 22.

[0037] A nip formation surface 32c on the nip formation portion 32a facing the fixing belt 22 directly contacts the inner circumferential surface of the fixing belt 22. Therefore, when the fixing belt 22 rotates, the fixing belt 22 slides along the nip formation surface 32c. In order to improve the abrasion resistance and the slidability of the nip formation surface 32c, preferably the nip formation surface 32c is treated with an alumite or a fluororesin material coating. Additionally, a lubricant such as a fluorine-based grease may be applied to the nip formation surface 32c in order to ensure slidability over time. In the present embodiment, the nip formation surface 32c is planar. Alternatively, the nip formation surface 32c may define a recess or other shape. For example, the nip formation surface 32c having a concave shape recessed to the side opposite to the pressure roller 23 leads the outlet of the sheet in the fixing nip N to be closer to the pressure roller 23, which improves separation of the sheet from the fixing belt 22.

[0038] The nip formation pad 32 is made of a material having a thermal conductivity larger than that of the stay 33. For example, the material of the nip formation pad 32 is preferably copper (thermal conductivity: 398 W / mk) or aluminum (thermal conductivity: 236 W / mk). The

nip formation pad 32 made of the material having such a large thermal conductivity absorbs the radiant heat from the halogen heater 31 and effectively transmits heat to the fixing belt 22. For example, setting the thickness of the nip formation pad 32 to 1 mm or less can shorten a heat transfer time in which the heat transfers from the nip formation pad 32 to the fixing belt 22, which is advantageous in shortening a warm-up time of the fixing device 7. In contrast, setting the thickness of the nip formation pad 32 to be larger than 1 mm and 5 mm or less can improve a heat storage capacity of the nip formation pad 32.

[0039] The stay 33 is the support to support the nip formation pad 32 against pressure from the pressure roller 23. Similar to the nip formation pad 32, the stay 33 extends in a longitudinal direction thereof parallel to the width direction of the fixing belt 22 and inside the loop of the fixing belt 22. In the present embodiment, the stay 33 has a U-shaped cross-section including a pair of side wall portions 33a and a bottom wall portion 33b that connects the pair of side wall portions 33a. The pair of side wall portions 33a of the stay 33 supports both ends of the nip formation pad 32 in the belt rotation direction B. The side wall portions 33a extending in a direction in which the pressure roller 23 presses against the nip formation pad 32 that is a vertical direction in FIG. 2 strengthens the rigidity of the stay 33 in the direction in which the pressure roller 23 presses against the nip formation pad 32 and reduces the bend of the nip formation portion 32a caused by the pressure force of the pressure roller 23. Such a configuration results in a uniform width of the nip in the longitudinal direction. The stay 33 is preferably made of an iron-based metal such as stainless steel (SUS) or Steel Electrolytic Cold Commercial (SECC) that is electrogalvanized sheet steel to ensure rigidity.

[0040] The reflector 34 is disposed opposite the halogen heater 31 inside the loop of the fixing belt 22 to reflect the radiant heat that is infrared light emitted from the halogen heater 31 to the nip formation pad 32. In the present embodiment, the reflector 34 has a U-shaped cross-section including a reflector portion 34a formed as an ellipse cross-section and a pair of bent portions 34b bent from both ends of the reflector portion 34a in a direction in which the bent portions separate from each other in the belt rotation direction B. Each bent portion 34b is sandwiched between each side wall portion 33a of the stay 33 and the nip formation portion 32a of the nip formation pad 32 to hold the reflector 34.

[0041] An opening of an ellipse concave surface of the reflector portion 34a that opens toward the nip formation pad 32 reflects the radiant heat from the halogen heater 31 toward the nip formation pad 32. That is, the halogen heater 31 directly irradiates the nip formation pad 32 with the infrared light, and, additionally, the nip formation pad 32 is also irradiated with the infrared light reflected by the reflector portion 34a. Therefore, the nip formation pad 32 is effectively heated.

[0042] Since the reflector portion 34a is interposed between the halogen heater 31 and the stay 33, the reflector portion 34a functions to block the infrared light from the halogen heater 31 to the stay 33. This function eliminates wasteful energy use to heat the stay 33. Additionally, in the present embodiment, thermal insulation of the layer of air in a gap between the stay 33 and the reflector portion 34a blocks heat transfer to the stay 33.

[0043] As described above, in the present embodiment, the reflector 34 is provided to cover the halogen heater 31, and the radiant heat from the halogen heater 31 and the radiant heat reflected by the reflector 34 are efficiently collected to a U-shaped opening of the reflector 34, that is, to the nip formation pad 32. The heated nip formation pad 32 can efficiently heat the fixing belt 22 in the fixing nip N. The stay 33 is disposed to cover the outer circumferential surface of the reflector 34. A fixing belt 22 is disposed outside the stay 33. That is, in the circumferential direction of the fixing belt 22, the fixing belt 22 faces the halogen heater 31 through the nip formation pad 32 in the fixing nip N and, in the portion other than the fixing nip N and openings 33c and 34c described below, faces the halogen heater 31 through the reflector 34 and the stay 33.

[0044] The surface of the reflector portion 34a of the reflector 34 facing the halogen heater 31 is treated with a mirror finish or the like to increase reflectance. In the present embodiment, reflectance is measured using the spectrophotometer that is the ultraviolet visible infrared spectrophotometer UH4150 manufactured by Hitachi High-Technologies Corporation in which the incident angle is set 5°. In general, the color temperature of the halogen heater varies depending on the application. The color temperature of the heater for the fixing device is about 2500 K. The reflectance of the reflector 34 used in the present embodiment is preferably 70% or more with wavelengths of high emission intensity in the halogen heater 31, that is, specifically the wavelengths of 900 to 1600 nm and more preferably 70% or more with the wavelengths of 1000 to 1300 nm.

[0045] Alternatively, the stay 33 may have the function of reflection and thermal insulation of the reflector 34. For example, performing the thermal insulation treatment or the mirror finishing on the inner surface of the stay 33 in the halogen heater 31 side enables the stay 33 to function as the reflector 34. In this case, the reflector 34 that is a separate part from the stay 33 can be removed. The reflectance of the stay 33 subjected to the mirror finishing is preferably similar to the reflectance of the reflector 34.

[0046] As illustrated in FIG. 4, a pair of belt holders 35 is inserted in both lateral ends of the fixing belt 22 in the axial direction of the fixing belt 22 to rotatably support the fixing belt 22. As described above, the belt holders 35 inserted into the inner periphery of the fixing belt 22 support the fixing belt 22 in a state in which the fixing belt 22 is not basically applied with tension in a circumferential direction thereof while the fixing belt 22 does not rotate, that is, by a free belt system.

[0047] As illustrated in FIGS. 3 to 5, the belt holders

35 include a C-shaped supporter 35a inserted into the inner periphery of the fixing belt 22 to support the fixing belt 22 and a flange 35b that contacts an end face of the fixing belt 22 to stop a movement of the fixing belt 22 in the width direction, that is, walking of the fixing belt 22 in the width direction. As illustrated in FIG. 6, the supporter 35a may have a cylindrical shape which is continuous over its entire circumference. As illustrated in FIG. 4, each of belt holders 35 is fixed on a pair of side plates 36 that are frames of the fixing device 7. The belt holders 35 define opening 35c as illustrated in FIG. 5, and both ends of the halogen heater 31 and the stay 33 are fixed to the side plates 36 through the openings 35c. The halogen heater 31 and the stay 33 may be fixed to the belt holder 35.

[0048] As illustrated in FIG. 3, the stay 33 and the reflector 34 have openings 33c and 34c on both ends in the width direction of the fixing belt 22, respectively. In the width direction, the openings 33c and 34c are disposed at the same position. As illustrated in FIG. 7, in a circumferential direction of the fixing belt 22 that is a direction in which the fixing belt 22 rotates in a plane perpendicular to the longitudinal direction of the pressure roller 23, the direction indicated by arrow B in FIG. 7 and the direction opposite to the arrow B, and the direction indicated by a double-headed arrow G in FIG. 3, the openings 33c and 34c are disposed opposite a portion (a first portion) of the fixing belt 22 other than another portion (a second portion) facing the nip formation pad 32. The openings 33c and 34c are arranged to overlap when the two openings are viewed from a direction perpendicular to the longitudinal direction as illustrated in FIG. 3.

[0049] As illustrated by arrows X in the vertical cross-sectional view in FIG. 7, an inner surface of the fixing belt 22 at portions corresponding to the openings 33c and 34c in the circumferential direction of the fixing belt 22 is directly irradiated with the radiant heat from the halogen heater 31 that is not blocked by the stay 33 and the reflector 34 and passes through the openings 33c and 34c. Since the portions of the fixing belt 22 corresponding to the openings 33c and 34c are directly heated by the halogen heater 31 in addition to heat transfer through the nip formation pad 32, the fixing belt 22 is efficiently heated.

