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(54) **DRYING DEVICE AND RECORDING DEVICE**

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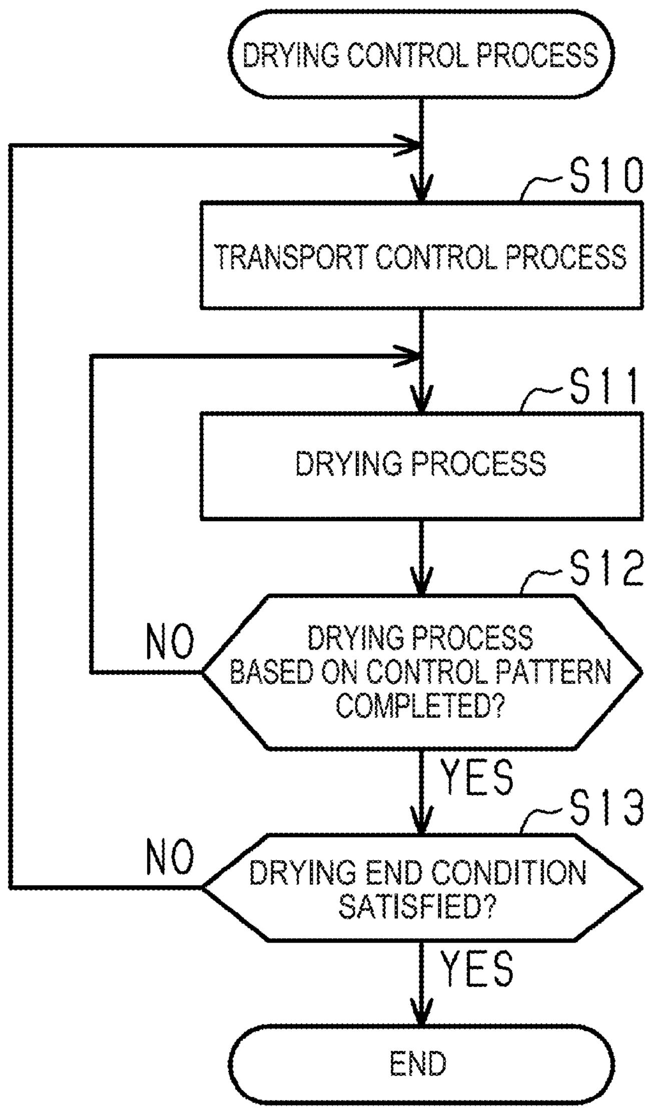
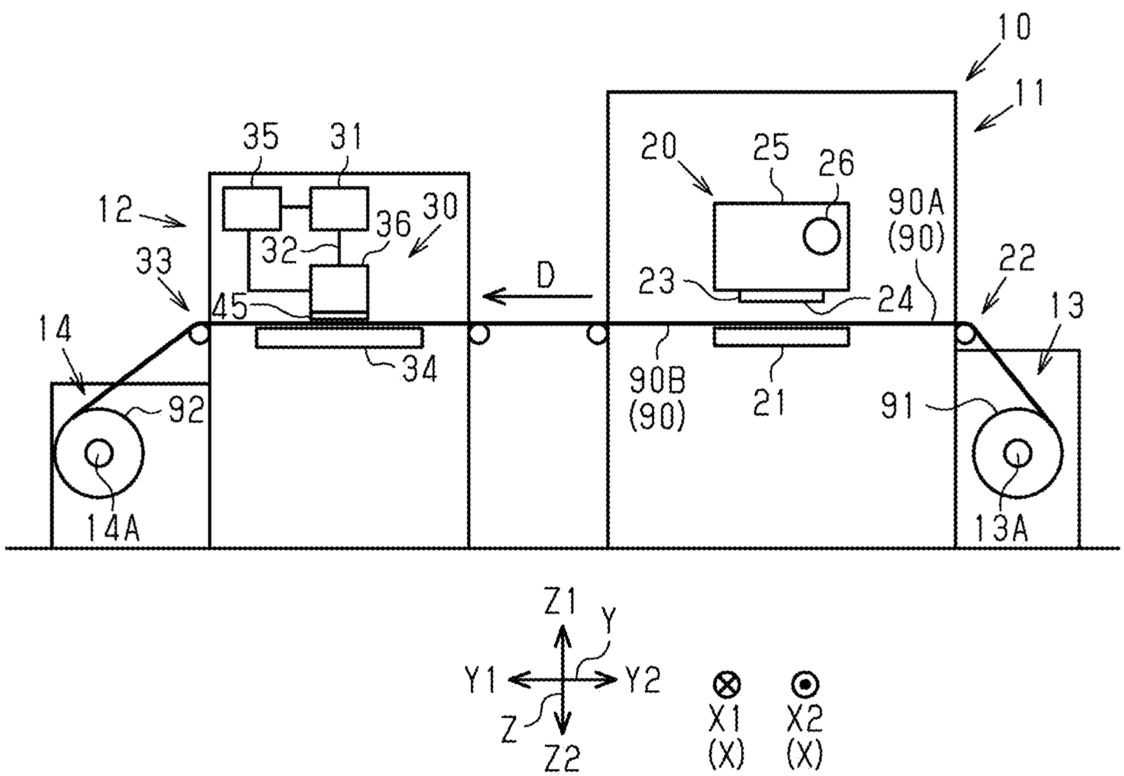
(57) **ABSTRACT**

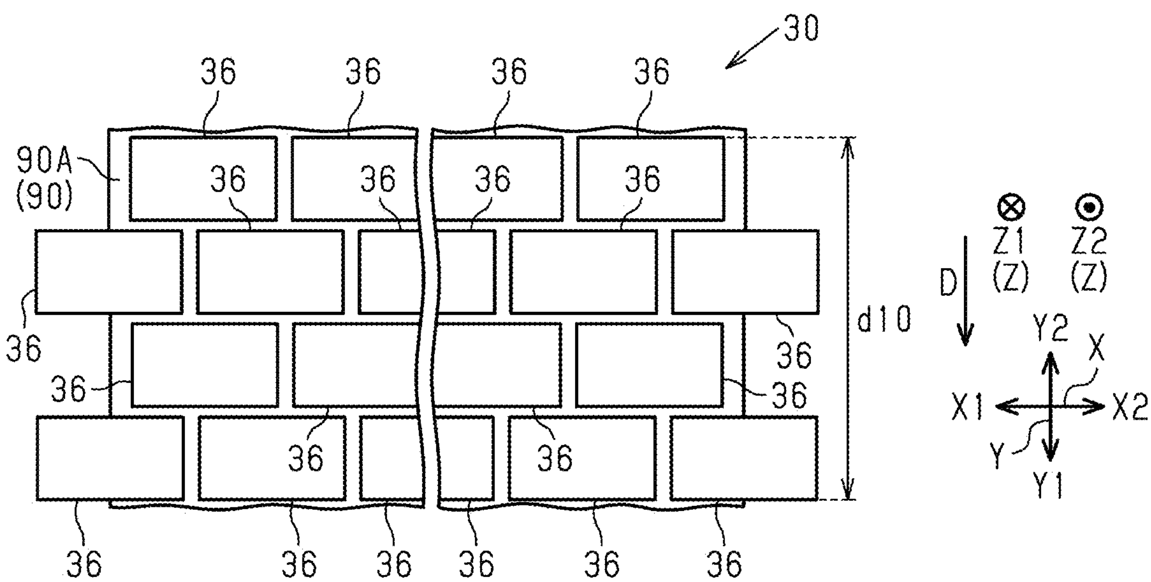
A drying device include a drying section that dries a medium onto which pigment ink containing a pigment, water, and a solvent was ejected by generating an electromagnetic wave in response to application of a high-frequency voltage. The drying section includes a first electrode, a second electrode arranged so as to surround the first electrode in plan view from a first direction toward a medium, a first conductor that includes a coil and that electrically connects a transmission line, which is configured to transmit a high-frequency voltage, and the first electrode, and a second conductor that electrically connects the transmission line and the second electrode. The drying section generates electromagnetic waves so that an irradiation intensity of the electromagnetic wave on a medium onto which pigment ink was ejected becomes pulsed in time series.





10
11
20
25
26
90A
(90)
22
13
35
31
12
30
36
32
33
D
23
24
45
14
34
90B
(90)
21
91
92
14A
13A
Z1
Y
Y1
Y2
Z
Z2
X1
(X)
X2
(X)

FIG. 1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(90)
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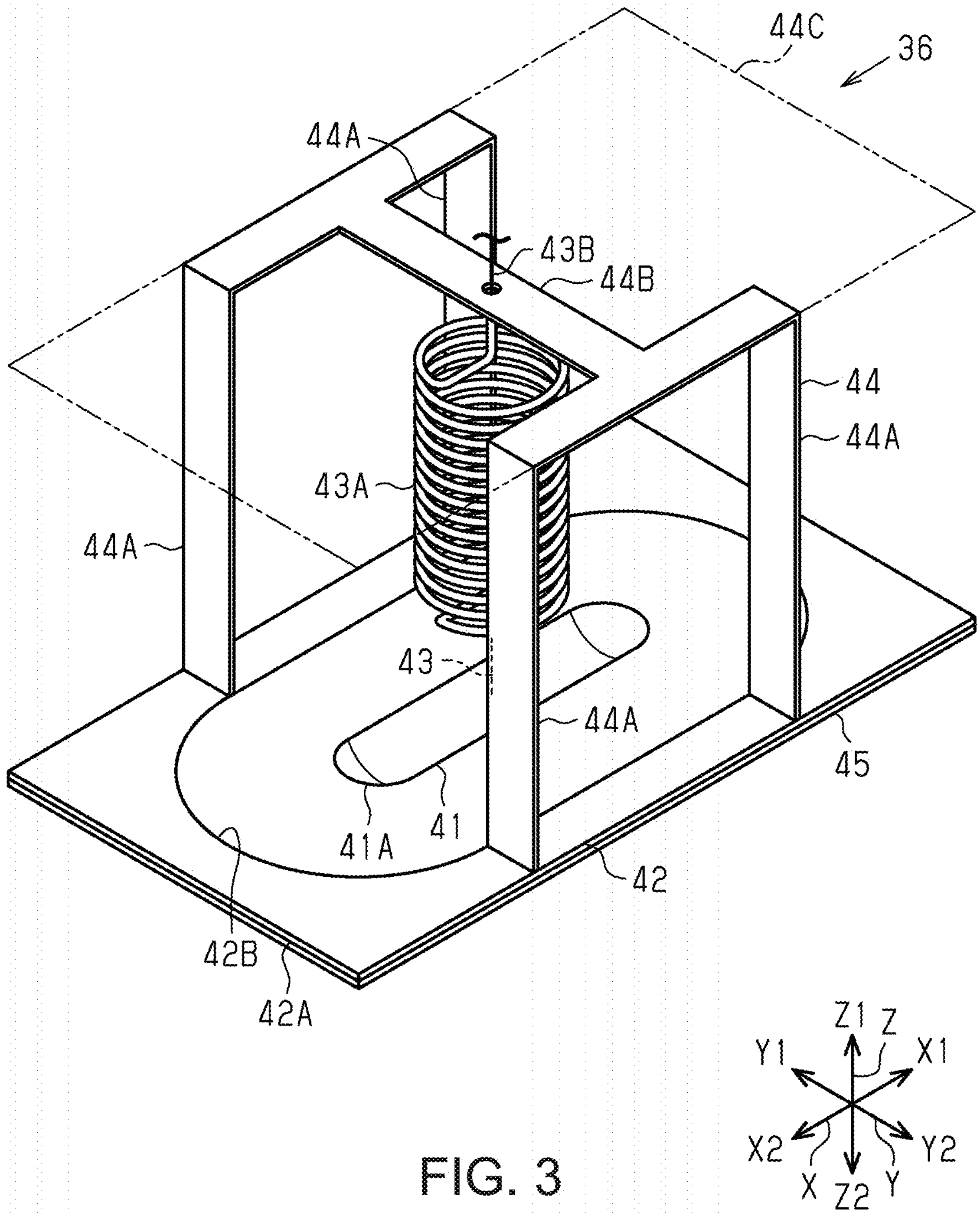
36
36
36
36
36
d10
D
Z1
(Z)
Z2
(Z)
Y2
X
X1
X2
Y
Y1

