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(54) **DRYING APPARATUS AND DRYING METHOD USING THE DRYING APPARATUS**

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(57) **ABSTRACT**

A drying apparatus includes a heating mechanism configured to heat an inside of a drying oven in which paint applied to a workpiece is dried. The inside of the drying oven is partitioned into an upper region and a lower region by a partition plate. The drying oven has an air passage that enables air to flow between the upper region and the lower region. A metal member to which paint is applied is conveyed into the upper region, and a resin member to which paint is applied is conveyed into the lower region.

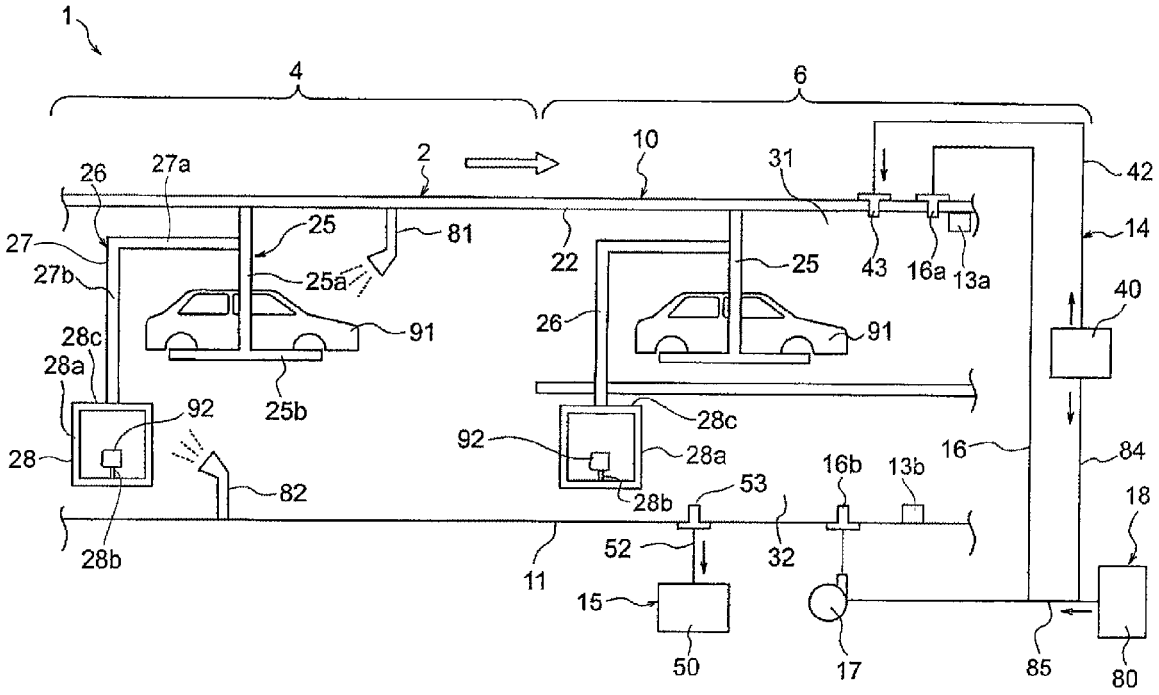
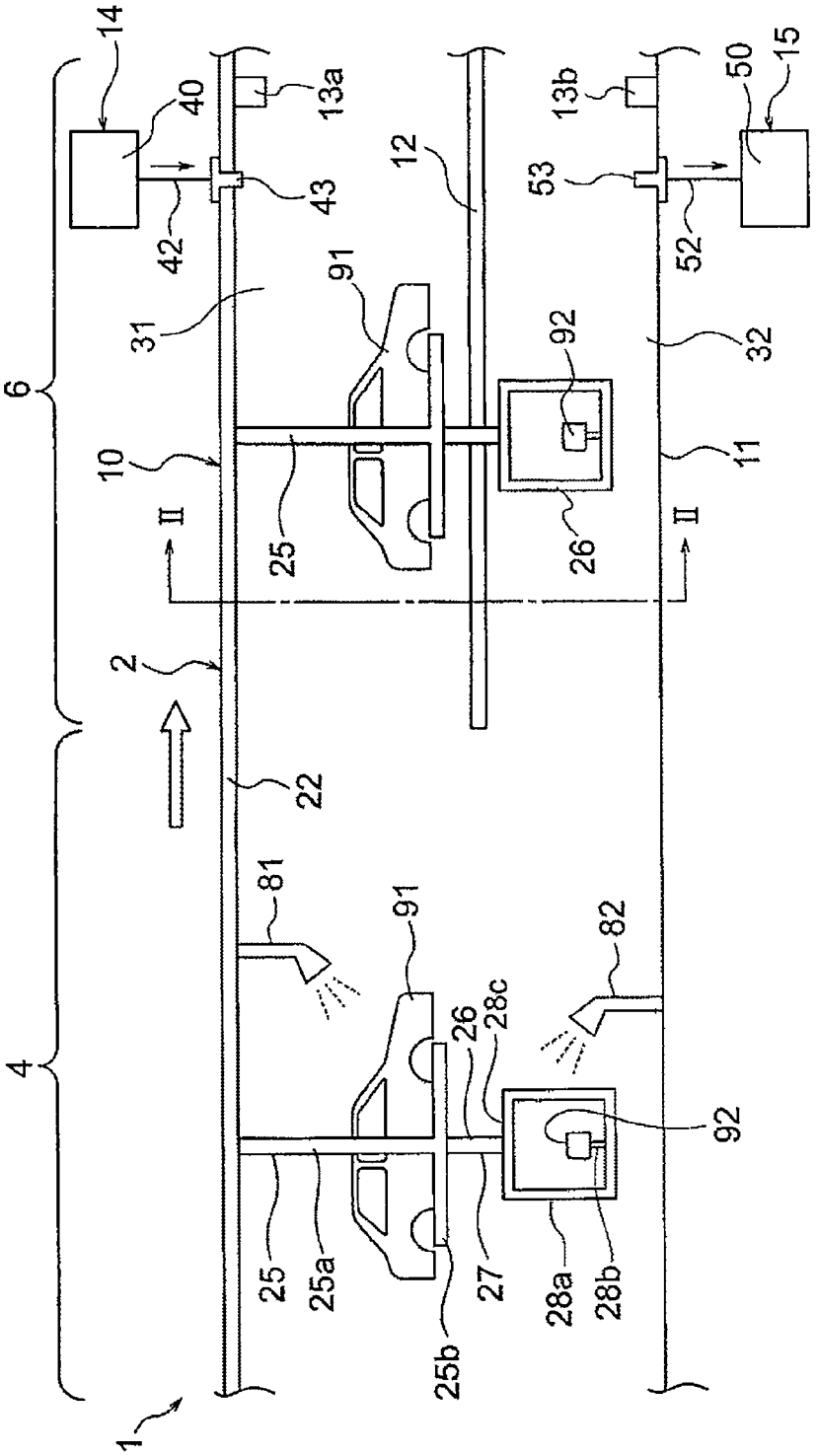