[0050] As illustrated in FIG. 8, the openings 33c and 34c are arranged corresponding to a sheet passing area H1 of the sheet P1 having the largest width that can pass through the fixing device 7. Specifically, outer ends of the openings 33c and 34c in the width direction are arranged so as to substantially coincide with the ends of the sheet P1 in the width direction. The ends of the sheet P1 is the outermost side in the width direction in the region of the sheet heated by the fixing belt 22, and arranging the openings 33c and 34c inside from the ends of the sheet P1 enables the heater to efficiently heat a region in which the temperature of the fixing belt 22 tends to be low that is described in detail bellow. The largest width of the sheet that can pass through the fixing device 7 is, for example, when the fixing device 7 can use a postcard and sheets of A4 size and B5 size, the largest width when the sheet with A4 size is placed sideways and equals a length of the sheet with A4 size in the longitudinal direction.

[0051] FIG. 9 is a graph illustrating a temperature distribution in a width direction of the fixing belt 22 when the halogen heater 31 heats the fixing belt 22. In FIG. 9, an X-axis represents the position of the fixing belt 22 in the width direction of the fixing belt 22, and a Y-axis represents the surface temperature of the fixing belt 22. A dotted line illustrates the temperature distribution of the fixing belt 22 when the stay 33 and the reflector 34 do not have the openings 33c and 34c, and a solid line illustrates the temperature distribution of the fixing belt 22 in the present embodiment. Rectangles 33c and 34c illustrated in FIG. 9 and other graphs illustrating the temperature distributions below indicate positions of the openings 33c and 34c in the width direction. A temperature TO is a target temperature of the fixing belt 22.

[0052] As illustrated by the dotted line in FIG. 9, a temperature at each of end portions of the fixing belt 22 in the width direction tends to be lower than a temperature at the center portion of the fixing belt 22 in the width direction. This is because the belt holders 35 draw heat from end portions of the fixing belt 22 in the width direction, and the length of the halogen heater 31 tends to be insufficient to heat the end portions of the fixing belt 22 in the width direction.

[0053] In contrast, in the present embodiment, arranging the openings 33c and 34c at portions corresponding to the end portions of the fixing belt 22 in the width direction enables the heater to efficiently heat the end portions of the fixing belt 22 in the width direction. Therefore, this configuration can reduce temperature unevenness during heating in the fixing belt 22 when the temperature at the end portions of the fixing belt 22 in the width direction approaches the target temperature TO. That is, the fixing device 7 in the present embodiment can sufficiently heat end portions of the large sheet P1 in the width direction and fix the image on the surface of the end portions of the large sheet P1 onto the sheet surface. On the other hand, arranging the opening at the center portion of the stay 33 and the reflector 34 in the width direction that is a portion with a large amount of heating prevents a uniform increase in the temperature of the fixing belt. That is, to obtain the uniform increase in the temperature like the present embodiment, arranging the opening at the end portion of the stay and the reflector in the width direction is important. Although the outer ends of the openings 33c and 34c in the width direction are arranged so as to substantially coincide with the ends of the sheet P1 in the present embodiment, arranging the openings near the ends of the sheet P1 can give a similar effect. Note that arranging outer ends of the openings 33c and 34c in the width direction inside outer ends of the sheet P1 and setting widths of the openings 33c and 34c smaller

improve strength of the stay 33 and the reflector 34. On the other hand, arranging outer ends of the openings 33c and 34c in the width direction outside the outer ends of the sheet P1 effectively solves the temperature shortage at the end portion of the sheet P1 and the vicinity of the end portion of the sheet P1 and have an advantage in heating the fixing belt 22 when the heater starts to heat the fixing belt 22 to use the image forming apparatus.

[0054] As illustrated in FIG. 10A, the openings 33c and 34c faces a portion D of the fixing belt 22 upstream from the fixing nip N in a direction of rotation of the fixing belt 22, that is, in an entrance side of the nip in which the recording medium enters. As a result, the rotation of the fixing belt 22 indicated by the arrow B brings the portion D of the fixing belt 22 to the fixing nip N immediately after the radiant heat of the halogen heater 31 heats the portion D as illustrated in FIG. 10B. Therefore, the end portions of the fixing belt 22 in the width direction becomes high temperature at the fixing nip N, which can efficiently heat the sheet P conveyed to the fixing nip N.

[0055] Additionally, as illustrated in FIG. 8, a temperature sensor 28 as a temperature detector is disposed opposite the end portion of the fixing belt 22 in the width direction. That is, the temperature sensor 28 as the temperature detector is disposed at a position corresponding to the openings 33c and 34c in the width direction of the fixing belt 22. The temperature sensor 28 is disposed outside the loop of the fixing belt 22 as illustrated in FIG. 2 and detects a temperature of the fixing belt 22. Output of the halogen heater 31 is controlled based on the temperature of the outer circumferential surface of the fixing belt 22 detected by the temperature sensor 28. Thus, the temperature of the fixing belt 22 is adjusted to a desired fixing temperature. The temperature sensor 28 may be either contact type or non-contact type. The temperature sensor 28 may be a known temperature sensor type such as a thermopile, a thermostat, a thermistor, or a non-contact (NC) sensor. FIG. 8 illustrates the temperature sensor 28 disposed opposite one end portion of the fixing belt 22 in the width direction, but the fixing device 7 in the present embodiment includes another temperature sensor arranged opposite the center portion of the fixing belt 22 in the width direction.

[0056] Setting the temperature sensor 28 opposite the end portion of the fixing belt 22 in the width direction in which the temperature of the fixing belt 22 is difficult to rise allows control that slows down a sheet conveyance speed to get time to heat the sheet when the temperature on the end portion of the fixing belt 22 is not sufficient.

[0057] Next, the fixing devices according to other embodiments are described.

[0058] As illustrated in FIG. 11, the halogen heater 31 according to the second embodiment has different densities of the filament coiled helically at positions in the width direction, that is, high heat portions 31b having a high density of the filament coiled helically (that is, emitting a large amount of heat) on end portions of the halogen heater in the width direction and a low heat portion 31a having a relatively low density of the filament coiled helically on a center portion of the halogen heater in the width direction. That is, setting the high heat portions 31b opposite the end portions of the fixing belt 22 in the width direction at which the temperature of the fixing belt tends to be low sufficiently heats the end portions of the fixing belt 22 in the width direction and reduces the temperature unevenness in the fixing belt 22.

[0059] Additionally, in the present embodiment, arranging the openings 33c and 34c at positions corresponding to the high heat portions 31b of the halogen heater 31 on the stay 33 and the reflector 34 enables the halogen heater 31 to directly heat the end portions of the fixing belt 22 in the width direction. The above-described configuration increases the radiant heat from the halogen heater 31 to the end portions of the fixing belt 22 in the width direction and the heat amount added to the end portions of the fixing belt 22 in the width direction. Therefore, the above-described configuration enables the end portions of the fixing belt 22 in the width direction to heat to the target temperature TO even when raising the temperature of the end portions of the fixing belt 22 in the width direction is difficult.

[0060] In the third embodiment, as illustrated in FIG. 12, the image forming apparatus 1 includes an airflow generator 40 that generates an airflow E in the image forming apparatus 1. The airflow generator 40 generates the airflow E flowing from one side in the longitudinal direction of the fixing device 7 toward the other side (hereinafter, this direction is referred to as an airflow direction). In the fixing device 7 according to the third embodiment, the stay 33 and the reflector 34 have the openings 33c and 34c at both end portions of the stay 33 and the reflector 34 in the longitudinal direction, respectively. The width of each of the openings 33c and 34c on the upstream side in the airflow direction is larger than the width of each of the openings 33c and 34c on the downstream side in the airflow direction.

[0061] The airflow E flowing in the longitudinal direction of the fixing device 7 according to the third embodiment transfers heat of the fixing belt 22 from the upstream side to the downstream side in the airflow direction. Therefore, as illustrated in FIG. 13A, the openings 33c and 34c having the same width and disposed at both end portions of the stay 33 and the reflector 34 as described in the above embodiments cause the temperature of the fixing belt 22 on the upstream side in the airflow direction not to reach the target temperature T0 and cause the temperature of the fixing belt 22 on the downstream side in the airflow direction to exceed the target temperature TO.