FIG. 2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44A
43A
44A
43
44A
45
41A
41
42
42B
42A
Z1
Z
Y1
X1
X2
Y2
X
Y
Z2

FIG. 3

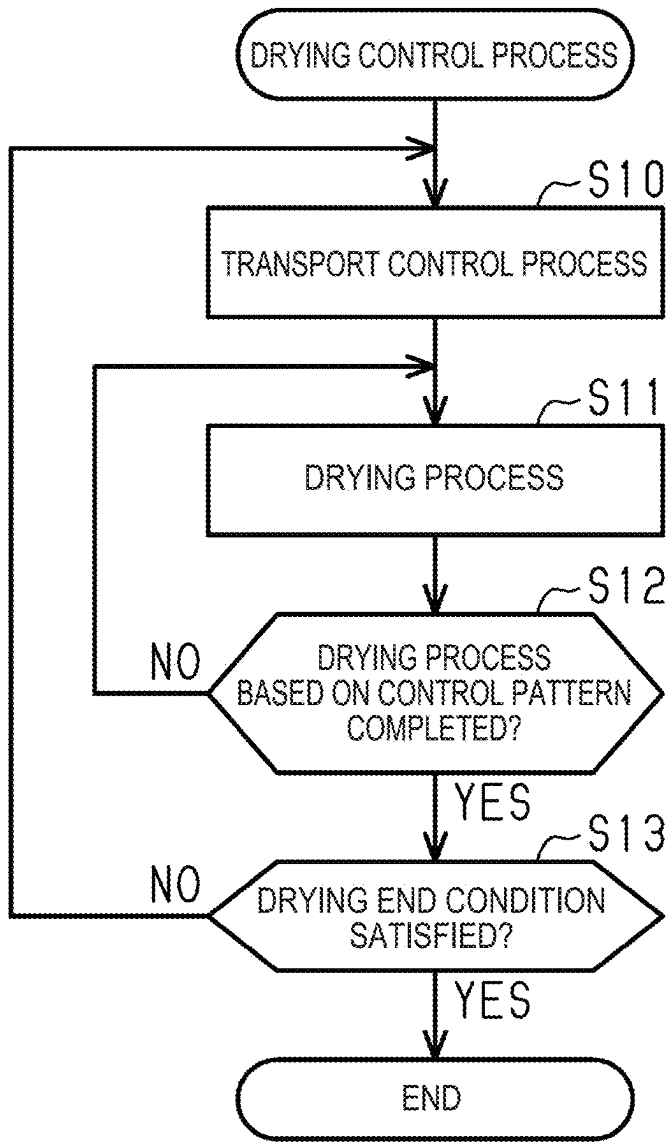
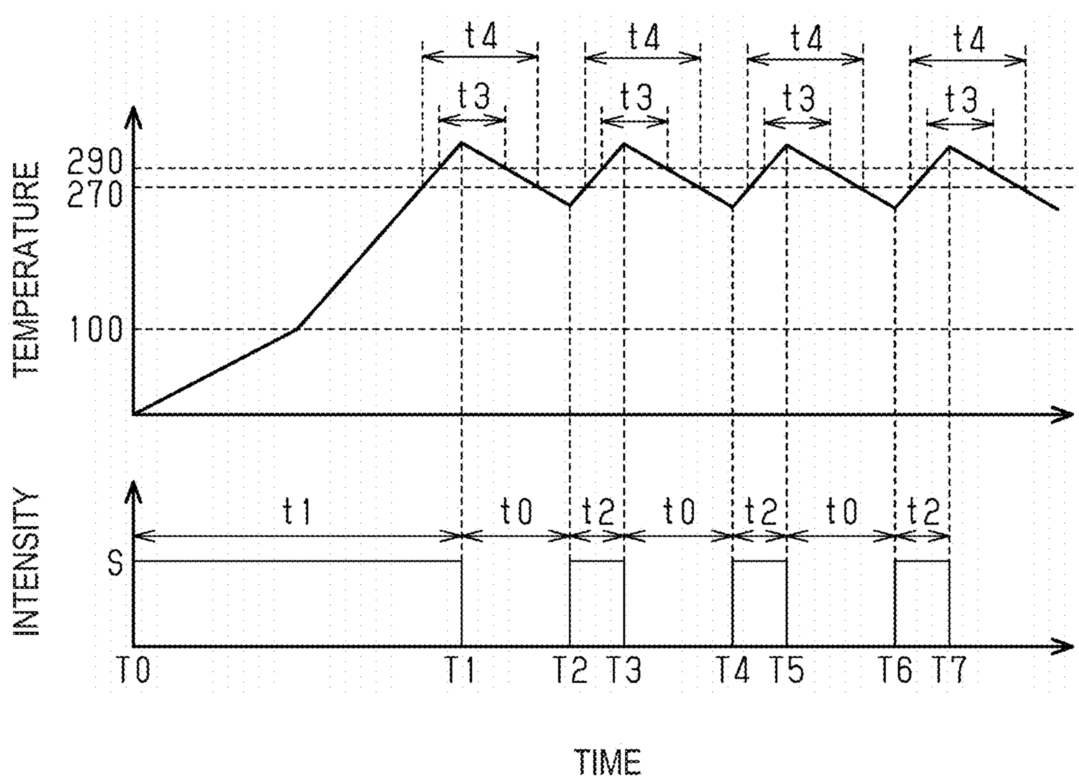

DRYING CONTROL PROCESS
S10
TRANSPORT CONTROL PROCESS
S11
DRYING PROCESS
S12
NO
DRYING PROCESS
BASED ON CONTROL PATTERN
COMPLETED?
YES
S13
NO
DRYING END CONDITION
SATISFIED?
YES
END

FIG. 4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100
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t2
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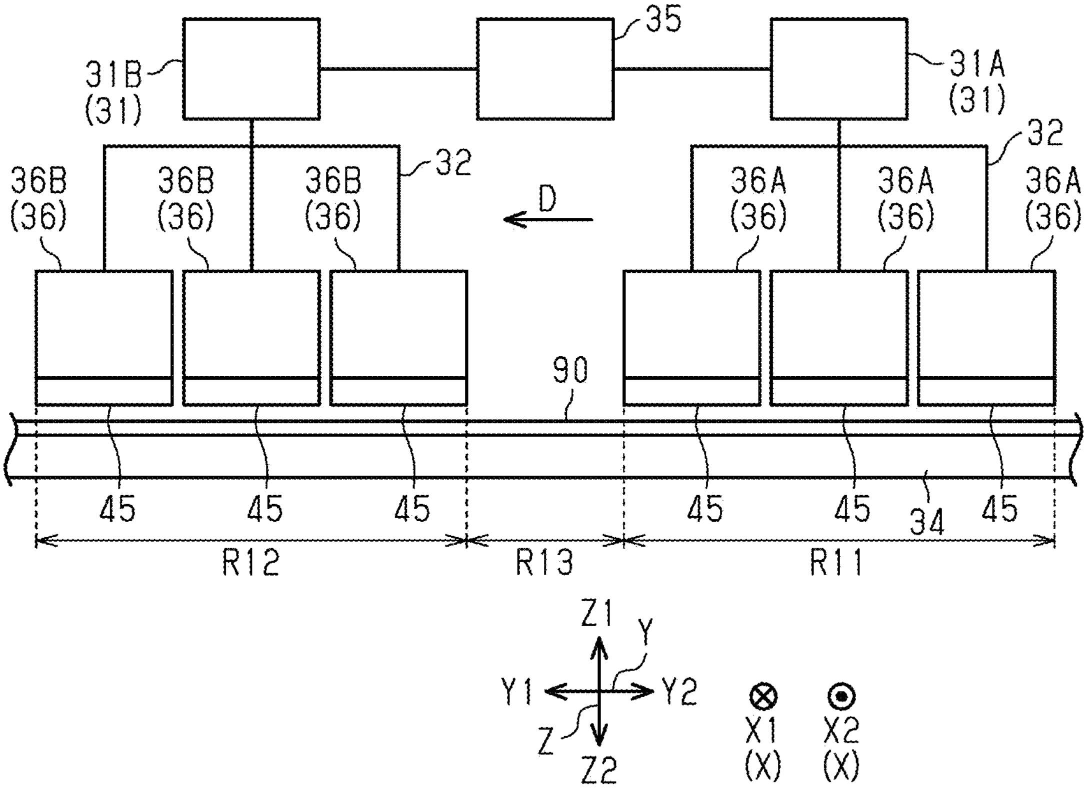
S
INTENSITY
T0
T1
T2
T3
T4
T5
T6
T7
TIME

FIG. 5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(36)
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(36)
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(36)
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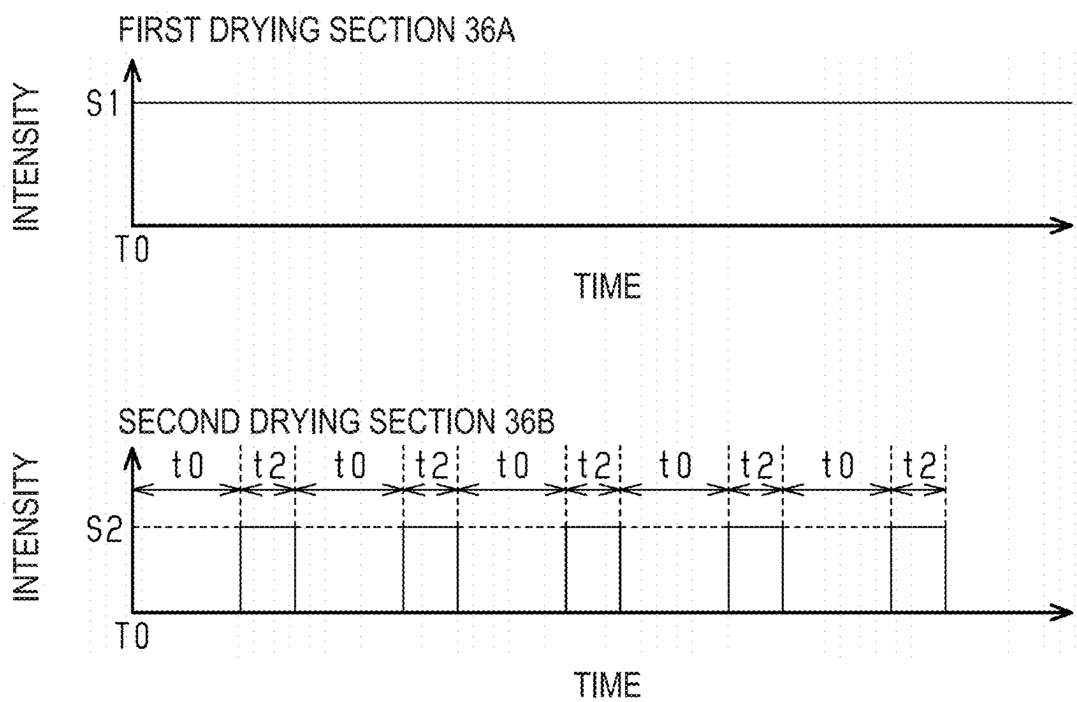
36A
(36)
36A
(36)
90
45
45
45
45
45
34
45
R12
R13
R11
Z1
Y
Y1
Y2
Z
Z2
X1
(X)
X2
(X)