FIG. 1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92
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11
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II
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81
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28c
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25a
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28a
28b
25b
1

FIG. 2

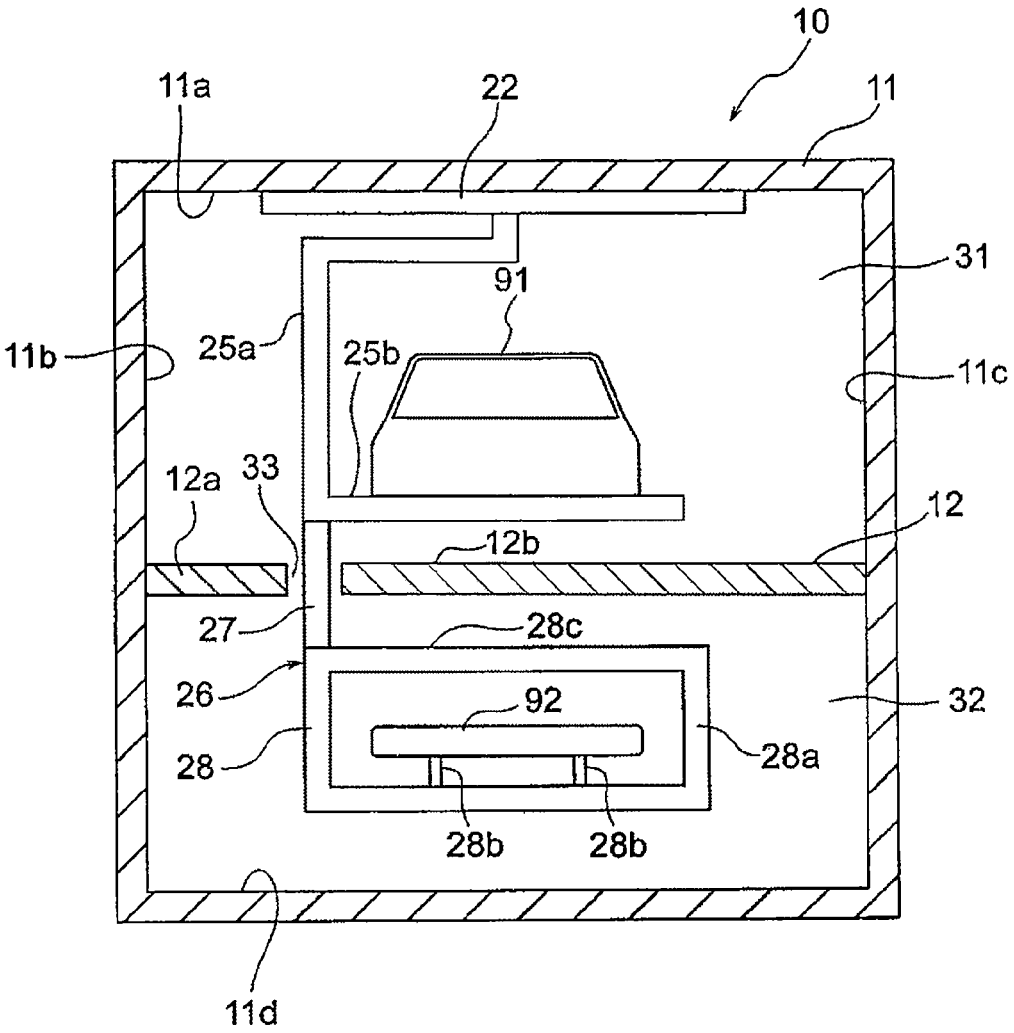
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FIG. 3