[0062] In contrast, in the third embodiment, the openings 33c and 34c disposed at both end portions of the stay 33 and the reflector 34 have different width so that the end portion of the fixing belt 22 on the upstream side in the airflow direction directly receives a greater heat amount of the radiant heat from the heater than the end portion of the fixing belt 22 on the downstream side in the airflow direction. Therefore, as illustrated in FIG. 13B,

the temperatures of the fixing belt 22 at both end portions in the longitudinal direction approach the target temperature TO. As described above, the widths of the openings 33c and 34c may not equal at both end portions of the stay 33 and the reflector 34 and may be appropriately changed according to conditions that affect temperature. For example, when airflow in the direction opposite to that of the present embodiment, that is, airflow from right to left in FIG. 12, is generated, the openings 33c and 34c on the right side in FIG. 12 may be wider than the openings 33c and 34c on the left side. Or the widths of the openings 33c and 34c on the side opposite to the side where the driving source of the pressure roller is provided may be increased. The openings 33c and 34c may be disposed at one end portion of the stay 33 and the reflector 34 in the longitudinal direction. Note that the arrangement of the airflow generator 40 illustrated in FIG. 12 is an example and may be arranged at an appropriate position in the image forming apparatus 1.

[0063] As illustrated in FIG. 14, the fixing device 7 according to the fourth embodiment includes a second reflector 341 different from the reflector 34. The second reflector 341 is disposed at a position corresponding to the openings 33c and 34c in the longitudinal direction. The second reflector 341 is disposed opposite the openings 33c and 34c across the halogen heater 31. The second reflector 341 has a reflection face 341a facing the openings 33c and 34c. Specifically, the reflection face 341a is provided at an angle such that a part of perpendicular lines to the reflection face 341a passes through the openings 33c and 34c.

[0064] Toward the openings 33c and 34c, the reflection face 341a of the second reflector 341 reflects radiant heat X' radiated from the halogen heater 31 to the side opposite to the openings 33c and 34c. This increases the heat amount of the radiant heat directly radiated from the halogen heater 31, which efficiently heats the end portion of the fixing belt 22 in the width direction.

[0065] The present disclosure is not limited to the details of the embodiments described above and various modifications and improvements are possible.

[0066] The image forming apparatus 1 according to the present embodiment of this disclosure is applicable not only to a color image forming apparatus illustrated in FIG. 1 but also to a monochrome image forming apparatus, a copier, a printer, a facsimile machine, or a multifunction peripheral including at least two functions of the copier, printer, and facsimile machine.

[0067] The sheets P serving as recording media may be thick paper, postcards, envelopes, plain paper, thin paper, coated paper, art paper, tracing paper, overhead projector (OHP) transparencies, plastic film, prepreg, copper foil, and the like.

[0068] In the above description, the heating device of the present disclosure is applied to the fixing device that presses and heats the image to fix the image onto the sheet. However, the present disclosure is not limited to this. For example, in an inkjet type image forming apparatus, the heating device of the present disclosure may be applied to a heating device to dry an ink image formed on the recording medium.

[0069] In the above description, the halogen heater is used as the heater. However, the present disclosure is not limited to this. For example, a carbon heater may be used as the heater.

Claims

1. A heating device (7) comprising:

an endless heating belt (22);
a pressing member (23) configured to press an outer surface of the heating belt (22);
a nip formation pad (32) disposed inside a loop of the heating belt (22) and configured to contact the pressing member (23) via the heating belt (22) to form a nip;
a heater (31) disposed inside the loop of the heating belt (22) and configured to heat the heating belt (22);
a reflector (34) disposed inside the loop of the heating belt (22) and configured to reflect heat from the heater (31), the reflector (34) having an opening (34c) disposed opposite a first portion of the heating belt (22) other than a second portion of the heating belt (22) facing the nip formation pad (32) in a circumferential direction of the heating belt (22), the opening (34c) of the reflector (34) disposed at a position, in a width direction of the heating belt (22), corresponding to an end of a recording medium having a largest width in recording media that the heating device (7) handles; and
a support (33) disposed inside the loop of the heating belt (22) and configured to support the nip formation pad (32), the support (33) having an opening (33c) disposed opposite the first portion of the heating belt (22) , the opening (33c) of the support (33) disposed at a position, in the width direction of the heating belt (22), corresponding to the end of the recording medium having the largest width in the recording media that the heating device (7) handles;
characterised by another reflector (341) different from the reflector (34), wherein said another reflector (341) has a reflection face (341a) that faces the opening (33c) of the support (33) and the opening (34c) of the reflector (34), wherein the reflection face (341a) is configured to reflect heat, radiated from the heater (31) to the side opposite the openings (33c, 34c), towards the openings (33c, 34c).

2. The heating device (7) according to claim 1, wherein the opening (33c) of the support (33) and

the opening (34c) of the reflector (34) are directed to an entrance side of the nip in which the recording medium enters.

3. The heating device (7) according to claim 1 or 2,

wherein the heater (31) has a high heat portion (31b) configured to generate more heat than any other portion of the heater (31) in the width direction of the heating belt (22), and
wherein the opening (33c) of the support (33) and the opening (34c) of the reflector (34) are disposed corresponding to the high heat portion (31b) in the width direction of the heating belt (22).

4. The heating device (7) according to any one of claims 1 to 3, further comprising a temperature detector (28) disposed opposite the opening (33c) of the support (33) and the opening (34c) of the reflector (34) in the width direction of the heating belt (22).

5. A fixing device (7) comprising the heating device (7) according to any one of claims 1 to 4.

6. An image forming apparatus (1) comprising the heating device (22) according to any one of claims 1 to 4 or the fixing device (22) according to claim 5.

7. The image forming apparatus (1) according to claim 6,

wherein, in addition to the opening (33c) of the support (33) disposed corresponding to one end of the recording medium having the largest width, the support (33) has another opening (33c) disposed corresponding to the other end of the recording medium having the largest width, and another opening (33c) has a different width from a width of the opening (33c) disposed corresponding to the one end, and
wherein, in addition to the opening (34c) of the reflector (34) disposed corresponding to one end of the recording medium having the largest width, the reflector (34) has another opening (34c) disposed corresponding to the other end of the recording medium having the largest width, and another opening (34c) has a different width from the opening (34c) disposed corresponding to the one end.

8. The image forming apparatus (1) according to claim 7, further comprising an airflow generator (40) configured to generate an airflow in the image forming apparatus (1),
wherein, in a direction of the airflow generated by the airflow generator, a width of an upstream one of the opening (33c) and said another opening (33c) of the support (33) is larger than a width of a downstream one of the opening (33c) and said another opening (33c) of the support (33), and a width of an upstream one of the opening (34c) and said another opening (34c) of the reflector (34) upstream is larger than a width of a downstream one of the opening (34c) and said another opening (34c) of the reflector (34).

Patentansprüche

1. Heizvorrichtung (7), umfassend:

ein endloses Heizband (22);
ein Andruckelement (23), das konfiguriert ist, um eine Außenfläche des Heizbandes anzudrücken;
ein Spaltbildungskissen (32), das innerhalb einer Schleife des Heizbandes (22) angeordnet und konfiguriert ist, um das Andruckelement (23) über das Heizband (22) zu berühren, um einen Spalt zu bilden;
ein Heizelement (31), das innerhalb der Schleife des Heizbandes (22) angeordnet und konfiguriert ist, um das Heizband (22) zu erwärmen;
einen Reflektor (34), der innerhalb der Schleife des Heizbandes (22) angeordnet und konfiguriert ist, um Wärme von dem Heizelement (31) zu reflektieren, wobei der Reflektor (34) eine Öffnung (34c) aufweist, die gegenüber einem ersten Abschnitt des Heizbandes (22) angeordnet ist, der ein anderer ist als ein zweiter Abschnitt des Heizbandes (22), der in einer Umfangsrichtung des Heizbandes (22) dem Spaltbildungskissen (32) zugewandt ist, wobei die Öffnung (34c) des Reflektors (34) in einer Breitenrichtung des Heizbandes (22) an einer Position angeordnet ist, die einem Ende eines Aufzeichnungsmediums mit einer größten Breite bei Aufzeichnungsmedien entspricht, mit denen die Heizvorrichtung (7) arbeitet; und
einen Träger (33), der innerhalb der Schleife des Heizbandes (22) angeordnet und konfiguriert ist, um das Spaltbildungskissen (32) zu tragen, wobei der Träger (33) eine Öffnung (33c) aufweist, die gegenüber dem ersten Abschnitt des Heizbandes (22) angeordnet ist, wobei die Öffnung (33c) des Trägers (33) in der Breitenrichtung des Heizbandes (22) an einer Position angeordnet ist, die dem Ende des Aufzeichnungsmediums mit der größten Breite bei Aufzeichnungsmedien entspricht, mit denen die Heizvorrichtung (7) arbeitet;
gekennzeichnet durch einen anderen Reflektor (341), der sich von dem Reflektor (34) unterscheidet, wobei der andere Reflektor (341) eine

Reflexionsfläche (341a) aufweist, die der Öffnung (33c) des Trägers (33) und der Öffnung (34c) des Reflektors (34) zugewandt ist, wobei die Reflexionsfläche (341a) konfiguriert ist, um Wärme, die von dem Heizelement (31) auf die den Öffnungen (33c, 34c) gegenüberliegende Seite abgestrahlt wird, in Richtung der Öffnungen (33c, 34c) zu reflektieren.