FIG. 6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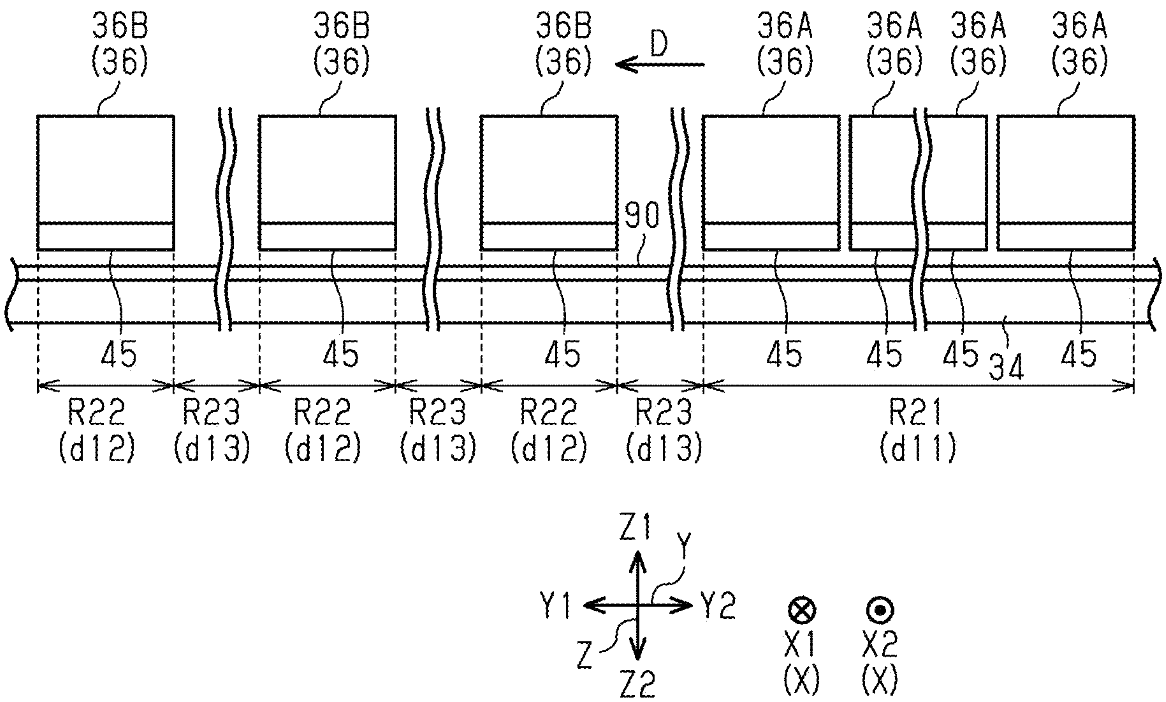
INTENSITY
S1
T0
TIME
SECOND DRYING SECTION 36B
INTENSITY
t0
t2
t0
t2
t0
t2
t0
t2
t0
t2
S2
T0
TIME

FIG. 7


36B
(36)
36B
(36)
36B
(36)
D
36A
(36)
36A
(36)
36A
(36)
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(36)
90
45
45
45
45
45
45
34
45
R22
(d12)
R23
(d13)
R22
(d12)
R23
(d13)
R22
(d12)
R23
(d13)
R21
(d11)
Z1
Y
Y1
Y2
Z
Z2
X1
(X)
X2
(X)

FIG. 8

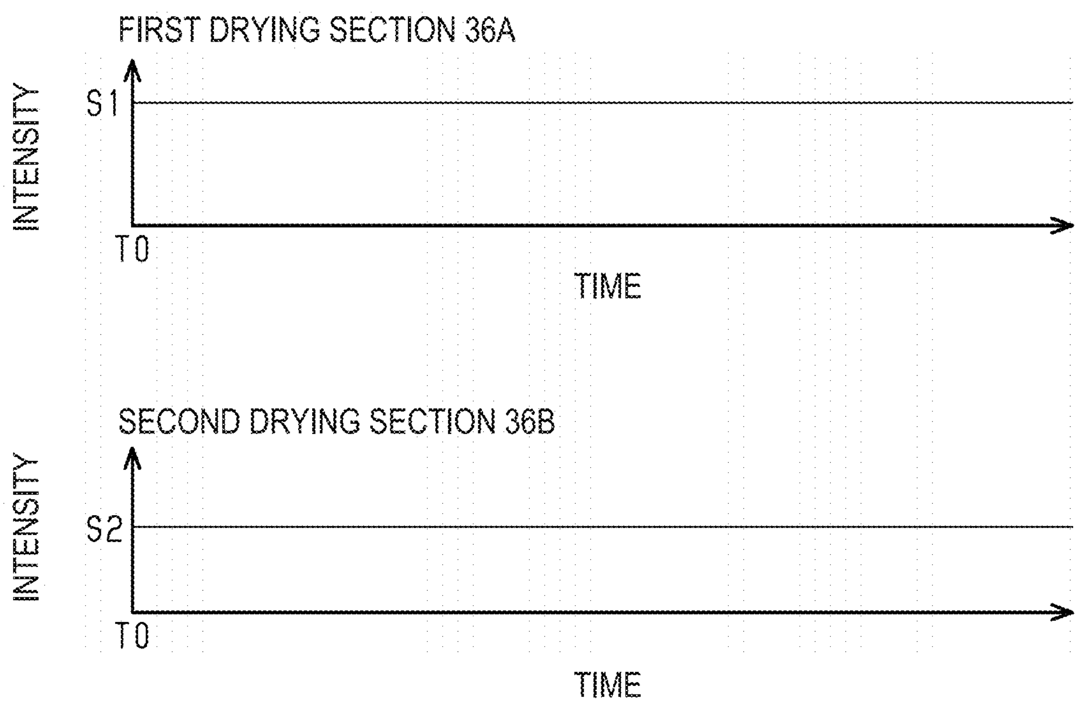
FIRST DRYING SECTION 36A
INTENSITY
S1
T0
TIME
SECOND DRYING SECTION 36B
INTENSITY
S2
T0
TIME

FIG. 9

DRYING DEVICE AND RECORDING DEVICE

[0001] The present application is based on, and claims priority from JP Application Serial Number 2024-017760, filed Feb. 8, 2024, the disclosure of which is hereby incorporated by reference herein in its entirety.

BACKGROUND

1. Technical Field

[0002] The present disclosure relates to a drying device and a recording device.

2. Related Art

[0003] For example, JP-A-2017-16742 discloses a drying device that dries a medium by generating electromagnetic waves on the medium onto which liquid was ejected. As the liquid, pigment ink may be used. Pigment ink includes a pigment, water, and a solvent, and the solvent may include, for example, glycerin.

[0004] Such a drying device generates a high-intensity electromagnetic wave in a medium by supplying a high-frequency voltage between a first electrode and a second electrode. By this, the medium can be dried in a short time by boiling liquid ejected onto the medium regardless of whether or not the surrounding of the medium is saturated with water vapor.

[0005] However, in such a drying device, since a high-intensity electromagnetic wave is generated, there is a possibility that thermal denaturation may occur with respect to the medium. Therefore, it is desired to dry the medium in a short time while maintaining the quality of the medium.

SUMMARY

[0006] A drying device to overcome the above-described problem includes a drying section that dries a medium onto which pigment ink containing a pigment, water, and a solvent was ejected by generating an electromagnetic wave in response to application of a high-frequency voltage, wherein the drying section includes a first electrode, a second electrode arranged so as to surround the first electrode in plan view from a first direction toward a medium, a first conductor that includes a coil and that electrically connects a transmission line, which is configured to transmit a high-frequency voltage, and the first electrode, and a second conductor that electrically connects the transmission line and the second electrode and the drying section generates electromagnetic waves so that an irradiation intensity of the electromagnetic wave on a medium onto which pigment ink was ejected becomes pulsed in time series.

[0007] A recording device to overcome the above-described problem includes a recording section that performs recording by ejecting pigment ink containing a pigment, water, and a solvent onto a medium and a drying section that dries a medium onto which pigment ink was ejected by the recording section by generating an electromagnetic wave in response to application of a high-frequency voltage, wherein the drying section includes a first electrode, a second electrode arranged so as to surround the first electrode in plan view from a first direction toward a medium, a first conductor that includes a coil and that electrically connects a transmission line, which is configured to transmit a high-frequency voltage, and the first electrode, and a second conductor that electrically connects the transmission line and the second electrode and the drying section generates electromagnetic waves so that an irradiation intensity of the electromagnetic wave on a medium onto which pigment ink was ejected becomes pulsed in time series.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** is a schematic diagram showing a recording system of a first embodiment.

[0009] FIG. **2** is a top view showing a drying section of the first embodiment.

[0010] FIG. **3** is a perspective view showing the drying section of the first embodiment.

[0011] FIG. **4** is a flowchart showing a drying control process of the first embodiment.

[0012] FIG. **5** is an explanatory diagram showing an intensity of an electromagnetic wave in a medium and temperature in the medium of the first embodiment.

[0013] FIG. **6** is a top view showing a drying section of a second embodiment.

[0014] FIG. **7** is an explanatory diagram showing an intensity of electromagnetic waves in a medium of the second embodiment.

[0015] FIG. **8** is a top view showing a drying section of a third embodiment.

[0016] FIG. **9** is an explanatory diagram showing an intensity of an electromagnetic wave in a medium of the third embodiment.

DESCRIPTION OF EMBODIMENTS

First Embodiment

[0017] Hereinafter, an embodiment of a recording system including a drying device and a recording device will be described. In the following description, a direction intersecting a vertical direction Z is referred to as a width direction X, and a direction intersecting the vertical direction Z and the width direction X is referred to as a depth direction Y. One direction along the width direction X is referred to as a first width direction X**1**, and the other direction along the width direction X is referred to as a second width direction X**2**. One direction along the depth direction Y is referred to as a first depth direction Y**1**, and the other direction along the depth direction Y is referred to as a second depth direction Y**2**. In the vertical direction Z, an upper direction is referred to as an upper direction Z**1**, and a lower direction is referred to as a lower direction Z**2**. The vertical direction Z corresponds to an example of a first direction.

Configuration of Recording System **10**

[0018] As shown in FIG. **1**, a recording system **10** is a system that performs recording on a medium **90**. In particular, the recording system **10** is a system that performs recording on the medium **90** by ejecting liquid onto the medium **90**. The recording system **10** is a system that dries the medium **90** on which recording has been performed by ejecting liquid.

[0019] The liquid is pigment ink. Pigment ink includes a pigment, water, and a solvent. The solvent may include, for example, glycerin. Glycerin is a solvent for preventing clogging of a nozzle that ejects liquid. Due to the vaporization of glycerin, the abrasion resistance of the medium **90** onto which pigment ink was ejected is improved.

[0020] The recording system **10** includes a recording device **11**. The recording device **11** is configured to perform recording on the medium **90**. In particular, the recording device **11** performs recording on the medium **90** by ejecting liquid onto the medium **90**. The recording device **11** may be an inkjet type printer that performs recording by ejecting pigment ink as liquid onto the medium **90**. The medium **90** includes a front surface **90**A and a back surface **90**B. The medium **90** is fabric, but may be, for example, paper.

[0021] The recording system **10** includes a drying device **12**. The drying device **12** is configured to dry the medium **90** after recording onto which the recording device **11** has ejected liquid. In particular, the drying device **12** generates an electromagnetic wave to dry the medium **90** after recording.

[0022] The recording system **10** includes a feeding section **13**. The feeding section **13** feeds the medium **90** before recording to the recording device **11**. The feeding section **13** includes a feed roller **13**A. The feed roller **13**A extends along the width direction X. In the width direction X, the width of the feed roller **13**A is longer than the width of the medium **90**. The feed roller **13**A is configured to rotatably hold a first roll body **91**. The first roll body **91** is the medium **90** before recording that is wound and stacked. The medium **90** may be elongated. In this way, the feed roller **13**A holds the medium **90** to be fed to the recording device **11**.

[0023] The recording system **10** includes a winding section **14**. The winding section **14** winds up the medium **90** after recording by the recording device **11**. In particular, the winding section **14** winds up the medium **90** after recording and drying by the drying device **12**. The winding section **14** includes a winding roller **14**A. The winding roller **14**A extends along the width direction X. In the width direction X, the width of the winding roller **14**A is longer than the width of the medium **90**. The winding roller **14**A is configured to rotatably hold a second roll body **92**. The second roll body **92** is the medium **90** after recording that is wound and stacked. In this way, the winding roller **14**A winds up the medium **90** that was recorded by the recording device **11** and dried by the drying device **12**.

Configuration of Recording Device **11**

[0024] Here, the configuration of the recording device **11** will be described in detail.