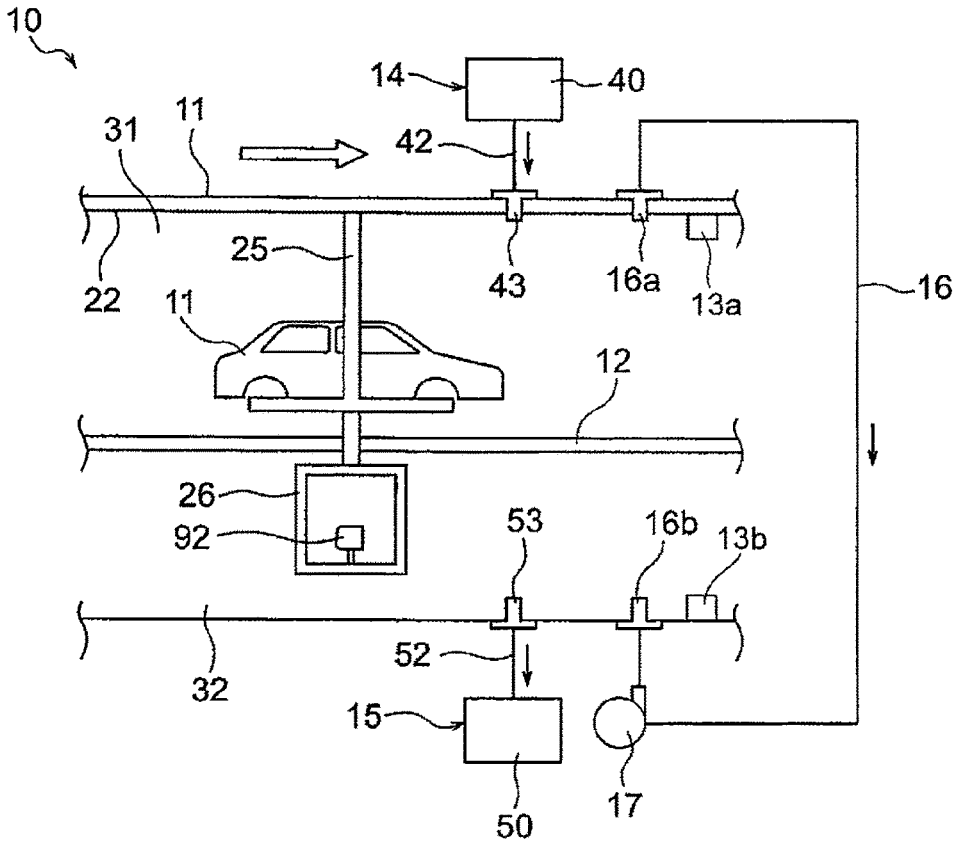
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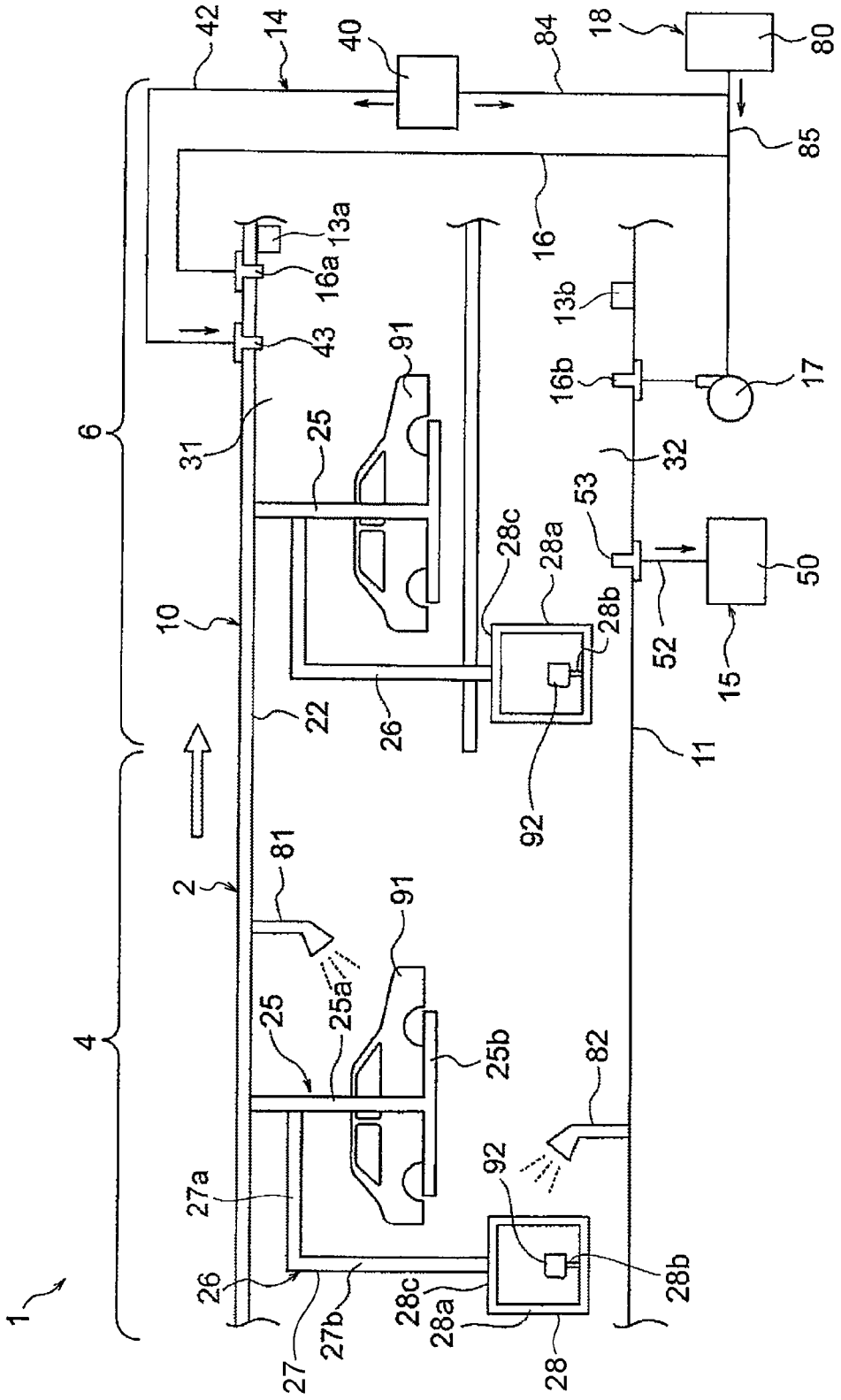
FIG. 4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28c
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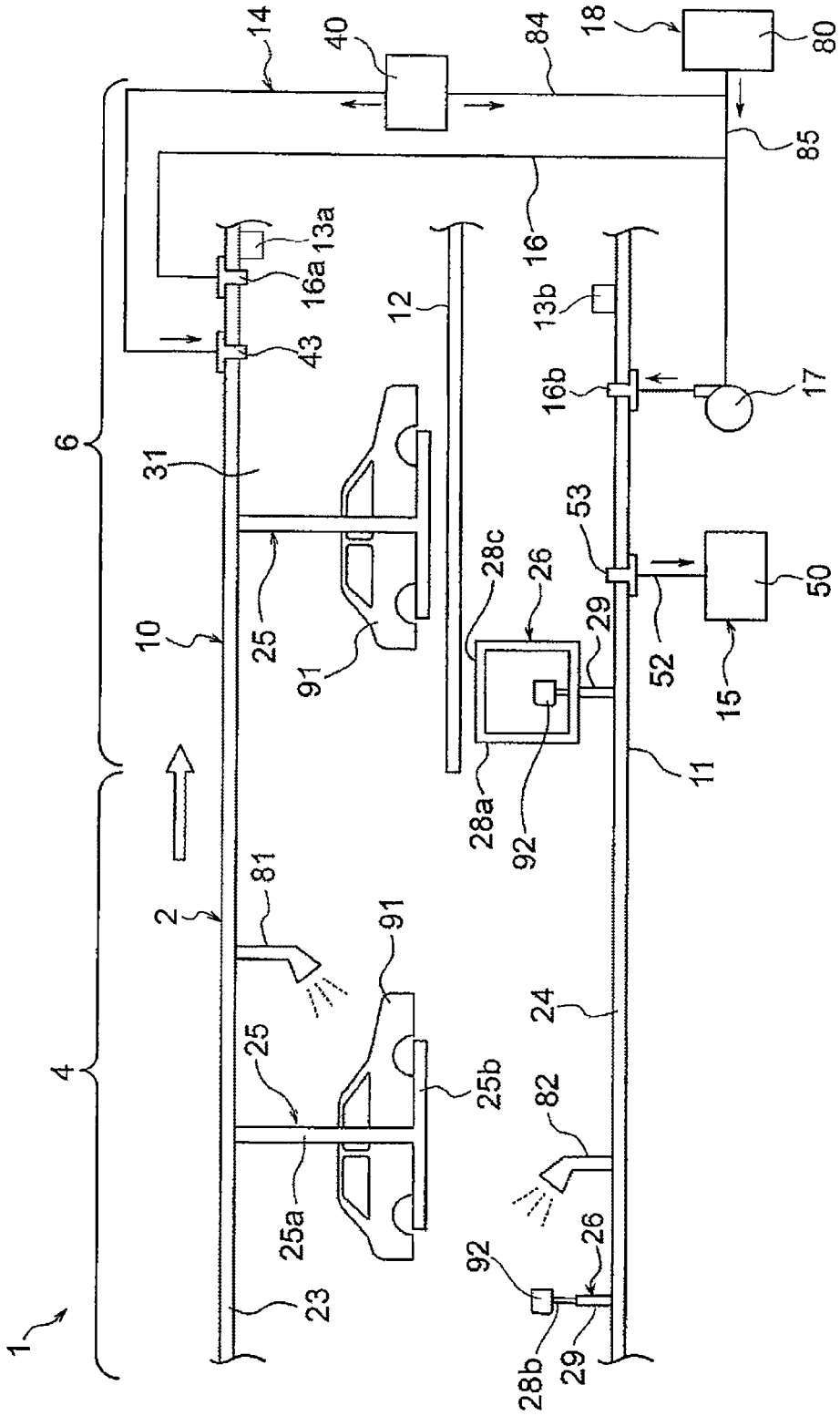
FIG. 5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DRYING APPARATUS AND DRYING METHOD USING THE DRYING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority from Japanese Patent Application No. 2017-096157 filed on May 15, 2017, the entire contents of which are hereby incorporated by reference.