2. Heizvorrichtung (7) nach Anspruch 1, wobei die Öffnung (33c) des Trägers (33) und die Öffnung (34c) des Reflektors (34) auf eine Eintrittsseite des Spaltes gerichtet sind, in den das Aufzeichnungsmedium eintritt.

3. Heizvorrichtung (7) nach Anspruch 1 oder 2,

wobei das Heizelement (31) einen Hochwärmeabschnitt (31b) aufweist, der konfiguriert ist, um mehr Wärme als jeder andere Abschnitt des Heizelements (31) in der Breitenrichtung des Heizbandes (22) zu erzeugen, und
wobei die Öffnung (33c) des Trägers (33) und die Öffnung (34c) des Reflektors (34) entsprechend dem Hochwärmeabschnitt (31b) in der Breitenrichtung des Heizbandes (22) angeordnet sind.

4. Heizvorrichtung (7) nach einem der Ansprüche 1 bis 3, ferner umfassend einen Temperaturdetektor (28), der gegenüber der Öffnung (33c) des Trägers (33) und der Öffnung (34c) des Reflektors (34) in der Breitenrichtung des Heizbandes (22) angeordnet ist.

5. Befestigungsvorrichtung (7), umfassend die Heizvorrichtung (7) nach einem der Ansprüche 1 bis 4.

6. Bilderzeugungsgerät (1) umfassend die Heizvorrichtung (22) nach einem der Ansprüche 1 bis 4 oder die Fixiervorrichtung (22) nach Anspruch 5.

7. Bilderzeugungsvorrichtung (1) nach Anspruch 6,

wobei zusätzlich zu der Öffnung (33c) des Trägers (33), die entsprechend einem Ende des Aufzeichnungsmediums mit der größten Breite angeordnet ist, der Träger (33) eine weitere Öffnung (33c) aufweist, die entsprechend dem anderen Ende des Aufzeichnungsmediums mit der größten Breite angeordnet ist, und wobei eine weitere Öffnung (33c) eine andere Breite aufweist als eine Breite der Öffnung (33c), die entsprechend dem einen Ende angeordnet ist, und wobei zusätzlich zu der Öffnung (34c) des Reflektors (34), die entsprechend einem Ende des Aufzeichnungsmediums mit der größten Breite angeordnet ist, der Reflektor (34) eine weitere Öffnung (34c) aufweist, die entsprechend dem anderen Ende des Aufzeichnungsmediums mit der größten Breite angeordnet ist, und wobei eine weitere Öffnung (34c) eine andere Breite aufweist als die Öffnung (34c), die entsprechend dem einen Ende angeordnet ist.

8. Bilderzeugungsvorrichtung (1) nach Anspruch 7, ferner umfassend einen Luftstromerzeuger (40), der konfiguriert ist, um einen Luftstrom in der Bilderzeugungsvorrichtung (1) zu erzeugen,
wobei in einer Richtung des durch den Luftstromerzeuger erzeugten Luftstroms eine Breite einer stromaufwärts gelegenen der Öffnung (33c) und der anderen Öffnung (33c) des Trägers (33) größer ist als eine Breite einer stromabwärts gelegenen der Öffnung (33c) und der anderen Öffnung (33c) des Trägers (33) und eine Breite einer stromaufwärts gelegenen der Öffnung (34c) und der anderen Öffnung (34c) des Reflektors (34) stromaufwärts größer ist als eine Breite einer stromabwärts gelegenen der Öffnung (34c) und der anderen Öffnung (34c) des Reflektors (34).

Revendications

1. Dispositif de chauffage (7) comprenant :

une courroie chauffante sans fin (22) ;
un élément de pression (23) configuré pour presser une surface extérieure de la courroie chauffante (22) ;
un tampon de formation de pincement (32) disposé à l'intérieur d'une boucle de la courroie chauffante (22) et configuré pour entrer en contact avec l'élément de pression (23) via la courroie chauffante (22) pour former un pincement ;
un élément chauffant (31) disposé à l'intérieur de la boucle de la courroie chauffante (22) et configuré pour chauffer la courroie chauffante (22) ;
un réflecteur (34) disposé à l'intérieur de la boucle de la courroie chauffante (22) et configuré pour réfléchir la chaleur de l'élément chauffant (31), le réflecteur (34) ayant une ouverture (34c) disposée à l'opposé d'une première partie de la courroie chauffante (22) autre qu'une seconde partie de la courroie chauffante (22) faisant face au tampon de formation de pincement (32) dans une direction circonférentielle de la courroie chauffante (22), l'ouverture (34c) du réflecteur (34) étant disposée à une position, dans une direction de la largeur de la courroie chauffante (22), correspondant à une extrémité d'un support d'enregistrement ayant une plus grande largeur dans les supports d'enregistrement que le dispositif de chauffage (7) manipule ; et

un support (33) disposé à l'intérieur de la boucle de la courroie chauffante (22) et configuré pour supporter le tampon de formation de pincement (32), le support (33) ayant une ouverture (33c) disposée à l'opposé de la première partie de la courroie chauffante (22), l'ouverture (33c) du support (33) étant disposée à une position, dans la direction de la largeur de la courroie chauffante (22), correspondant à l'extrémité du support d'enregistrement ayant la plus grande largeur dans les supports d'enregistrement que le dispositif de chauffage (7) manipule ;
caractérisé par un autre réflecteur (341) différent du réflecteur (34), dans lequel ledit autre réflecteur (341) a une face de réflexion (341a) qui fait face à l'ouverture (33c) du support (33) et à l'ouverture (34c) du réflecteur (34), dans lequel la face de réflexion (341a) est configurée pour réfléchir la chaleur rayonnée depuis l'élément chauffant (31) au côté opposé aux ouvertures (33c, 34c), vers les ouvertures (33c, 34c).

2. Dispositif de chauffage (7) selon la revendication 1, dans lequel l'ouverture (33c) du support (33) et l'ouverture (34c) du réflecteur (34) sont dirigées vers un côté d'entrée du pincement dans lequel le support d'enregistrement entre.

3. Dispositif de chauffage (7) selon la revendication 1 ou 2,

dans lequel l'élément chauffant (31) a une partie à chaleur élevée (31b) configurée pour générer plus de chaleur que toute autre partie de l'élément chauffant (31) dans la direction de la largeur de la courroie chauffante (22), et
dans lequel l'ouverture (33c) du support (33) et l'ouverture (34c) du réflecteur (34) sont disposées en correspondance avec la partie à chaleur élevée (31b) dans la direction de la largeur de la courroie chauffante (22).

4. Dispositif de chauffage (7) selon l'une quelconque des revendications 1 à 3, comprenant en outre un détecteur de température (28) disposé à l'opposé de l'ouverture (33c) du support (33) et de l'ouverture (34c) du réflecteur (34) dans la direction de la largeur de la courroie chauffante (22).

5. Dispositif de fixation (7) comprenant le dispositif de chauffage (7) selon l'une quelconque des revendications 1 à 4.

6. Appareil de formation d'images (1) comprenant le dispositif de chauffage (22) selon l'une quelconque des revendications 1 à 4 ou le dispositif de fixation (22) selon la revendication 5.

7. Appareil de formation d'image (1) selon la revendication 6,

dans lequel, en plus de l'ouverture (33c) du support (33) disposée en correspondance à une extrémité du support d'enregistrement ayant la plus grande largeur, le support (33) a une autre ouverture (33c) disposée en correspondance à l'autre extrémité du support d'enregistrement ayant la plus grande largeur, et une autre ouverture (33c) a une largeur différente d'une largeur de l'ouverture (33c) disposée en correspondance à la première extrémité, et
dans lequel, en plus de l'ouverture (34c) du réflecteur (34) disposée en correspondance à une extrémité du support d'enregistrement ayant la plus grande largeur, le réflecteur (34) a une autre ouverture (34c) disposée en correspondance à l'autre extrémité du support d'enregistrement ayant la plus grande largeur, et une autre ouverture (34c) a une largeur différente de l'ouverture (34c) disposée en correspondance à la première extrémité.