[0025] The recording device **11** includes a recording section **20**, a recording support section **21**, and a recording transport section **22**. The recording section **20** is configured to perform recording on the medium **90** by ejecting liquid onto the medium **90**. The recording section **20** is configured to perform recording on the medium **90** by ejecting liquid onto the front surface **90**A of the medium **90**. The recording section **20** performs recording on the medium **90** supported by the recording support section **21**. The recording section **20** performs recording on the medium **90** transported by the recording transport section **22**.

[0026] The recording section **20** includes a head **23**. The head **23** may be a serial head or may be a line head. A serial head is a head that scans in the width direction X of the medium **90**. A line head is a head that records simultaneously across the width direction X of the medium **90**.

[0027] The head **23** includes a nozzle surface **24** in which a plurality of nozzles (not shown) are opened. The nozzle surface **24** is a surface facing the lower direction Z2. The nozzle surface **24** is a surface facing the front surface **90**A of the medium **90** transported by the recording transport section **22**. Each of the plurality of nozzles is configured to open up in the lower direction Z2. Each of the plurality of nozzles is configured to eject liquid.

[0028] The recording section **20** may include a carriage **25** and a carriage support section **26**. The carriage **25** is configured to support the head **23**. The carriage support section **26** extends along the width direction X. The carriage support section **26** supports the carriage **25** so as to be movable along the width direction X. The carriage **25** is movable in the width direction X along the carriage support section **26** by a driving force from a drive source (not shown).

[0029] The recording support section **21** is configured to support the medium **90** transported by the recording transport section **22**. The recording support section **21** is positioned in the lower direction Z2 of the recording section **20**. The recording support section **21** supports the back surface **90**B of the medium **90** transported by the recording transport section **22**. The recording support section **21** is positioned in the lower direction Z2 of the head **23**.

[0030] The recording transport section **22** is configured to transport the medium **90** in a transport direction D. The transport direction D is a direction along the depth direction Y. The recording transport section **22** may include a plurality of rollers. Although the recording transport section **22** transports the medium **90** in the transport direction D using the plurality of rollers, the recording transport section **22** may transport the medium **90** in the transport direction D using a transport belt driven by a plurality of rollers. The recording transport section **22** may perform intermittent transport in which the transport and stop of the medium **90** are repeated.

Configuration of Drying Device **12**

[0031] Next, the configuration of the drying device **12** will be described in detail.

[0032] The drying device **12** includes a drying unit **30**. The drying unit **30** is configured to dry the medium **90** after recording. That is, the drying device **12** sets the medium **90** on which recording is performed by the recording section **20** as an object to be dried.

[0033] The drying unit **30** is configured to dry the medium **90** after recording by generation of electromagnetic waves. The drying unit **30** is positioned in the upper direction Z1 of the medium **90**, but may be positioned in the lower direction Z2 of the medium **90**, or may be positioned both in the upper direction Z1 and in the lower direction Z2 of the medium **90**. In this way, the vertical direction Z is a direction toward the medium **90**.

[0034] The drying device **12** includes a high-frequency voltage generation section **31**. The high-frequency voltage generation section **31** is configured to generate a high-frequency voltage. The high-frequency voltage generation section **31** supplies a high-frequency voltage to the drying unit **30** through a transmission line **32**.

[0035] The transmission line **32** is a line for connecting the drying unit **30** and the high-frequency voltage generation section **31**. The transmission line **32** is capable of transmitting a high-frequency voltage from the high-frequency voltage generation section **31** to the drying unit **30**. That is, the transmission line **32** is capable of transmitting a high-frequency voltage.

[0036] The transmission line **32** may be a coaxial cable, but is not limited to coaxial cable. The transmission line **32** may include a first line and a second line. The first line may be a core line of the transmission line **32**. The second line may be an electromagnetic shield that covers the first line.

[0037] The drying device **12** includes a drying transport section **33**. The drying transport section **33** is configured to transport the medium **90** in the transport direction D. The drying transport section **33** may transport the medium **90** in the transport direction D using a plurality of rollers. The drying transport section **33** transports the medium **90** in the transport direction D at a predetermined speed. The drying transport section **33** performs intermittent transport in which the transport and stop of the medium **90** are repeated. Slackening of the medium **90** may occur between the recording transport section **22** and the drying transport section **33**.

[0038] The drying device **12** includes a drying support section **34**. The drying support section **34** is configured to support the medium **90** transported by the drying transport section **33**. The drying support section **34** is positioned in the lower direction Z2 of the drying unit **30**. The drying support section **34** supports the back surface **90**B of the medium **90** transported by the drying transport section **33**. The drying support section **34** is positioned in the lower direction Z2 of the drying section **36** (to be described later).

[0039] The drying device **12** includes a control section **35**. The control section **35** controls the drying device **12**. Specifically, the control section **35** controls the drying unit **30**. The control section **35** controls the high-frequency voltage generation section **31**. The control section **35** controls the drying transport section **33**.

[0040] The control section **35** may be constituted by one or more processors that execute various processes in accordance with a computer program. The control section **35** may be composed of one or more dedicated hardware circuits. The control section **35** may be configured with an application specific integrated circuit that executes at least a part of various processes. The control section **35** may be composed of a processor and a circuit including a combination of hardware circuits. The processor includes a CPU and memories such as a RAM and a ROM. The memory stores program codes or instructions configured to cause the CPU to perform processes. Memory, that is computer-readable medium, includes any readable medium that can be accessed by a general-purpose or dedicated computer.

[0041] The drying unit **30** includes a drying section **36**. That is, the drying device **12** includes the drying section **36**. The drying unit **30** may include a plurality of drying sections **36**. The drying section **36** may be rectangular in plan view from the vertical direction Z. The drying section **36** may be arranged so that the width direction X is a longitudinal direction. Hereinafter, a plan view from the vertical direction Z is simply referred to as plan view.

[0042] The drying section **36** is configured to generate an electromagnetic wave in response to application of a high-frequency voltage. The drying section **36** generates an electromagnetic wave in response to application of a high-frequency voltage. By this, the drying section **36** is configured to dry the medium **90** onto which liquid was ejected by the recording section **20**. The drying section **36** is an electromagnetic wave generation section.

[0043] The drying section **36** generates an alternating current electric field by generating an electromagnetic wave. An electromagnetic wave generated by the drying section **36** has an electric field as a main component. The drying section **36** can significantly reduce induction of a magnetic field due to a generated electric field as compared with an electromagnetic wave generation section that generates a normal electromagnetic wave.

[0044] As a specific example, the drying section **36** generates electromagnetic waves of 2.4 GHz, but is not limited to this. The drying section **36** may generate, for example, electromagnetic waves of 3 MHz to 300 MHz. The drying section **36**, for example, may generate electromagnetic waves of 300 MHz to 30 GHZ, and among these, may generate electromagnetic waves of 10 MHz to 20 GHZ.

[0045] The drying section **36** dries the medium **90** by heating the medium **90** from the front surface **90**A. Specifically, the drying section **36** heats liquid ejected onto the medium **90** from the front surface **90**A. The drying section **36** dries the medium **90** by vaporizing liquid ejected onto the medium **90**. That is, the drying section **36** is a method of drying the medium **90** regardless of whether or not water vapor is saturated around the medium **90**. Therefore, the drying section **36** does not need to blow dry gas in which water vapor is not saturated around the medium **90**.

Arrangement of Drying Section **36**

[0046] As shown in FIG. **2**, when the drying unit **30** includes a plurality of drying sections **36**, the plurality of drying sections **36** may be arranged in the width direction X, and the plurality of drying sections **36** may be arranged in the depth direction Y. In this case, the plurality of drying sections **36** may be arranged across the entire width of the medium **90** in the width direction X. A plurality of drying sections **36** may be arranged over a distance d**10** in the depth direction Y. Thus, a region of the medium **90** facing the plurality of the drying sections **36** corresponds to a region to be dried.

Configuration of Drying Section **36**

[0047] As shown in FIG. **3**, the drying section **36** includes a first electrode **41**, a second electrode **42**, a first conductor **43**, and a second conductor **44**. The drying section **36** may include a facing section **45**. FIG. **2** is a view in which the first electrode **41** and second electrode **42** are arranged on a lower direction **Z2** side.

[0048] The first electrode **41** has a flat plate shape. The first electrode **41** is elongated in the width direction X in plan view. That is, the first electrode **41** extends in the width direction X in plan view. The first electrode **41** may have a rectangular shape in plan view.

[0049] The first electrode **41** includes a first electrode surface **41**A. The first electrode surface **41**A is a surface facing the lower direction **Z2**. That is, the first electrode surface **41**A is a surface facing the front surface **90**A of the medium **90**. The first electrode **41** is arranged such that the first electrode surface **41**A abuts the facing section **45**.

[0050] The second electrode **42** has a flat plate shape. The second electrode **42** includes a second electrode surface **42**A. The second electrode surface **42**A is a surface facing the lower direction **Z2**. That is, the second electrode surface **42**A is a surface facing the front surface **90**A of the medium **90**. The second electrode **42** is arranged such that the second electrode surface **42**A abuts the facing section **45**.

[0051] The second electrode **42** includes an opening section **42**B. The opening section **42**B has a rounded rectangular shape in plan view, but may have a rectangular shape. The first electrode **41** is positioned in the opening section

42B in plan view. That is, the second electrode **42** is arranged so as to surround the first electrode **41** in plan view.

[0052] The first conductor **43** is configured to electrically connect the transmission line **32** and the first electrode **41**. The first conductor **43** includes a coil **43**A. The coil **43**A extends in the vertical direction Z. One end of the coil **43**A is connected to the first electrode **41**. The other end of the coil **43**A is connected to a conductor wire **43**B.

[0053] The second conductor **44** is configured to electrically connect the transmission line **32** and the second electrode **42**. The second conductor **44** may include a columnar support **44**A. The second conductor **44** may include a plurality of columnar supports **44**A. The columnar supports **44**A are electrically connected to the second electrode **42**. The columnar support **44**A extends from the second electrode **42** in the upper direction Z**1**. The columnar support **44**A is made of metal.

[0054] The second conductor **44** may include a connection section **44**B. The connection section **44**B is electrically connected to the columnar supports **44**A. The connection section **44**B is provided at an upper end section of the columnar support **44**A. The connection section **44**B connects a plurality of columnar supports **44**A. The connection section **44**B may be integral with the columnar support **44**A. The connection section **44**B may be H-shaped in plan view. The connection section **44**B is made of metal.

[0055] The second conductor **44** may include a top plate **44**C. The top plate **44**C is positioned in the upper direction Z**1** of the connection section **44**B. The top plate **44**C is electrically connected to the connection section **44**B. The top plate **44**C may be integral with the connection section **44**B. The top plate **44**C is made of metal.

[0056] The facing section **45** is positioned between the first electrode **41** and the second electrode **42**, and the medium **90**. The facing section **45** may have a flat plate shape. The facing section **45** is made of a material that transmits electromagnetic waves generated by the drying section **36**. The facing section **45** is arranged so as to face the front surface **90**A of the medium **90**. The facing section **45** may not be in contact with the medium **90**, and may be in contact with the medium **90**. The facing section **45** protects the first electrode **41** and the second electrode **42**. The facing section **45** is composed of a member having insulating properties. The facing section **45** may be a glass plate. The facing section **45** may be a ceramic with high transmittance. The facing section **45** may be made of a resin with a low dissipation factor. The facing section **45** may be made of polypropylene. The facing section **45** may be made of polyethylene.

[0057] By configuring the drying section **36** in this manner, when a high-frequency voltage is applied, the first electrode **41** and the second electrode **42** heat the medium **90** by generating an electromagnetic wave in response to application of a high-frequency voltage.

[0058] Such a drying section **36** can transmit a large amount of thermal energy to the medium **90** due to generation of electromagnetic waves. The drying section **36** is not of a thermal conduction type but of an electromagnetic wave type, and does not need to include a member such as a heating wire for heating. This allows the drying section **36** to be made smaller in size.