BACKGROUND

1. Technical Field

[0002] The present invention relates to a drying apparatus that dries a workpiece to which paint is applied and a drying method using the drying apparatus.

2. Related Art

[0003] Vehicles, such as automobiles, are generally formed by assembling metal members that constitute, for example, a vehicle body and resin members that constitute, for example, bumpers. In recent years, more and more resin members have been used to reduce vehicle weight.

[0004] Metal members and resin members are normally painted in different steps because they have different heat resistances. More specifically, the metal and resin members, which are workpieces to be painted, are separately subjected to cleaning, paint application, and paint drying processes, and then the painted metal and resin members are assembled in a trim assembly step.

[0005] Japanese Unexamined Patent Application Publication (JP-A) No. 2011-25153, for example, describes a painting method for a vehicle including a metal steel plate and a resin member. In this painting method, the metal steel plate is heated and dried (baked) by a first drying apparatus after paint is applied thereto. The resin member is heated and dried (baked) by a second drying apparatus, which is different from the first drying apparatus, after the same paint as the paint applied to the metal steel plate is applied thereto. The first and second drying apparatuses each have an individual heating device. The second drying apparatus dries the resin member at a heating temperature lower than that of the first drying apparatus.

[0006] According to the painting method described in JP-A No. 2011-25153, the same paint is applied to the metal steel plate and the resin member, so that the paint can be applied to different members in the same step. Thus, the painting step can be improved.

SUMMARY OF THE INVENTION

[0007] An aspect of the present invention provides a drying apparatus including a heating mechanism configured to heat an inside of a drying oven in which paint applied to a workpiece is dried. The inside of the drying oven is partitioned into an upper region and a lower region by a partition plate. The drying oven has an air passage that enables air to flow between the upper region and the lower region. A metal member to which paint is applied is conveyed into the upper region, and a resin member to which paint is applied is conveyed into the lower region.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** illustrates the structure of a painting system including a drying apparatus according to a first example of the present invention;

[0009] FIG. **2** is a sectional view of FIG. **1** taken along line II-II;

[0010] FIG. **3** illustrates the structure of a drying apparatus according to a modification;

[0011] FIG. **4** illustrates the structure of a painting system including a drying apparatus according to a second example; and

[0012] FIG. **5** illustrates the structure of a painting system including a drying apparatus according to a third example.

DETAILED DESCRIPTION

[0013] In the following, a description is given of some examples of the technology with reference to the accompanying drawings. Note that the following description is directed to illustrative examples of the technology and not to be construed as limiting to the technology. Factors including, without limitation, numerical values, shapes, materials, components, positions of the components, and how the components are coupled to each other are illustrative only and not to be construed as limiting to the technology. Further, elements in the following examples which are not recited in a most-generic independent claim of the disclosure are optional and may be provided on an as-needed basis. The drawings are schematic and are not intended to be drawn to scale.

[0014] According to the painting method described in JP-A No. 2011-25153, the paint that can be used is limited because the paint needs to be applicable to both the metal steel plate and the resin member. Therefore, the paint for the metal steel plate and the resin member cannot be selected from many types of paint depending on the required finishing.

[0015] In the painting method according to the related art, the metal steel plate and the resin member need to be dried at different heating temperatures. Therefore, the metal steel plate and the resin member have their respective drying apparatuses, which each have an individual heating device. In other words, the metal steel plate and the resin member are conveyed to their respective drying apparatuses in different steps after the paint is applied thereto, and the temperatures of the metal steel plate and the resin member are managed by drying the paint in different steps. Accordingly, the painting cost is high and it is difficult to increase the manufacturing efficiency.