8. Appareil de formation d'images (1) selon la revendication 7, comprenant en outre un générateur de flux d'air (40) configuré pour générer un flux d'air dans l'appareil de formation d'images (1),
dans lequel, dans une direction du flux d'air généré par le générateur de flux d'air, une largeur d'une ouverture en amont parmi l'ouverture (33c) et ladite autre ouverture (33c) du support (33) est supérieure à une largeur d'une ouverture en aval parmi l'ouverture (33c) et ladite autre ouverture (33c) du support (33), et une largeur d'une ouverture en amont parmi l'ouverture (34c) et ladite autre ouverture (34c) du réflecteur (34) en amont est supérieure à une largeur d'une ouverture en aval parmi l'ouverture (34c) et ladite autre ouverture (34c) du réflecteur (34).

FIG. 1

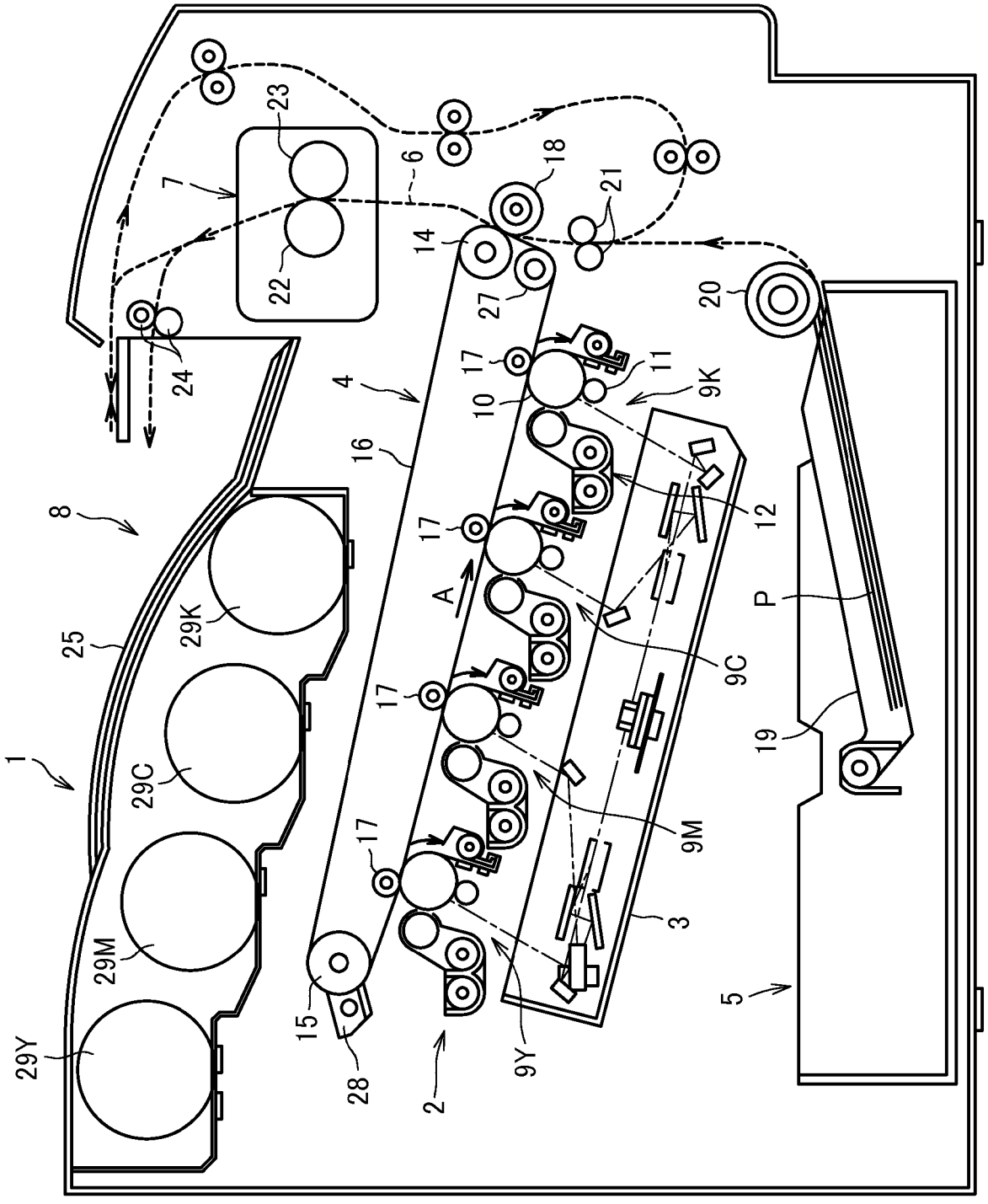

1
2
3
4
5
6
7
8
9C
9K
9M
9Y
10
11
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16
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18
19
20
21
22
23
24
25
27
28
29C
29K
29M
29Y
A
P