[0059] The minimum separation distance between the first electrode **41** and the second electrode **42** is equal to or less than 1/10 of the wavelength of an electromagnetic wave output from the drying section **36**. By this, electromagnetic waves generated when a high-frequency voltage is applied can be attenuated in the vicinity of the first electrode **41** and the second electrode **42**. By this, it is possible to reduce the intensity of an electromagnetic wave that reaches a distant place from the first electrode **41** and the second electrode **42**. That is, an electromagnetic wave generated from the drying section **36** is very strong in the vicinity of the first electrode **41** and the second electrode **42**, and is very weak in a distant place.

[0060] Such a drying section **36** can intensively generate an alternating current electric field in the vicinity of the first electrode **41** and the second electrode **42** by appropriately controlling the frequency band of an electromagnetic wave to be generated. In other words, it is possible to suppress the influence on the surroundings accompanying the generation of electromagnetic waves beyond the vicinity of the first electrode **41** and the second electrode **42**. The vicinity of the first electrode **41** and the second electrode **42** may correspond to a range of, for example, 3 mm to 3 cm.

Drying Control Process

[0061] Here, a drying control process will be described with reference to FIG. **4**. The drying control process is a process executed by the control section **35** when there is a drying instruction from a user.

[0062] As shown in FIG. **4**, in step S**10**, the control section **35** executes a transport control process. In this process, the control section **35** controls the drying transport section **33** so as to transport the medium **90** in the transport direction D. In particular, the control section **35** performs intermittent transport in which the transport of the medium **90** is stopped for a predetermined time after the medium **90** is transported in the transport direction D by the distance d**10**.

[0063] The distance d**10** is a distance at which the drying section **36** is arranged in the transport direction D. That is, the distance d**10** is a distance corresponding to a region to be dried for drying the medium **90**. The predetermined time is a time corresponding to a control pattern of the drying section **36**. The control pattern is a pattern for controlling drying section **36**. The control pattern is a pattern in which the drying section **36** generates an electromagnetic wave.

[0064] In step S**11**, the control section **35** executes a drying process. In this process, the control section **35** controls the high-frequency voltage generation section **31** to supply a high-frequency voltage to the drying section **36**. By this, the control section **35** controls the high-frequency voltage generation section **31** to drive the drying section **36**.

[0065] In particular, the control section **35** controls the high-frequency voltage generation section **31** so as to drive the drying section **36** based on the control pattern. By this, the drying section **36** generates an electromagnetic wave based on the control pattern in a state in which the transport of the medium **90** is stopped.

[0066] In step S**12**, control section **35** determines whether the drying process based on the control pattern is completed or not. In a case where the control section **35** determines that the drying process based on the control pattern is not completed, the control section **35** shifts the process to step S**11**. In a case where the control section **35** determines that the drying process based on the control pattern is completed, the control section **35** shifts the process to step S**13**.

[0067] In step S**13**, the control section **35** determines whether a drying end condition is satisfied or not. The drying end condition may be satisfied when there is a drying end instruction from a user. The drying end condition may be satisfied when a predetermined time has elapsed.

[0068] In a case where the control section **35** determines that the drying end condition is not satisfied, the control section **35** shifts the process to step S**10**. When the control section **35** determines that the drying end condition is satisfied, the control section **35** controls the drying transport section **33** to stop the transport of the medium **90** and controls the high-frequency voltage generation section **31** to stop the supply of a high-frequency voltage to the drying section **36**. Thereafter, the control section **35** ends the drying control process.

[0069] As described above, until the drying end condition is satisfied, the control section **35** repeatedly executes the transport control process for transporting the medium **90** in the transport direction D by the distance d**10**, and then executes the drying process based on the control pattern for a region to be dried in a state where the transport of the medium **90** is stopped.

Control Pattern

[0070] Next, a control pattern for controlling the drying section **36** will be described with reference to FIG. **5**.

[0071] As shown in FIG. **5**, the control pattern is a pattern in which the intensity of an electromagnetic wave generated from the drying section **36** is intensity S from the timing indicated by the reference symbol T**0** to the timing indicated by the reference symbol T**1**. The time t**1** from the timing indicated by the reference symbol T**0** to the timing indicated by the reference symbol T**1** may be, for example, 3 seconds. As described above, the control pattern is a pattern in which an electromagnetic wave is generated from the timing indicated by the reference symbol T**0** over a first pulse width of the time t**1**. The timing indicated by the reference symbol T**0** corresponds to an example of a first start timing.

[0072] The control pattern is a pattern in which an electromagnetic wave is not generated from the drying section **36** from the timing indicated by the reference symbol T**1** to the timing indicated by the reference symbol T**2**. The time to from the timing indicated by the reference symbol T**1** to the timing indicated by the reference symbol T**2** may be, for example, 1 second. The time to is shorter than the time t**1**.

[0073] The control pattern is a pattern in which the intensity of an electromagnetic wave generated from the drying section **36** is the intensity S from the timing indicated by reference symbol T**2** to the timing indicated by reference symbol T**3**. The time t**2** from the timing indicated by reference symbol T**2** to the timing indicated by reference symbol T**3** may be, for example, 0.5 seconds. The time t**2** is shorter than the time to and the time t**1**. As described above, the control pattern is a pattern in which an electromagnetic wave is generated from the timing indicated by the reference symbol T**2** over a second pulse width of the time t**2**. The timing indicated by reference symbol T**2** corresponds to an example of a second start timing.

[0074] The control pattern is a pattern in which an electromagnetic wave is not generated from the drying section **36** from the timing indicated by the reference symbol T**3** to the timing indicated by the reference symbol T**4** and from the timing indicated by the reference symbol T**5** to the timing indicated by the reference symbol T**6**. The time to from the timing indicated by the reference symbol T**3** to the timing indicated by the reference symbol T**4**, and the time to from the timing indicated by the reference symbol T**5** to the timing indicated by the reference symbol T**6**, may be the same as the time to from the timing indicated by the reference symbol T**1** to the timing indicated by the reference symbol T**2**.

[0075] The control pattern is a pattern in which the intensity of an electromagnetic wave generated from the drying section **36** is the intensity S from the timing indicated by the reference symbol T**4** to the timing indicated by the reference symbol T**5** and from the timing indicated by the reference symbol T**6** to the timing indicated by the reference symbol T**7**. The time t**2** from the timing indicated by the reference symbol T**4** to the timing indicated by the reference symbol T**5** and the time t**2** from the timing indicated by the reference symbol T**6** to the timing indicated by the reference symbol T**7** may be the same as the time t**2** from the timing indicated by the reference symbol T**2** to the timing indicated by the reference symbol T**3**. As described above, the control pattern is a pattern in which an electromagnetic wave is generated from the timing indicated by the reference symbols T**4** and T**6** over the second pulse width of the time t**2**.

[0076] The control pattern is a pattern in which an electromagnetic wave is generated for the time t**1**, then not generated for the time to, and then generated for the time t**2**, and this sequence is repeated over three cycles.

[0077] In this manner, the drying section **36** generates an electromagnetic wave with respect to the medium **90** so that the intensity of the electromagnetic wave to be generated becomes pulsed in time series. In a state where the transport of medium **90** is stopped, the intensity of an electromagnetic wave generated by drying section **36** corresponds to the irradiation intensity of an electromagnetic wave in the medium **90**. In other words, the drying section **36** generates an electromagnetic wave so that the irradiation intensity of the electromagnetic wave in the medium **90** becomes pulsed in time series.

Drying Principle of Medium **90**

[0078] Pigment ink as liquid is ejected onto the medium **90** by the recording device **11**. Unlike dye ink that permeates into the medium **90**, pigment ink is fixed on the front surface **90**A of the medium **90** to perform recording.

[0079] Pigment ink contains water in addition to a pigment. Pigment ink contains glycerin as a solvent. When the temperature of pigment ink reaches approximately 100° C., water contained in pigment ink is vaporized. When the temperature of pigment ink reaches approximately 290° C., glycerin contained in pigment ink is vaporized.

[0080] Pigment ink ejected onto the front surface **90**A of the medium **90** is heated by an electromagnetic wave generated from the drying section **36**. By this, water and a solvent contained in pigment ink are vaporized, whereby the medium **90** is dried. In particular, since glycerin contained in pigment ink is vaporized, the abrasion resistance of the medium **90** can be improved.

[0081] An electromagnetic wave generated from the drying section **36** does not heat gas around the medium **90**. Therefore, an electromagnetic wave does not directly heat the medium **90** itself but heats pigment ink. As described above, the generation of an electromagnetic wave itself does not directly cause thermal denaturation of the medium **90**. On the other hand, when pigment ink is heated by the generation of an electromagnetic wave, the heat of pigment ink is transferred to medium **90**. This may cause thermal denaturation of medium **90**.

[0082] For example, in a case where the type of medium **90** is a cotton cloth, when a state in which the temperature of the medium **90** is approximately 270° C. continues for 1 second, thermal denaturation with respect to medium **90** occurs. Thermal denaturation of the medium **90** includes a property that medium **90** changes to yellow. In addition, when the temperature of the medium **90** exceeds 400° C., there is a risk of ignition, and it is necessary to prevent the temperature of the medium **90** from exceeding approximately 350° C.

[0083] As described above, when the medium **90** on which pigment ink is ejected is dried, it is necessary to raise the temperature of pigment ink to 290° C. or higher. On the other hand, it is necessary to dry the medium **90** so that the temperature of the medium **90** does not exceed approximately 350° C. and the temperature of the medium **90** does not exceed approximately 270° C. continuously for 1 second.

[0084] As shown in FIG. **5**, when the drying section **36** generates an electromagnetic wave based on a control pattern, the temperature of the medium **90** increases from the timing indicated by the reference symbol T**0** and reaches approximately 100° C. In this manner, by rapidly increasing the temperature of the medium **90** from the timing indicated by the reference symbol T**0**, water contained in pigment ink is vaporized, and thus provisional drying is performed. Then, the temperature becomes approximately 310° C. at the timing indicated by the reference symbol T**1**.

[0085] From the timing indicated by the reference symbol T**1**, the drying section **36** does not generate an electromagnetic wave. Therefore, the temperature of the medium **90** is lowered to approximately 250° C. at the timing indicated by the reference symbol T**2**. At this time, the temperature of the medium **90** exceeds approximately 290° C. for the time t**3**.

[0086] Since the drying section **36** generates an electromagnetic wave from the timing indicated by the reference symbol T**2**, the temperature of the medium **90** rises and reaches approximately 310° C. at the timing indicated by the reference symbol T**3**. Thereafter, from the timing indicated by the reference symbol T**3**, the drying section **36** does not generate an electromagnetic wave. Therefore, the temperature of the medium **90** is lowered to approximately 250° C. at the timing indicated by the reference symbol T**4**.

[0087] At this time, the temperature of the medium **90** exceeds approximately 290° C. for the time t**3**. Also, the temperature of the medium **90** exceeds approximately 270° C. for the time t**4**. For example, the time t**3** may be 0.4 seconds, and the time t**4** may be 0.6 seconds.

[0088] In this way, from the timing indicated by the reference symbol T**0** to the timing indicated by the reference symbol T**2**, after the temperature of the medium **90** is rapidly increased, the temperature repeatedly exceeds 290° C. for the time t**3** and exceeds 270° C. for the time t**4** without exceeding about 350° C. Then, drying based on the control pattern is completed at the timing indicated by the reference symbol T**7**.

[0089] By this, main drying is performed by vaporizing a solvent contained in pigment ink without causing thermal denaturation of the medium **90**. In particular, in the main drying, an electromagnetic wave is generated over three cycles in order to increase the reliability of vaporization of glycerin. The time from the timing indicated by the reference symbol T**0** to the timing indicated by the reference symbol T**7** may be, for example, 7.5 seconds.

Operations and Effects of First Embodiment

[0090] Operations and effects of the first embodiment will be described.

[0091] (1-1) In the related art, main drying is performed by blowing high temperature hot air or irradiating infrared rays, but it is necessary to perform drying at an appropriate temperature for a long period of time such as 120 seconds, for example, which results in a decrease in drying efficiency and an increase in the size of a system.

[0092] Therefore, the drying section **36** generates an electromagnetic wave so that the irradiation intensity of an electromagnetic wave in the medium **90** on which pigment ink is ejected becomes pulsed in time series. According to this configuration, the medium **90** can be dried in a short time by generating an electromagnetic wave in response to application of a high-frequency voltage.