[0016] It is desirable to provide a drying apparatus capable of reducing the cost of painting a metal member and a resin member and facilitating the manufacturing steps, and a painting method using the drying apparatus.

First Example

[0017] A painting system **1** including a drying apparatus **10** according to a first example of the present invention will now be described in detail. FIG. **1** illustrates the structure of the painting system **1** including the drying apparatus **10** according to the first example of the present invention. FIG. **2** is a sectional view of FIG. **1** taken along line II-II.

[0018] The painting system **1** applies paint to a surface of each of a metal member **91** and a resin member **92**, which constitute a vehicle, such as an automobile, and then dries

the paint by heating the paint. In this example, the metal member **91** is a body of an automobile, and the resin member **92** is a bumper of the automobile. The painting system **1** includes a conveyor line **2** that extends in a direction indicated by the white hollow arrow in FIG. **1**. A painting zone **4**, in which the paint is applied to the members, and a drying zone **6**, in which the paint is dried, are provided along the conveyor line **2**.

[0019] The metal member **91** and the resin member **92** are conveyed through each of the zones **4** and **6** by a conveying mechanism. The conveying mechanism includes a first conveying jig **25** that supports the metal member **91** in a suspended state, a second conveying jig **26** that supports the resin member **92** in a suspended state, and a conveyor **22** that moves the first conveying jig **25** and the second conveying jig **26** along the conveyor line **2**. The conveyor **22** continuously or discontinuously extends along the conveyor line **2**. In this example, the conveyor **22** continuously extends through upper parts of the painting zone **4** and the drying zone **6** so as to couple these zones **4** and **6**.

[0020] The first conveying jig **25** includes a first support **25***a* and a first holder **25***b*. The first support **25***a* is rod-shaped and coupled to the conveyor **22** at the top end thereof. The first holder **25***b* is coupled to the bottom end of the first support **25***a*, and holds the automobile body, that is, the metal member **91**. The first conveying jig **25** may instead hold the automobile body at both sides thereof in the width direction.

[0021] The second conveying jig **26** includes a second support **27** and a second holder **28**. The second support **27** is rod-shaped and coupled to the first conveying jig **25** at the top end thereof. The second holder **28** is coupled to the bottom end of the second support **27** and holds the resin member **92**. Referring to the side view of FIG. **1**, in this example, the top end of the second support **27** is coupled to the bottom end of the first support **25***a* so that the first support **25***a* and the second support **27** extend along a straight line. When the metal member **91** and the resin member **92** are conveyed, the resin member **92** is directly below the metal member **91**.

[0022] The second holder **28** includes a rectangular-parallelepiped-shaped frame **28***a*, a bottom plate that defines the bottom of the frame **28***a*, mounts **28***b* that project from the bottom plate, and a top plate **28***c* that covers the upper surface of the frame **28***a*. The resin member **92** is conveyed in the frame **28***a*, and the top plate **28***c* covers the entire upper surface of the resin member **92** when the resin member **92** is conveyed. Four peripheral sides of the frame **28***a* are open. The top plate **28***c* may constantly cover the upper surface of the frame **28***a*, or be capable of opening and exposing the upper surface of the frame **28***a*.

[0023] Referring to FIG. **1**, painting devices **81** and **82** are disposed in a painting chamber that defines the painting zone **4**. The painting devices **81** and **82** spray paint toward the metal member **91** and the resin member **92**, respectively. The painting device **81** for metal and the painting device **82** for resin may discharge the same paint or different paints. In this example, different paints are used.

[0024] The drying apparatus **10** is installed in the drying zone **6**. The drying apparatus **10** includes a drying oven **11**, a partition plate **12**, temperature sensors **13***a* and **13***b*, a drying mechanism **14**, and an odor treatment mechanism **15**.

[0025] As illustrated in FIG. **2**, the drying oven **11** has a rectangular shape and includes a ceiling surface **11***a*, left and right side surfaces **11***b* and **11***c*, and a floor surface **11***d*. The conveyor **22**, which extends from the painting zone **4**, is disposed on the ceiling surface **11***a* of the drying oven **11**. The inside of the drying oven **11** is vertically partitioned into an upper region **31** and a lower region **32** by the partition plate **12**, which is flat plate-shaped. The upper region **31** and the lower region **32** respectively accommodate the temperature sensors **13***a* and **13***b*, which are capable of detecting the temperatures in the upper region **31** and the lower region **32**, respectively.

[0026] The partition plate **12** may be any plate as long as the inside of the drying oven **11** can be vertically partitioned, and it is not necessary that the upper region **31** and the lower region **32** be separated from each other in a sealed state. The partition plate **12** may have a slit, a through hole, or the like that enables air to flow between the upper region **31** and the lower region **32**. In this example, as illustrated in FIG. **2**, the partition plate **12** includes plate members **12***a* and **12***b* arranged in a width direction (direction perpendicular to the vertical direction and the conveying direction) so as to be parallel to the floor surface **11***d*. Each of the plate members **12***a* and **12***b* extends in the conveying direction of the conveyor line **2**, and a gap **33** is provided between the plate members **12***a* and **12***b*, which are adjacent to each other.