FIG. 2

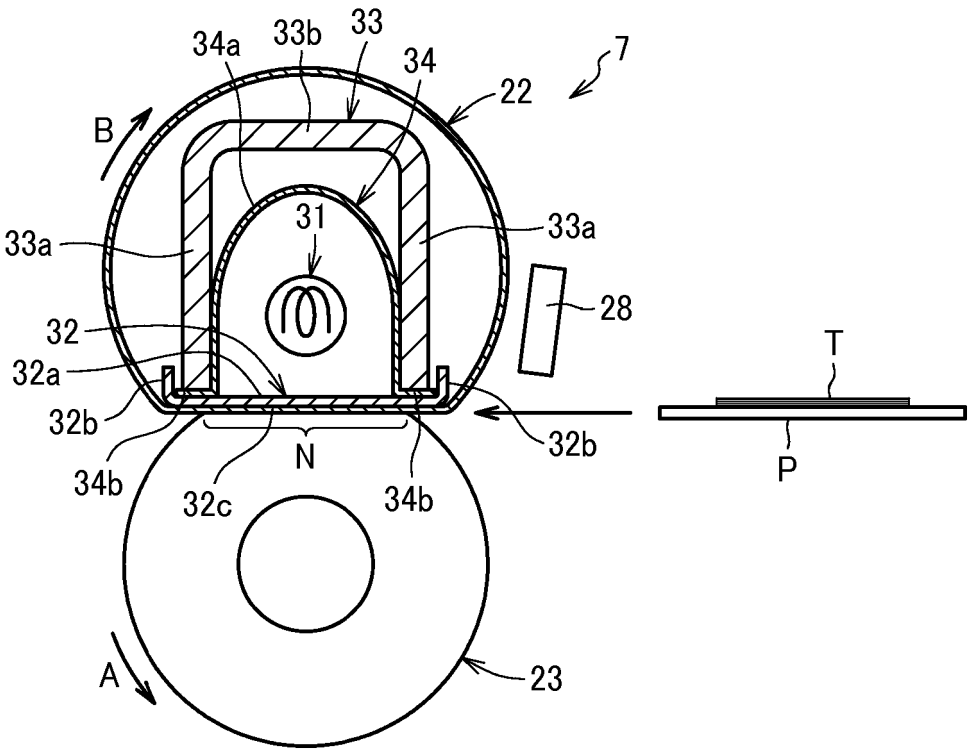

34a
33b
33
34
7
22
B
31
33a
33a
28
32
32a
32b
T
32b
P
N
34b
32c
34b
A
23

FIG. 3

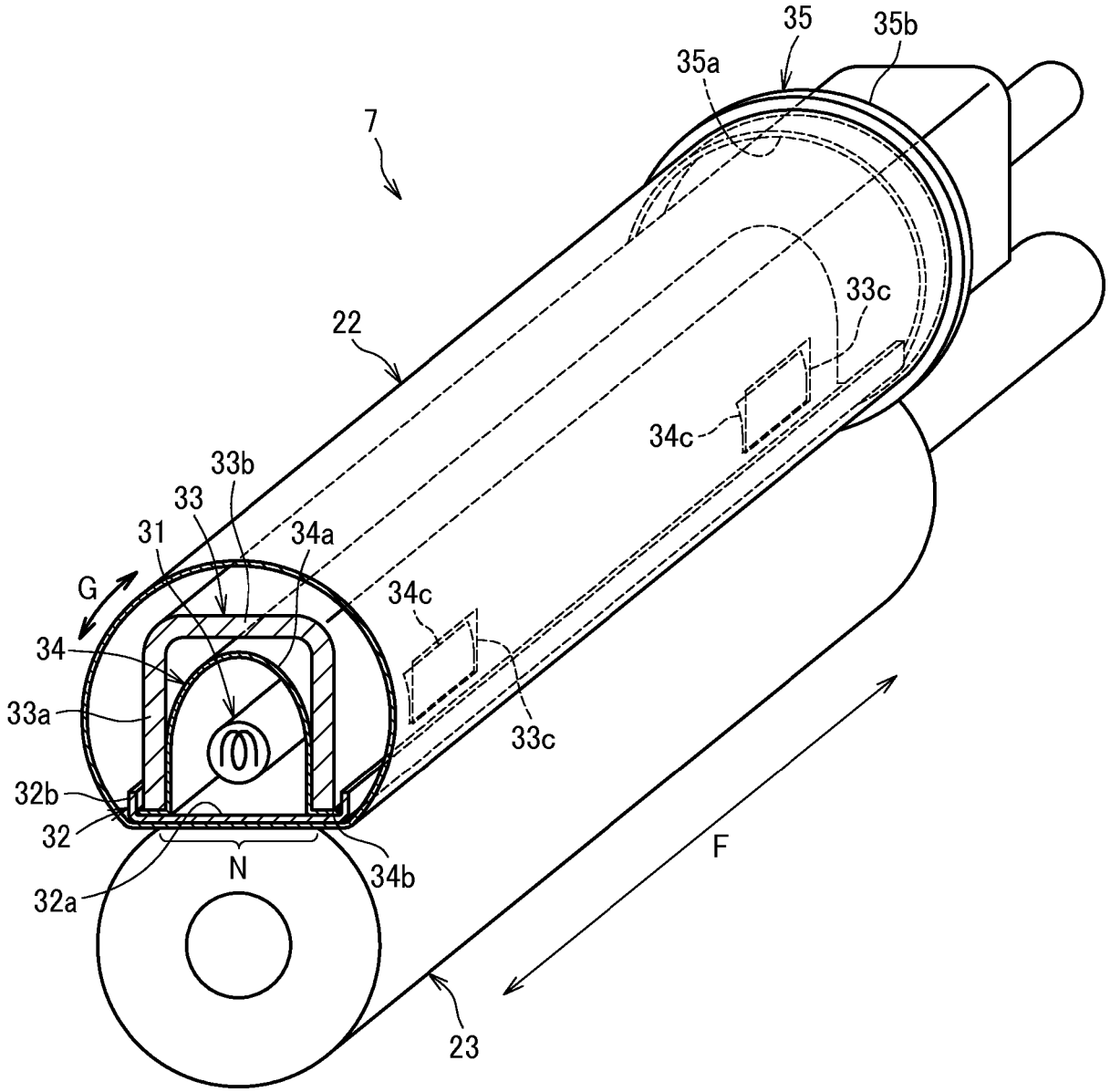

35
35b
35a
7
22
33c
34c
33b
33
31
34a
G
34c
34
33a
33c
32b
32
N
34b
32a
F
23

FIG. 4

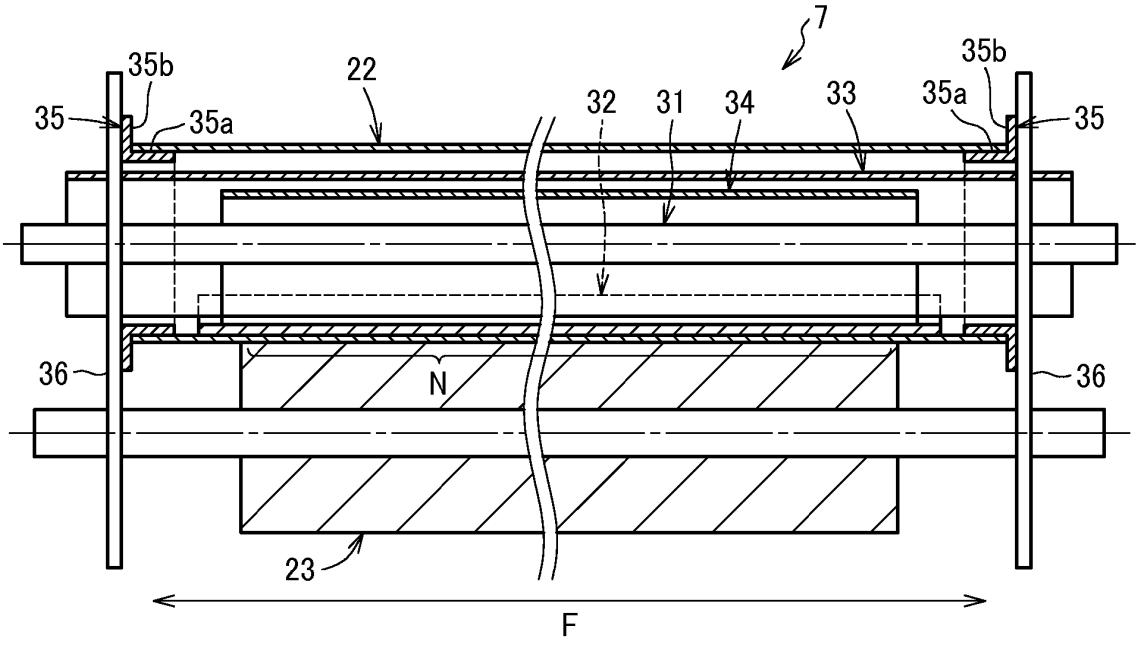


FIG. 5

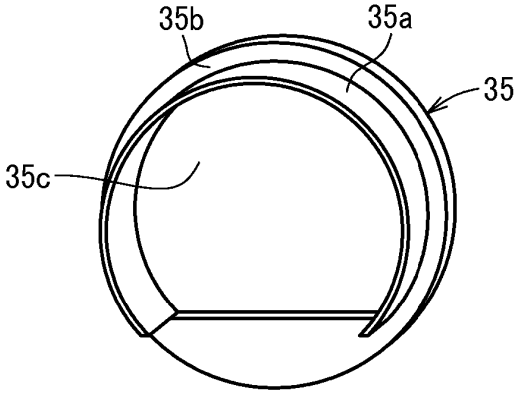


FIG. 6

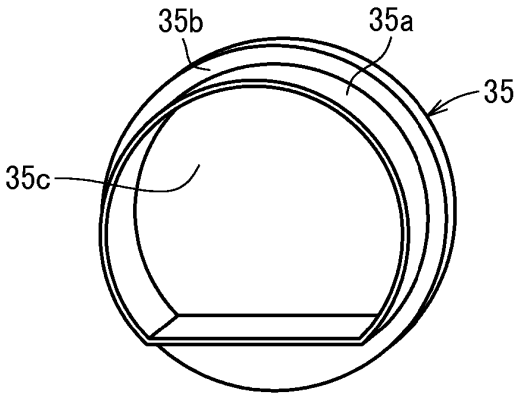


FIG. 7

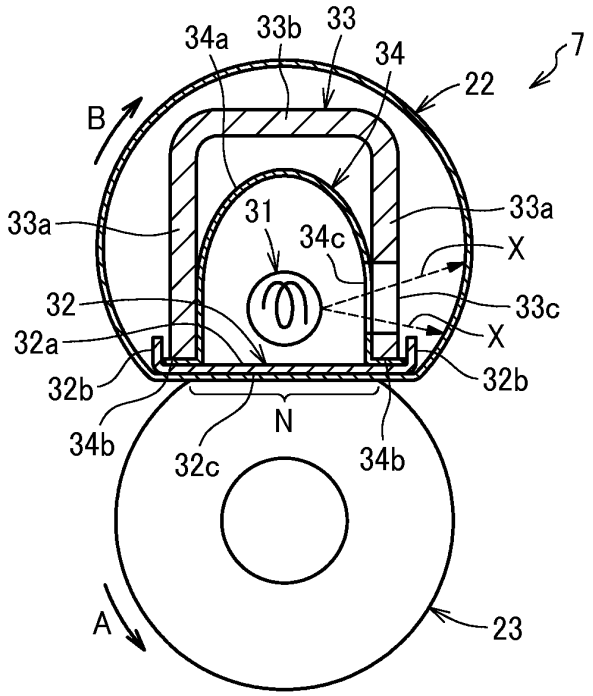

34a
33b
33