[0093] In addition, even if the intensity of an electromagnetic wave is strong, the irradiation intensity of the electromagnetic wave in the medium **90** can become pulsed in time series. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium **90** onto which pigment ink was ejected. Therefore, it is possible to dry the medium **90** in a short time while maintaining the quality of the medium **90**.

[0094] (1-2) The drying section **36** generates an electromagnetic wave based on a control pattern. The control pattern is a pulsed pattern in which an electromagnetic wave is generated over a first pulse width from the timing indicated by the reference symbol T**0**, and an electromagnetic wave is generated over a second pulse width shorter than the first pulse width from the timing indicated by the reference symbol T**2**. According to this configuration, the generation timing of an electromagnetic wave can be controlled based on the control pattern. Therefore, the control accuracy of the temperature of pigment ink can be improved.

[0095] In particular, by generating an electromagnetic wave over the first pulse width from the timing indicated by the reference symbol T**0**, it is possible to increase the speed of increasing the temperature of pigment ink ejected onto the medium **90**. Then, by generating an electromagnetic wave over the second pulse width that is shorter than the first pulse width from the timing indicated by the reference symbol T**2**, it is possible to suppress an excessive rise in the temperature of pigment ink ejected onto the medium **90**. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium **90** onto which pigment ink was ejected. Therefore, it is possible to dry the medium **90** in a short time while maintaining the quality of the medium **90**.

[0096] (1-3) The drying section **36** generates an electromagnetic wave based on the control pattern when the transport of the medium **90** is stopped. According to this configuration, an electromagnetic wave can be generated based on the control pattern when the transport of medium **90** is stopped. Therefore, the control accuracy of the temperature of pigment ink can be improved. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium **90** onto which pigment ink was ejected. Therefore, it is possible to dry the medium **90** in a short time while maintaining the quality of the medium **90**.

[0097] (1-4) The drying section **36** is provided on a front surface **90**A side of the medium **90**. Therefore, the medium **90** can be dried by heating liquid from a front surface **90**A side of the medium **90** onto which liquid was ejected.

Second Embodiment

[0098] Next, a second embodiment will be described. In the following description, the same configuration as that of the embodiment already described will be omitted or simplified, and a configuration different from that of the embodiment already described will be described.

[0099] As shown in FIG. **6**, in the second embodiment, in the drying device **12**, the drying section **36** may include a first drying section **36**A and a second drying section **36**B. The drying section **36** may include a plurality of first drying sections **36**A and a plurality of second drying sections **36**B. That is, the drying device **12** may include the first drying section **36**A and the second drying section **36**B.

[0100] The first drying section **36**A performs provisional drying of the medium **90** by generating electromagnetic waves. The first drying section **36**A is provided in an upstream region R**11**. The upstream region R**11** is positioned upstream of a downstream region R**12** (to be described later) in the transport direction D.

[0101] The second drying section **36**B performs main drying of the medium **90** by generating electromagnetic waves. The second drying section **36**B is provided in the downstream region R**12**. As described above, the second drying section **36**B is provided downstream of the first drying section **36**A in the transport direction D. An intermediate region R**13**, in which electromagnetic waves are not generated, is provided between the upstream region R**11** and the downstream region R**12** in the transport direction D.

[0102] The first drying section **36**A generates electromagnetic waves having a higher intensity than the second drying section **36**B. In detail, by configuring the inductance of the coil **43**A of the first drying section **36**A and the inductance of the coil **43**A of the second drying section **36**B to be different from each other, the resonance frequencies of the first drying section **36**A and the second drying section **36**B can be made different from each other. As described above, by setting the resonance frequency of the first drying section **36**A to be higher than the resonance frequency of the second drying section **36**B, the intensity of the electromagnetic waves generated from the first drying section **36**A can be made higher than the intensity of the electromagnetic waves generated from the second drying section **36**B.

[0103] The high-frequency voltage generation section **31** may include a first high-frequency voltage generation section **31**A and a second high-frequency voltage generation section **31**B. The first high-frequency voltage generation section **31**A supplies a high-frequency voltage to the first drying section **36**A. The second high-frequency voltage generation section **31**B supplies a high-frequency voltage to the second drying section **36**B.

[0104] The control section **35** causes the drying transport section **33** to perform continuous transport for continuously transporting the medium **90**. The control section **35** controls the first high-frequency voltage generation section **31**A to generate an electromagnetic wave in the first drying section **36**A based on a first control pattern while the medium **90** is continuously transported at a predetermined speed. By this, the first drying section **36**A generates an electromagnetic wave based on the first control pattern in a state where the medium **90** is continuously transported at a predetermined speed.

[0105] The control section **35** controls the second high-frequency voltage generation section **31**B to generate an electromagnetic wave in the second drying section **36**B based on a second control pattern while the medium **90** is continuously transported at a predetermined speed. By this, the second drying section **36**B generates an electromagnetic wave based on the second control pattern in a state where the medium **90** is continuously transported at a predetermined speed.

[0106] As shown in FIG. **7**, the first control pattern is a pattern in which an electromagnetic wave of a predetermined intensity is continuously generated. The first control pattern is a pattern for controlling the first drying section **36**A. Therefore, the first control pattern is a pattern in which an electromagnetic wave of first intensity S**1** is continuously generated from the first drying section **36**A. By this, the first drying section **36**A continuously generates an electromagnetic wave at a predetermined intensity based on the first control pattern in a state in which the medium **90** is continuously transported at a predetermined speed.

[0107] The second control pattern is a pulsed pattern for generating an electromagnetic wave over a predetermined pulse width. The second control pattern is a pattern for controlling the second drying section **36**B. For this reason, the second control pattern is a pattern in which an electromagnetic wave with second intensity S**2** smaller than the first intensity S**1** is generated in a pulse shape from the second drying section **36**B. The predetermined pulse width may be the same as the second pulse width of the time t**2**, or it may be shorter or longer than the second pulse width. By this, the second drying section **36**B generates a pulsed electromagnetic wave over a predetermined pulse width based on the second control pattern in a state where the medium **90** is continuously transported at a predetermined speed.

[0108] In this manner, the medium **90** is continuously transported at a predetermined speed along the transport direction D, and thus the first drying section **36**A generates an electromagnetic wave at the first intensity S**1** for a predetermined time with a region to be dried of the medium **90** arranged in the upstream region R**11** as a target. The predetermined time may be the time t**1**. By this, in the upstream region R**11**, a region to be dried of the medium **90** is continuously irradiated with an electromagnetic wave from the first drying section **36**A.

[0109] Thereafter, the medium **90** is transported such that a region to be dried of the medium **90** moves from the upstream region R**11** to the intermediate region R**13**. A region to be dried of the medium **90** arranged in the intermediate region R**13** is not irradiated with an electromagnetic wave for a predetermined period of time. The predetermined time may be the time to.

[0110] Subsequently, the medium **90** is transported such that a region to be dried of the medium **90** moves from the intermediate region R**13** to the downstream region R**12**. The second drying section **36**B repeats the generation of an electromagnetic wave at the second intensity S**2** for a time corresponding to a predetermined speed and a predetermined pulse width over three cycles with respect to a region to be dried of the medium **90** arranged in the downstream region R**12**. By this, in the downstream region R**12**, a region to be dried of the medium **90** is irradiated with a pulsed electromagnetic wave from the second drying section **36**B.

[0111] As described above, also in the second embodiment, as in the first embodiment, the drying section **36**, including the first drying section **36**A and the second drying section **36**B, generates an electromagnetic wave so that the irradiation intensity of the electromagnetic wave in the medium **90** becomes pulsed in time series.

Operations and Effects of Second Embodiment

[0112] Operations and effects of the second embodiment will be described.

[0113] (2-1) The first drying **36**A generates an electromagnetic wave based on the first control pattern in a state in which the medium **90** is continuously transported at a predetermined speed. The first control pattern is a pattern in which an electromagnetic wave of a predetermined intensity is continuously generated. The second drying section **36**B is provided downstream of the first drying section **36**A in the transport direction D. The second drying g section **36**B generates an electromagnetic wave based on the second control pattern in a state where the medium **90** is continuously transported at a predetermined speed. The second control pattern is a pulsed pattern for generating an electromagnetic wave over a predetermined pulse width. According to this configuration, it is possible to dry the medium **90** onto which pigment ink was ejected without stopping the transport of the medium **90**. By this, it is possible to increase the speed of drying the medium **90** onto which pigment ink was ejected.

[0114] In addition to this, by generating an electromagnetic wave from the first drying section **36**A, it is possible to increase the speed of raising the temperature of pigment ink ejected onto the medium **90**. In addition, it is possible to suppress an excessive increase in the temperature of pigment ink ejected onto the medium **90** due to the generation of an electromagnetic wave from the second drying section **36**B. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium **90** onto which pigment ink was ejected. Therefore, it is possible to dry the medium **90** in a short time while maintaining the quality of the medium **90**.

[0115] (2-2) The resonance frequency of the first drying section **36**A is different from the resonance frequency of the second drying section **36**B, and the first drying section **36**A generates an electromagnetic wave with a higher intensity than the second drying section **36**B. According to this configuration, by making the resonance frequency of the first drying section **36**A different from the resonance frequency of the second drying section **36**B, the first drying section **36**A can generate an electromagnetic wave with a higher intensity than that of the second drying section **36**B. Therefore, it is possible to further increase the speed at which the temperature of pigment ink ejected onto the medium **90** is raised by the generation of an electromagnetic wave from the first drying section **36**A. Additionally, it is possible to further suppress an excessive increase in the temperature of pigment ink ejected onto the medium **90** due to the generation of an electromagnetic wave from the second drying section **36**B. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium **90** onto which pigment ink was ejected. Therefore, it is possible to dry the medium **90** in a short time while maintaining the quality of the medium **90**. It is possible to reduce the control load for controlling the intensity of an electromagnetic wave generated by the first drying section **36**A and the intensity of an electromagnetic wave generated by the second drying section **36**B.

Third Embodiment

[0116] Next, a third embodiment will be described.

[0117] As shown in FIG. **8**, in the third embodiment, the first drying section **36**A is provided in a first region R**21**. The second drying section **36**B is provided in a second region R**22**. The second region R**22** is a region provided downstream of the first region R**21** in the transport direction D. As described above, the second drying section **36**B is provided downstream of the first drying section **36**A in the transport direction D. The second region R**22** may be provided at three positions downstream of the first region R**21** in the transport direction D.

[0118] A third region R**23** is provided between the first region R**21** and the second region R**22** in the transport direction D. The third region R**23** is a region where electromagnetic waves are not generated. That is, the second region R**22** is a region in which the third region R**23** is provided between the second region R**22** and the first region R**21**. A third region R**23** is also provided between the second regions R**22** in the transport direction D. That is, the second region R**22** is a region in which the third region R**23** is provided between the second regions R**22**.

[0119] The first region R**21** is provided over a first distance d**11** in the transport direction D. That is, the first distance d**11** is the distance of the first region R**21** in the transport direction D. The second region R**22** is provided over a second distance d**12** in the transport direction D. That is, the second distance d**12** is the distance of the second region R**22** in the transport direction D. The third region R**23** is provided over a third distance d**13** in the transport direction D. That is, the third distance d**13** is the distance of the third region R**23** in the transport direction D.

[0120] The first t distance d**11** is longer than the second distance d**12**. The ratio of the first distance d**11**, the second distance d**12**, and the third distance d**13** may be the same as the ratio of the time t**1**, the time t**2**, and the time to. For example, the ratio of the first distance d**11**, the second distance d**12**, and the third distance d**13** may be 6:1:2.

[0121] The first distance d**11** may be equal to the product of a predetermined speed at which the medium **90** is transported and the time t**1**. The second distance d**12** may be equal to the product of a predetermined speed at which the medium **90** is transported and the time t**2**. The third distance d**13** may be equal to the product of a predetermined speed at which the medium **90** is transported and the time t**3**.