[0027] The gap **33** serves as an air passage that enables air to flow between the upper region **31** and the lower region **32**. In the drying oven **11**, the second support **27** of the second conveying jig **26** conveys the resin member **92** along the conveyor line **2** in such a manner that the second support **27** extends from the upper region **31** to the lower region **32** through the gap **33** in the partition plate **12**.

[0028] The drying mechanism **14** heats the inside of the drying oven **11** to dry the paints. In this example, the drying mechanism **14** includes a heating device **40** and a duct **42** through which the heating device **40** and the drying oven **11** communicate. The duct **42** has an air outlet **43** in the upper region **31** of the drying oven **11**. The drying mechanism **14** blows hot air heated by the heating device **40** into the upper region **31** of the drying oven **11** through the duct **42**, thereby directly heating the upper region **31**. The heating device **40** and the temperature sensors **13***a* and **13***b* are coupled to a controller (not illustrated), so that the operation of the heating device **40** can be controlled based on the temperatures detected by the temperature sensors **13***a* and **13***b*.

[0029] The odor treatment mechanism **15** performs odor treatment for removing odor from air discharged from the lower region **32**, and discharges the treated air out of the drying oven **11**. The odor treatment mechanism **15** includes a duct **52** and an odor treatment device **50**. The duct **52** has an air inlet **53** in a wall surface of the lower region **32** of the drying oven **11**, and serves as an air channel for the air discharged from the lower region **32**. The odor treatment device **50** is coupled to the downstream end of the duct **52**.

[0030] A painting method for painting the metal member **91** and the resin member **92** by using the above-described painting system **1** will now be described.

[0031] As illustrated in FIG. **1**, the metal member **91** and the resin member **92**, which are respectively suspended by the first conveying jig **25** and the second conveying jig **26**, are conveyed together to the painting zone **4** by the conveyor **22**. In the painting zone **4**, the paints are applied to the surfaces of the metal member **91** and the resin member **92** by the painting devices **81** and **82**, respectively (paint applying step).

[0032] The metal member **91** and the resin member **92** to which the paints have been applied are respectively conveyed to the upper region **31** and the lower region **32** of the drying oven **11**, which defines the drying zone **6**, by the conveyor **22**.

[0033] In the drying oven **11**, the upper region **31** is directly heated by the hot air blown out of the drying mechanism **14**. The lower region **32** is indirectly heated by hot air blown thereinto through the gap **33** in the partition plate **12**. At this time, high-temperature air flows into the upper region **31** of the drying oven **11** and low-temperature air flows into the lower region **32** of the drying oven **11** because of the difference in specific gravity of the air due to the temperature difference. Accordingly, the temperature in the upper region **31** is maintained higher than that in the lower region **32**. As a result, the metal member **91** is heated and dried at a high temperature, and the resin member **92** is heated and dried at a temperature lower than the temperature at which the metal member **91** is heated and dried (drying step). In particular, since the drying mechanism **14** directly heats the upper region **31** and the lower region **32** is indirectly heated by the hot air blown thereinto from the upper region **31**, the temperature in the upper region **31** can be reliably maintained higher than that in the lower region **32**.

[0034] In general, the curing temperature of the paint applied to the resin member **92** is set lower than that of the paint applied to the metal member **91** to prevent deformation and quality degradation. In the drying apparatus **10** of this example, the metal member **91** and the resin member **92** can be dried at different heating temperatures by using a simple structure in which the inside of the drying oven **11** is vertically partitioned by the partition plate **12**. Therefore, the painting cost is significantly lower than that in the case where the metal member **91** and the resin member **92** are separately painted as in the related art. In addition, the metal member **91** and the resin member **92** can be simultaneously subjected not only to the paint applying process but also to the drying process by using the same conveying mechanism. Accordingly, the manufacturing steps can be facilitated and the manufacturing efficiency can be increased.

[0035] In this example, the metal member **91** and the resin member **92** are conveyed along the same conveyor line **2** in both the paint applying step and the drying step. However, the metal member **91** and the resin member **92** may instead be conveyed along different conveyor lines when they are painted, and then be carried to the same drying apparatus **10**.

[0036] In the drying step, air discharged from the lower region **32** is discharged out of the drying apparatus **10** after being subjected to odor treatment by the odor treatment mechanism **15**. Since hot air is supplied from the upper region **31** to the lower region **32** through the gap **33**, the odor concentration is higher in the lower region **32** than in the upper region **31**. In addition, the amount of odor is smaller than that in the case where an individual odor treatment device is provided for each of the metal member **91** and the resin member **92**. Thus, the treatment efficiency of the odor treatment device **50** can be increased by increasing the odor concentration and reducing the amount of odor.