34
7
22
B
33a
31
34c
33a
X
32
33c
32a
X
32b
32b
N
34b
32c
34b
A
23

FIG. 8

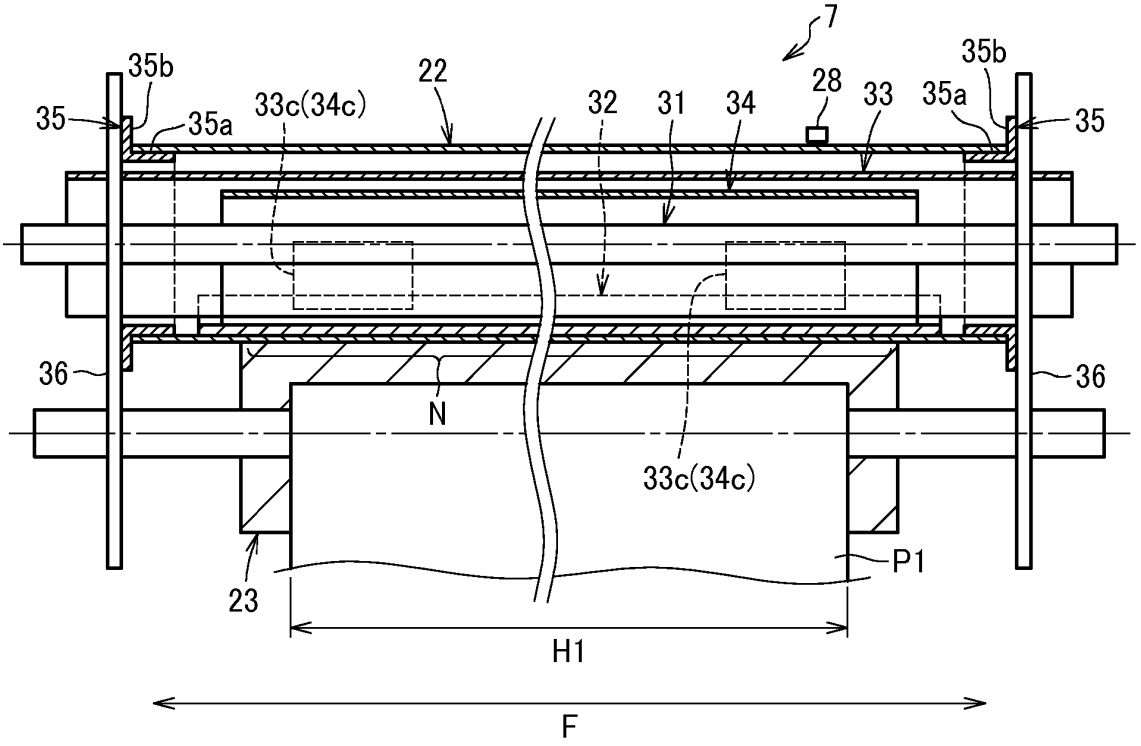

7
35b
22
28
33
35b
35
35a
33c(34c)
32
31
34
35a
35
36
36
N
33c(34c)
P1
23
H1
F

FIG. 9

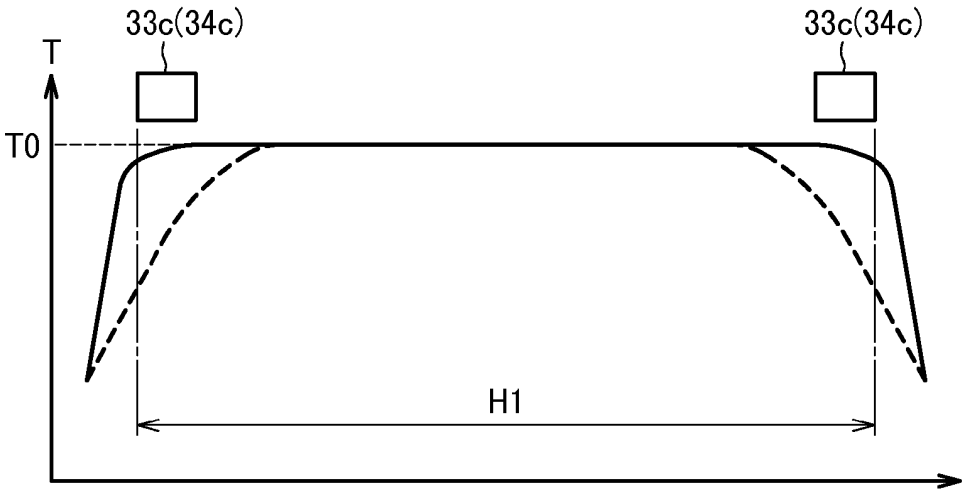


FIG. 10A

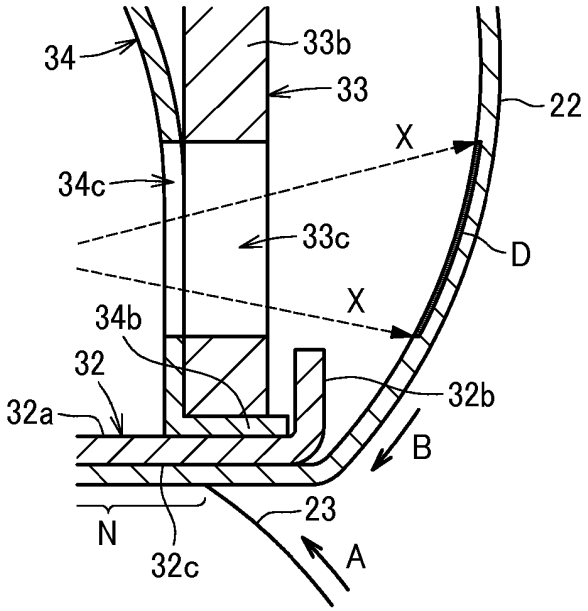


FIG. 10B

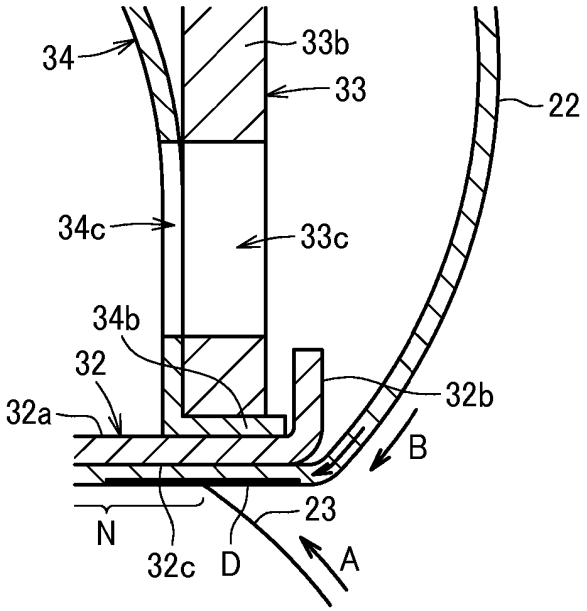


FIG. 11

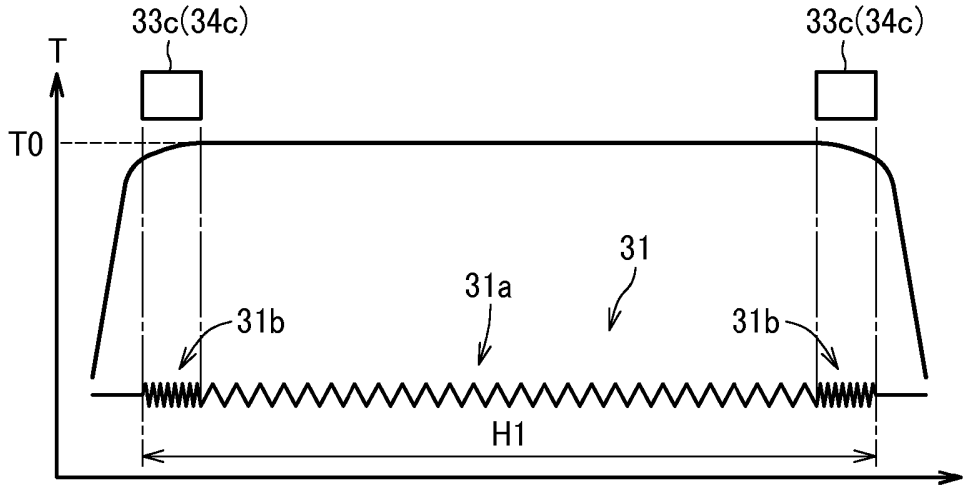

33c(34c)
33c(34c)
T
T0
31
31a
31b
31b
H1

FIG. 12