[0122] The first drying section **36**A and the second drying section **36**B may be supplied with the same high-frequency voltage from the high-frequency voltage generation section **31**. The control section **35** controls the high-frequency voltage generation section **31** to generate electromagnetic waves in the first drying section **36**A and the second drying section **36**B based on the control pattern.

[0123] The control section **35** causes the drying transport section **33** to perform continuous transport for continuously transporting the medium **90**. The control section **35** controls the high-frequency voltage generation section **31** to generate electromagnetic waves in the first drying section **36**A and the second drying section **36**B based on the control pattern in a state in which the medium **90** is continuously transported at a predetermined speed. That is, the first drying section **36**A and the second drying section **36**B generate electromagnetic waves based on the control pattern in a state in which the medium **90** is continuously transported at a predetermined speed.

[0124] As shown in FIG. **9**, the control pattern is a pattern in which an electromagnetic wave is continuously generated at a predetermined intensity. The control pattern is a pattern for controlling the first drying section **36**A and the second drying section **36**B. Therefore, the control pattern is a pattern in which an electromagnetic wave of the first intensity S**1** is continuously generated from the first drying section **36**A. The control pattern is a pattern in which an electromagnetic wave of the second intensity S**2** is continuously generated from the second drying section **36**B. By this, the first drying section **36**A and the second drying section **36**B continuously generate electromagnetic waves with a predetermined intensity based on the control pattern in a state in which the medium **90** is continuously transported at a predetermined speed.

[0125] In this manner, the medium **90** is continuously transported at a predetermined speed along the transport direction D, and thus the first drying section **36**A generates an electromagnetic wave with the first intensity S**1** for the time t**1** with a region to be dried of the medium **90** arranged in the first region R**21** as a target. By this, in the first region R**21**, an electromagnetic wave from the first drying section **36**A are continuously radiated to a region to be dried of the medium **90**.

[0126] Thereafter, the medium **90** is transported so that a region to be dried of the medium **90** moves from the first region R**21** to the third region R**23**. A region to be dried of the medium **90** arranged in the third region R**23** is not irradiated with an electromagnetic wave for the time to.

[0127] Subsequently, the medium **90** is transported so that a region to be dried of the medium **90** moves from the third region R**23** to the second region R**22**. The second drying section **36**B repeats the generation of an electromagnetic wave at the second intensity S**2** for the time t**2** on a region to be dried of the medium **90** arranged in the second region R**22** for three cycles. By this, in the second region R**22**, a region to be dried of the medium **90** is irradiated with a pulsed electromagnetic wave from the second drying section **36**B.

[0128] As described above, also in the third embodiment, as in the first embodiment and second embodiment, the drying section **36**, including the first drying section **36**A and the second drying section **36**B, generates electromagnetic waves so that the irradiation intensity of the electromagnetic waves in the medium **90** becomes pulsed in time series.

Operations and Effects of Third Embodiment

[0129] Operations and effects of a third embodiment will be described.

[0130] (3-1) The first drying section **36**A is provided in the first region R**21**. The second drying section **36**B is provided in a second region R**22**. The second region R**22** is a region provided downstream of the first region R**21** in the transport direction D. The second region R**22** is a region in which the third region R**23** in which an electromagnetic wave is not generated is provided between the second region R**22** and the first region R**21** in the transport direction D. The first distance d**11** of the first region R**21** in the transport direction D is longer than the second distance d**12** of the second region R**22** in the transport direction D. The first drying section **36**A and the second drying section **36**B generate electromagnetic waves based on the control pattern in a state in which the medium **90** is continuously transported at a predetermined speed. The control pattern is a pattern for continuously generating an electromagnetic wave of a predetermined intensity. According to this configuration, it is possible to dry the medium **90** onto which pigment ink was ejected without stopping the transport of the medium **90**. By this, it is possible to increase the speed of drying the medium **90** onto which pigment ink was ejected.

[0131] In addition to this, by generating an electromagnetic wave from the first drying section **36**A, it is possible to increase the speed of raising the temperature of pigment ink ejected onto the medium **90**. In addition, it is possible to suppress an excessive increase in the temperature of pigment ink ejected onto the medium **90** due to the generation of an electromagnetic wave from the second drying section **36**B. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium **90** onto which pigment ink was ejected. Therefore, it is possible to dry the medium **90** in a short time while maintaining the quality of the medium **90**.

[0132] By providing the first drying section **36**A in the first region R**21** and the second drying section **36**B in the second region R**22**, the control load for controlling the first drying section **36**A and the second drying section **36**B can be reduced.

Modifications

[0133] The present embodiment can be implemented with the following modifications. The present embodiment and the following modifications can be implemented in combination with each other within a technically compatible range.

[0134] In the second embodiment, one or more first drying sections **36**A may be arranged in the depth direction Y in the upstream region R**11**. In the upstream region R**11**, one or more first drying sections **36**A may be arranged in the width direction X. In each downstream region R**12**, one or more second drying sections **36**B may be arranged in the depth direction Y. In each downstream region R**12**, one or more second drying sections **36**B may be arranged in the width direction X.

[0135] In the second embodiment, the number of first drying sections **36**A arranged in the depth direction Y in the upstream region R**11** may be different from the number of second drying sections **36**B arranged in the depth direction Y in each of the downstream regions R**12**. The number of first drying sections **36**A arranged in the depth direction Y in the upstream region R**11** may be greater than or less than the number of second drying sections **36**B arranged in the depth direction Y in each of the downstream regions R**12**. The number of second drying sections **36**B arranged in the depth direction Y in each of the downstream regions R**12** may be different.

[0136] In the third embodiment, one or more first drying sections **36**A may be arranged in the depth direction Y in the first region R**21**. In the first region R**21**, one or more first drying sections **36**A may be arranged in the width direction X. In each second region R**22**, one or more second drying sections **36**B may be arranged in the depth direction Y. In each second region R**22**, one or more second drying sections **36**B may be arranged in the width direction X.

[0137] In the third embodiment, the number of first drying sections **36**A arranged in the depth direction Y in the first region R**21** may be different from the number of second drying sections **36**B arranged in the depth direction Y in each of the second regions R**22**. The number of first drying sections **36**A arranged in the depth direction Y in the first region R**21** may be greater than or less than the number of second drying sections **36**B arranged in the depth direction Y in each of the second regions R**22**. The number of second drying sections **36**B arranged in the depth direction Y may be different in each of the second regions R**22**.

[0138] In the first embodiment, the control section **35** may continuously transport the medium **90**. In the second embodiment and the third embodiment, the control section **35** may intermittently transport the medium **90**.

[0139] In the first embodiment, the drying section **36** may generate an electromagnetic wave such that the intensity of an electromagnetic wave in provisional drying is higher than the intensity of an electromagnetic wave in main drying. The drying section **36** may generate an electromagnetic wave such that the intensity of an electromagnetic wave in provisional drying is lower than the intensity of an electromagnetic wave in main drying.

[0140] In the second embodiment and the third embodiment, the drying section **36** may generate an electromagnetic wave such that the intensity of an electromagnetic wave in provisional drying is the same as the intensity of an electromagnetic wave in main drying. In the second embodiment and the third embodiment, the drying section **36** may generate an electromagnetic wave such that the intensity of an electromagnetic wave in provisional drying is lower than the intensity of an electromagnetic wave in main drying. In these cases, the drying section **36** may dry the medium **90** onto which pigment ink was ejected by increasing the time for which an electromagnetic wave is generated as provisional drying.

[0141] The drying device **12** may perform main drying without performing provisional drying. In particular, in the first embodiment, the control pattern may be a pattern in which an electromagnetic wave is generated in a pulsed manner a plurality of times over a predetermined pulse width. In the second embodiment and the third embodiment, the drying device **12** may not include the first drying section **36**A as long as the irradiation intensity of electromagnetic waves in the medium **90** onto which pigment ink was ejected is pulsed in time series. That is, the drying device **12** may include at least the second drying section **36**B in a plurality of rows in the transport direction D as long as the irradiation intensity of electromagnetic waves in the medium **90** onto which pigment ink was ejected is pulsed in time series.

[0142] In the third embodiment, the third region R**23** is a region where the drying section **36** is not arranged, but it may also be a region where the drying section **36** is arranged but where an electromagnetic wave is not generated from the drying section **36**.

[0143] In main drying, an electromagnetic wave may be generated such that the irradiation intensity of the electromagnetic wave in the medium **90** is pulsed two times or four times or more in time series. That is, in main drying, two or four or more cycles may be repeatedly performed. It is sufficient that an electromagnetic wave is generated so that the irradiation intensity of the electromagnetic wave in the medium **90** becomes pulsed in time series at least in provisional drying and main drying. In this case, an electromagnetic wave may be generated in such a manner that the irradiation intensity of the electromagnetic wave in the medium **90** is pulsed only once in time series in main drying.

[0144] The control section **35** may control a high-frequency voltage supplied from the high-frequency voltage generation section **31** to the drying section **36** not by the high-frequency voltage generation section **31** but by the drying section **36** itself. Specifically, the drying section **36** may receive a high-frequency voltage based on the control pattern from the high-frequency voltage generation section **31** as long as an electromagnetic wave can be generated based on the control pattern. As long as the drying section **36** can generate an electromagnetic wave based on the control pattern, the drying section **36** may receive a high-frequency voltage from the high-frequency voltage generation section **31** and generate an electromagnetic wave as an envelope based on the control pattern.

[0145] The relationship between the high-frequency voltage generation section **31** and the drying section **36** may be one-to-many or one-to-one. In particular, in the second embodiment, the relationship between the first high-frequency voltage generation section **31**A and the first drying section **36**A may be one-to-many or one-to-one. In the second embodiment, the relationship between the second high-frequency voltage generation section **31**B and the second drying section **36**B may be one-to-many or one-to-one.

[0146] The drying section **36** may be arranged so that the depth direction Y is a longitudinal direction. The drying section **36** may be arranged so as to be inclined with respect to the width direction X and the depth direction Y.

[0147] In a case where the drying unit **30** includes a plurality of drying sections **36**, the plurality of drying sections **36** may be arranged in a plurality of rows in the width direction X. In a case where the drying unit **30** includes a plurality of drying sections **36**, the plurality of drying sections **36** may be arranged in a plurality of rows in the depth direction Y.

[0148] The drying section **36** may be provided on a back surface **90**B side of the medium **90**. The drying section **36** may be provided on both a front surface **90**A side of the medium **90** and a back surface **90**B side of the medium **90**. The drying section **36** may be capable of scanning in the width direction X.

[0149] The drying section **36** may be provided separately from the facing section **45**. That is, the drying section **36** may not include the facing section **45**. In this case, it is desirable for the facing section **45** to be provided between the first electrode **41** and the second electrode **42**, and the medium **90**.

[0150] The first electrode **41** is not limited to a flat plate shape and may, for example, have a substantially flat plate shape. The substantially flat shape may include, for example, a shape curved in the thickness direction, which is a direction along the vertical direction Z, or a linear shape with an extremely large aspect ratio of a rectangular shape. The first electrode **41** may have a shape with a thickness in the vertical direction Z, and a plurality of electrode members may be connected in the vertical direction Z.

[0151] The second electrode **42** is not limited to a flat plate shape and may, for example, have a substantially flat plate shape. The substantially flat shape may include, for example, a shape curved in the thickness direction, which is a direction along the vertical direction Z, or a linear shape with an extremely large aspect ratio of a rectangular shape.

[0152] At least one of the first electrode surface **41**A and the second electrode surface **42**A is not limited to a planar shape, and may be a substantially planar shape. The substantially planar shape may include, for example, a shape curved in the thickness direction, which is a direction along the vertical direction Z, or a linear shape with an extremely large aspect ratio of a rectangular shape.

[0153] The drying section **36** may not be provided in the drying device **12** and may be provided in the recording device **11**. That is, the recording device **11** may include the drying section **36**. In this case, it is sufficient that the drying section **36** is provided on a downstream side of the recording section **20** in the transport direction D. In this manner, the drying section **36** may be applied to the recording device **11** instead of the drying device **12**.

[0154] A lateral type printer may be adopted as the recording device **11**. The lateral type printer is a printer in which carriage **25** can move in two directions, a main scanning direction and a sub-scanning direction.