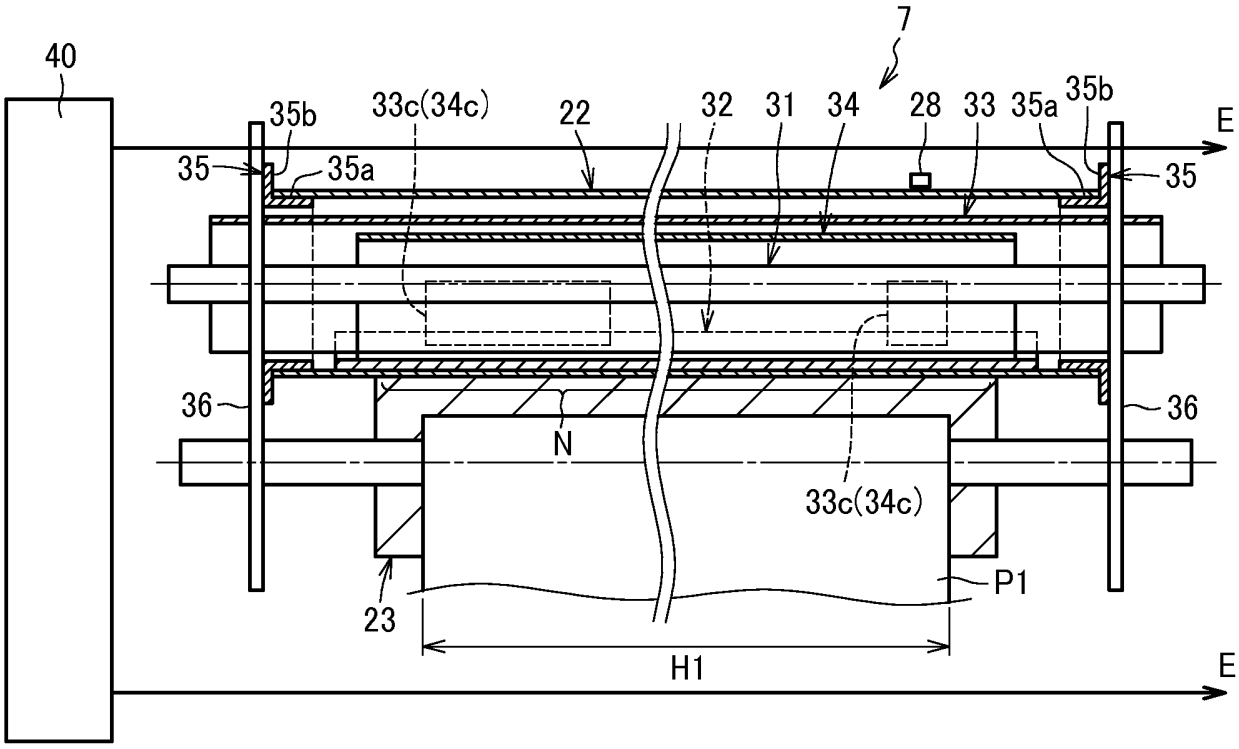

7
40
35b
33c(34c)
22
32
31
34
28
33
35a
35b
E
35
35a
35
36
36
N
33c(34c)
23
P1
H1
E

FIG. 13A

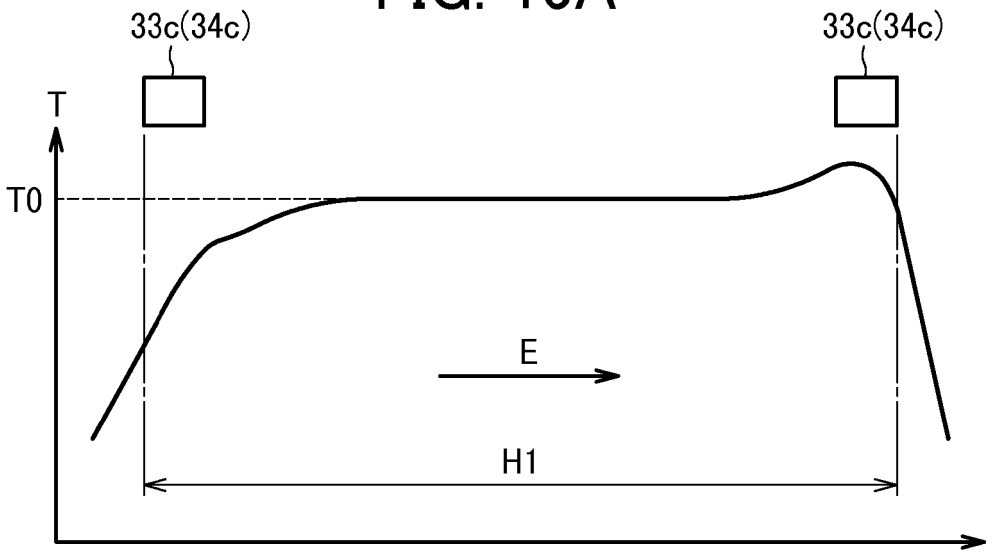


FIG. 13B

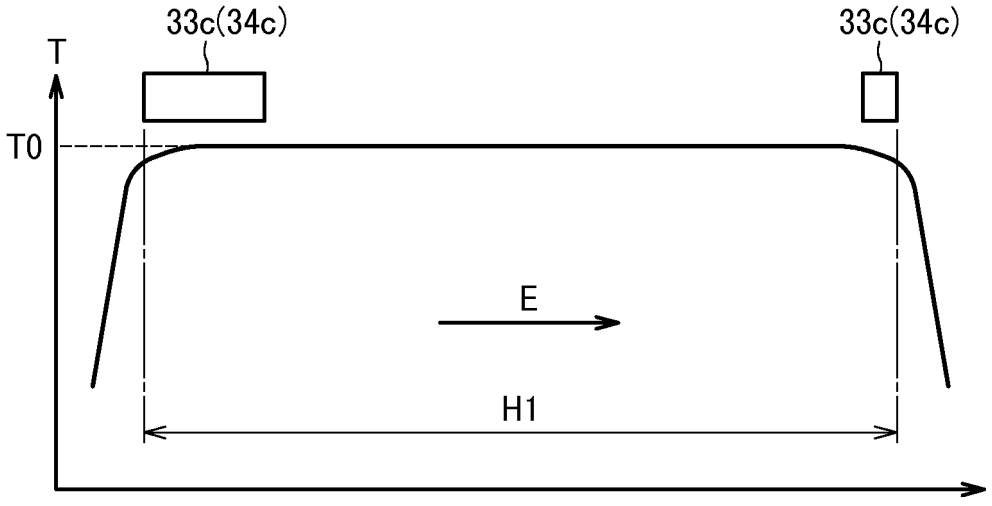
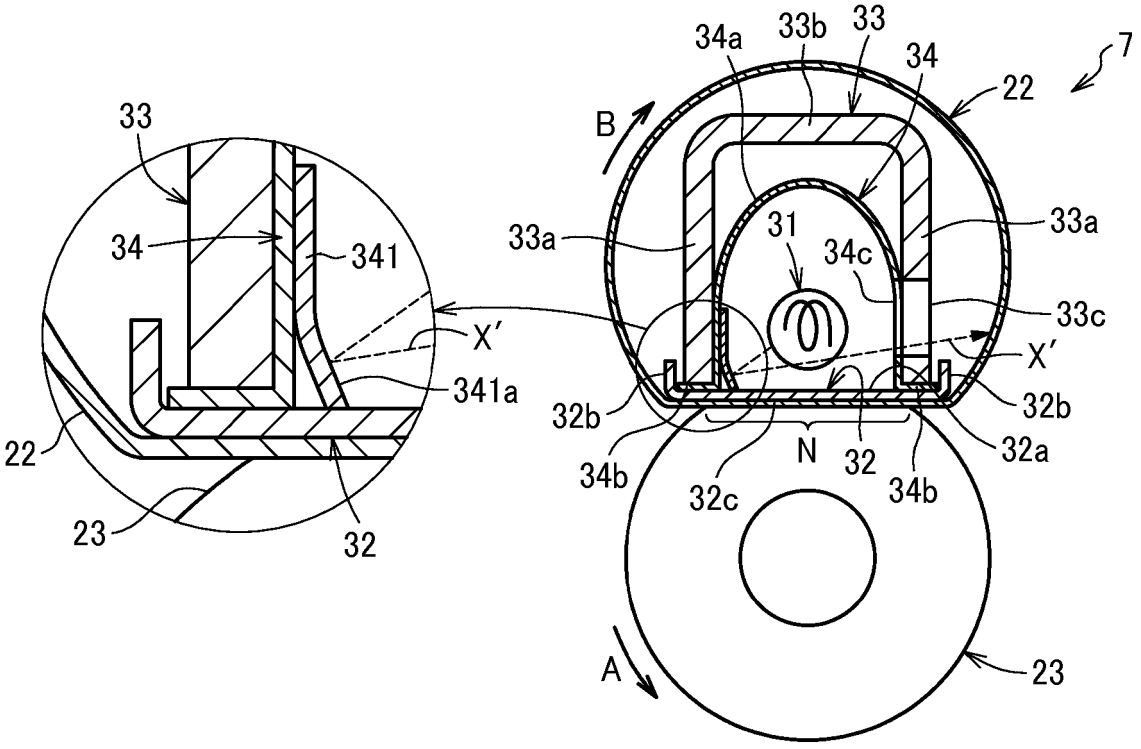


FIG. 14


33
34
341
X′
341a
22
23
32
34a
33b
33
34
7
22
B
33a
31
34c
33a
33c
X′
32b
32b
32a
34b
N
32
34b
32c
A
23

REFERENCES CITED IN THE DESCRIPTION

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