[0155] The medium **90** is not limited to a roll body. The medium **90** may be a paper sheet, a resin film or sheet, a resin-metal composite film, a laminate film, a textile, a nonwoven fabric, a metal foil, a metal film, a ceramic sheet, a garment, or the like.

[0156] Liquid can be arbitrarily selected as long as it is pigment ink for recording on the medium **90** by depositing to medium **90**. Pigment ink may contain a solvent other than glycerin. In such a case, the irradiation intensity of an electromagnetic wave in a medium may be varied depending on the boiling point of a solvent contained in pigment ink and the ratio of the solvent. Specifically, the irradiation intensity of electromagnetic waves in a medium can be adjusted by adjusting at least one of a first pulse width, a second pulse width, the number of times electromagnetic waves are generated with a second pulse width, the intensity with which electromagnetic waves are generated, and the number and arrangement of the drying section **36**.

[0157] As used herein, the phrase "at least any" means one or more of the desired options. As an example, the phrase "at least any" as used herein means only one option if the number of options is two, or both of the two options. As another example, the phrase "at least any" as used herein means only one option or a combination of any two or more options when the number of options is three or more.

Notes

[0158] Hereinafter, technical ideas grasped from the above-described embodiments and modifications, and operations and effects thereof will be described. The present technical ideas and the operations and effects thereof can be combined with each other within a technically consistent range.

[0159] (A) A drying device includes a drying section that dries a medium onto which pigment ink containing a pigment, water, and a solvent was ejected by generating an electromagnetic wave in response to application of a high-frequency voltage, wherein the drying section includes a first electrode, a second electrode arranged so as to surround the first electrode in plan view from a first direction toward a medium, a first conductor that includes a coil and that electrically connects a transmission line, which is configured to transmit a high-frequency voltage, and the first electrode, and a second conductor that electrically connects the transmission line and the second electrode and the drying section generates electromagnetic waves so that an irradiation intensity of the electromagnetic wave on a medium onto which pigment ink was ejected becomes pulsed in time series.

[0160] According to this configuration, a medium can be dried in a short time by generating an electromagnetic wave in response to application of a high-frequency voltage. In addition, even if the intensity of an electromagnetic wave is high, the irradiation intensity of the electromagnetic wave in the medium can be pulsed in time series. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium onto which pigment ink was ejected. Therefore, it is possible to dry a medium in a short time while maintaining the quality of the medium.

[0161] (B) The above-described drying device may be configured such that the drying section generates an electromagnetic wave based on a control pattern and the control pattern is a pulsed pattern that generates an electromagnetic wave from a first start timing over a first pulse width, and generates an electromagnetic wave from a second start timing that is after the first start timing over a second pulse width that is shorter than the first pulse width.

[0162] According to this configuration, the generation timing of an electromagnetic wave can be controlled based on the control pattern. Therefore, the control accuracy of the temperature of pigment ink can be improved.

[0163] In particular, by generating an electromagnetic wave over the first pulse width from the first start timing, it is possible to increase the speed of raising the temperature of pigment ink ejected onto a medium. By generating an electromagnetic wave over the second pulse width that is shorter than the first pulse width from the second start timing after the first start timing, it is possible to suppress an excessive rise in the temperature of pigment ink ejected onto the medium. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium onto which pigment ink was ejected. Therefore, it is possible to dry a medium in a short time while maintaining the quality of the medium.

[0164] (C) The above-described drying device may be configured such that the drying device further includes a drying transport section that transports a medium along a transport direction, wherein the drying transport section intermittently transports the medium along the transport direction and the drying section generates an electromagnetic wave based on the control pattern in a state in which a transport of the medium by the drying transport section is stopped.

[0165] According to this configuration, an electromagnetic wave can be generated based on the control pattern in a state in which a transport of the medium is stopped. Therefore, the control accuracy of the temperature of pigment ink can be improved. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium onto which pigment ink was ejected. Therefore, it is possible to dry a medium in a short time while maintaining the quality of the medium.

[0166] (D) The above-described drying device may be configured such that the drying device further includes a drying transport section that transports a medium along a transport direction, wherein the drying section includes a first drying section and a second drying section provided downstream of the first drying section in the transport direction, the first drying section generates an electromagnetic wave based on a first control pattern in a state where the medium is continuously transported at a predetermined speed by the drying transport section, the second drying section generates an electromagnetic wave based on a second control pattern in a state where the medium is continuously transported at a predetermined speed by the drying transport section, the first control pattern is a pattern for continuously generating an electromagnetic wave of a predetermined intensity, and the second control pattern is a pulsed pattern that generates an electromagnetic wave over a predetermined pulse width.

[0167] According to this configuration, it is possible to dry a medium onto which pigment ink was ejected without stopping the transport of a medium. By this, it is possible to increase the speed of drying the medium onto which pigment ink was ejected.

[0168] In addition to this, it is possible to increase the speed of raising the temperature of pigment ink ejected onto the medium due to the generation of an electromagnetic wave from the first drying section. It is possible to suppress an excessive rise in the temperature of pigment ink ejected onto the medium due to the generation of an electromagnetic wave from the second drying section provided downstream of the first drying section in the transport direction. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium onto which pigment ink was ejected. Therefore, it is possible to dry a medium in a short time while maintaining the quality of the medium.

[0169] (E) The above-described drying device may be configured such that the drying device further includes a drying transport section that transports a medium along a transport direction, wherein the drying section includes a first drying section and a second drying section provided downstream of the first drying section in the transport direction, the first drying section is provided in a first region, the second drying section is provided in a second region, the second region is a region provided downstream of the first region in the transport direction, and is a region in which a third region in which an electromagnetic wave is not generated is provided between the second region and the first region in the transport direction, a first distance of the first region in the transport direction is longer than a second distance of the second region in the transport direction, the first drying section and the second drying section generate electromagnetic waves based on a control pattern in a state where the medium is continuously transported at a predetermined speed by the drying transport section, and the control pattern is a pattern for continuously generating an electromagnetic wave of a predetermined intensity.

[0170] According to this configuration, it is possible to dry a medium onto which pigment ink was ejected without stopping the transport of a medium. By this, it is possible to increase the speed of drying the medium onto which pigment ink was ejected.

[0171] In addition to this, it is possible to increase the speed of raising the temperature of pigment ink ejected onto the medium due to the generation of an electromagnetic wave from the first drying section. It is possible to suppress an excessive rise in the temperature of pigment ink ejected onto the medium due to the generation of an electromagnetic wave from the second drying section provided downstream of the first drying section in the transport direction. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium onto which pigment ink was ejected. Therefore, it is possible to dry a medium in a short time while maintaining the quality of the medium. Since the first drying section is provided in the first region and the second drying section is provided in the second region, it is possible to reduce the control load for controlling the first drying section and the second drying section.

[0172] (F) The above-described drying device may be configured such that a resonance frequency of the first drying section is different from a resonance frequency of the second drying section and the first drying section generates an electromagnetic wave having a higher intensity than the second drying section.

[0173] According to this configuration, by making the resonance frequency of the first drying section different from the resonance frequency of the second drying section, the first drying section can generate an electromagnetic wave with a higher intensity than that of the second drying section. For this reason, it is possible to further increase the speed at which the temperature of pigment ink ejected onto a medium is increased by the generation of an electromagnetic wave from the first drying section. In addition, it is possible to further suppress an excessive rise in the temperature of pigment ink ejected onto the medium due to the generation of an electromagnetic wave from the second drying section. By this, it is possible to suppress the occurrence of thermal denaturation with respect to the medium onto which pigment ink was ejected. Therefore, it is possible to dry a medium in a short time while maintaining the quality of the medium. It is possible to reduce the control load for controlling the intensity of an electromagnetic wave generated by the first drying section and the intensity of an electromagnetic wave generated by the second drying section.

[0174] (G) A recording device includes a recording section that performs recording by ejecting pigment ink containing a pigment, water, and a solvent onto a medium and a drying section that dries a medium onto which pigment ink was ejected by the recording section by generating an electromagnetic wave in response to application of a high-frequency voltage, wherein the drying section includes a first electrode, a second electrode arranged so as to surround the first electrode in plan view from a first direction toward a medium, a first conductor that includes a coil and that electrically connects a transmission line, which is configured to transmit a high-frequency voltage, and the first electrode, and a second conductor that electrically connects the transmission line and the second electrode and the drying section generates electromagnetic waves so that an irradiation intensity of the electromagnetic wave on a medium onto which pigment ink was ejected becomes pulsed in time series.

[0175] According to this configuration, the same effect as in (A) is obtained.

What is claimed is:

1. A drying device comprising:

a drying section that dries a medium onto which pigment ink containing a pigment, water, and a solvent was ejected by generating an electromagnetic wave in response to application of a high-frequency voltage, wherein

the drying section includes

a first electrode,

a second electrode arranged so as to surround the first electrode in plan view from a first direction toward a medium, a first conductor that includes a coil and that electrically connects a transmission line, which is configured to transmit a high-frequency voltage, and the first electrode, and

a second conductor that electrically connects the transmission line and the second electrode and

the drying section generates electromagnetic waves so that an irradiation intensity of the electromagnetic wave on a medium onto which pigment ink was ejected becomes pulsed in time series.

2. The drying device according to claim **1**, wherein

the drying section generates an electromagnetic wave based on a control pattern and

the control pattern is a pulsed pattern that generates an electromagnetic wave from a first start timing over a first pulse width, and generates an electromagnetic wave from a second start timing that is after the first start timing over a second pulse width that is shorter than the first pulse width.

3. The drying device according to claim **2**, further comprising:

a drying transport section that transports a medium along a transport direction, wherein

the drying transport section intermittently transports the medium along the transport direction and

the drying section generates an electromagnetic wave based on the control pattern in a state in which a transport of the medium by the drying transport section is stopped.

4. The drying device according to claim **1**, further comprising:

a drying transport section that transports a medium along a transport direction, wherein

the drying section includes a first drying section and a second drying section provided downstream of the first drying section in the transport direction,

the first drying section generates an electromagnetic wave based on a first control pattern in a state where the medium is continuously transported at a predetermined speed by the drying transport section,

the second drying section generates an electromagnetic wave based on a second control pattern in a state where the medium is continuously transported at a predetermined speed by the drying transport section,

the first control pattern is a pattern for continuously generating an electromagnetic wave of a predetermined intensity, and

the second control pattern is a pulsed pattern that generates an electromagnetic wave over a predetermined pulse width.

5. The drying device according to claim **1**, further comprising:

a drying transport section that transports a medium along a transport direction, wherein

the drying section includes a first drying section and a second drying section provided downstream of the first drying section in the transport direction,

the first drying section is provided in a first region,

the second drying section is provided in a second region, the second region is a region provided downstream of the first region in the transport direction, and is a region in which a third region in which an electromagnetic wave is not generated is provided between the second region and the first region in the transport direction,

a first distance of the first region in the transport direction is longer than a second distance of the second region in the transport direction,

the first drying section and the second drying section generate electromagnetic waves based on a control pattern in a state where the medium is continuously transported at a predetermined speed by the drying transport section, and

the control pattern is a pattern for continuously generating an electromagnetic wave of a predetermined intensity.

6. The drying device according to claim **4**, wherein

a resonance frequency of the first drying section is different from a resonance frequency of the second drying section and

the first drying section generates an electromagnetic wave having a higher intensity than the second drying section.

7. A recording device comprising:

a recording section that performs recording by ejecting pigment ink containing a pigment, water, and a solvent onto a medium and

a drying section that dries a medium onto which pigment ink was ejected by the recording section by generating an electromagnetic wave in response to application of a high-frequency voltage, wherein

the drying section includes

a first electrode,

a second electrode arranged so as to surround the first electrode in plan view from a first direction toward a medium,

a first conductor that includes a coil and that electrically connects a transmission line, which is configured to transmit a high-frequency voltage, and the first electrode, and

a second conductor that electrically connects the transmission line and the second electrode and

the drying section generates electromagnetic waves so that an irradiation intensity of the electromagnetic wave on a medium onto which pigment ink was ejected becomes pulsed in time series.

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