[0037] In the above-described painting system **1**, the paint applying step and the drying step are performed while the metal member **91** and the resin member **92** are conveyed together at the same conveying speed by the first and second conveying jigs **25** and **26**, which are permanently affixed together. Therefore, the manufacturing steps can be facilitated by subjecting the metal member **91** and the resin member **92** to the paint applying step and the drying step together, and the size of the drying apparatus can be reduced. Furthermore, since the upper surface of the resin member **92** is covered by the top plate **28***c*, the paint applied to the metal member **91** is prevented from falling from the upper region **31** into the lower region **32** through the gap **33** in the partition plate **12** and adhering to the resin member **92** in the paint applying step and the drying step.

[0038] FIG. **3** illustrates the structure of a drying apparatus **10** according to a modification. In FIG. **3**, components similar to those in the example illustrated in FIGS. **1** and **2** are denoted by the same reference numerals, and description thereof is thus omitted.

[0039] In the modification, the drying apparatus **10** additionally includes an air duct **16** through which the upper region **31** and the lower region **32** communicate and which defines an air passage between the upper region **31** and the lower region **32**. The air duct **16** has a blower **17**, and an air inlet **16***a* and an air outlet **16***b* of the air duct **16** are respectively disposed in the upper region **31** and the lower region **32**.

[0040] In the drying apparatus **10** according to the modification, hot air in the upper region **31** flows into the lower region **32** through the gap **33** in the partition plate **12**, and is also guided to the lower region **32** through the air duct **19**. Accordingly, the hot air blown into the upper region **31** by the drying mechanism **14** is more effectively guided to the lower region **32**.

[0041] In the drawings, the air outlet **43** of the drying mechanism **14** and the air inlet **16***a* of the air duct **16** are disposed on the ceiling surface **11***a* in the upper region **31**, and the air inlet **53** of the odor treatment mechanism **15** and the air outlet **16***b* of the air duct **16** are disposed on the floor surface **11***d* in the lower region **32** to facilitate understanding of the structure. However, the arrangement of these components is not limited to the arrangement illustrated in the drawings. For instance, the air inlet **16***a* of the air duct **16** may instead be disposed at a position below the air outlet **43** of the drying mechanism **14** in the upper region **31**.

Second Example

[0042] FIG. **4** illustrates the structure of a painting system **1** including a drying apparatus **10** according to a second example. In FIG. **4**, components similar to those in the above-described example and modification are denoted by the same reference numerals, and description thereof is thus omitted.

[0043] In this example, the drying apparatus **10** additionally includes a temperature adjusting mechanism **18**. The temperature adjusting mechanism **18** is coupled to the air duct **16**, and adjusts the temperature of the air supplied to the lower region **32**. The temperature adjusting mechanism **18** shares the heating device **40** with the drying mechanism **14**, and includes a duct **84** that guides hot air from the heating device **40** toward the lower region **32**, a cooling device **80**, and a duct **85** that guides cold air from the cooling device **80** toward the lower region **32**. In the illustrated configuration, the downstream end of the duct **84** that extends from the heating device **40** is coupled to the duct **85** that extends from the cooling device **80**, and the downstream end of the duct **85** is coupled to the air duct **16**. The air whose temperature is adjusted by the heating device **40** and the cooling device

80 flows through the air duct **16** and is blown into the lower region **32** through the air outlet **16***b*.

[0044] The heating device **40**, the cooling device **80**, and the temperature sensors **13***a* and **13***b* are coupled a controller (not illustrated), and the operations of the heating device **40** and the cooling device **80** are controlled based on the temperatures detected by the temperature sensors **13***a* and **13***b*. For instance, the heating temperature of the heating device **40** may be increased when the temperature detected by the temperature sensor **13***a* in the upper region **31** is lower than a preset target drying temperature for the metal member **91**. Also, the cooling temperature of the cooling device **80** may be reduced to reduce the temperature of the air blown out of the air duct **16** when the temperature detected by the temperature sensor **13***b* in the lower region **32** is higher than a preset target drying temperature for the resin member **92**. Thus, the temperatures in the upper region **31** and the lower region **32** can be set to heating temperatures suitable for drying the metal member **91** and the resin member **92**, respectively.

[0045] The conveying mechanism of this example is configured such that the resin member **92** is suspended by the second conveying jig **26** at a position behind the metal member **91** suspended by the first conveying jig **25** in the conveying direction. In the illustrated configuration, the second support **27** of the second conveying jig **26** has the shape of an L-shaped rod. The second support **27** includes a horizontal member **27***a* that extends in a direction opposite to the conveying direction from one end thereof that is coupled to an upper part of the first support **25***a*, and a vertical member **27***b* that extends downward from the back end of the horizontal member **27***a*. The second holder **28** of the second conveying jig **26** is attached to the bottom end of the vertical member **27***b*.

[0046] In the drying apparatus **10** of this example, the lower region **32** can be heated by guiding air from the upper region **31** to the lower region **32** through the air duct **16**. In addition, since the air duct **16** is coupled to the temperature adjusting mechanism **18**, the temperature of the air blown into the lower region **32** from the air duct **16** can be adjusted to a temperature suitable for heating the resin member **92**. Furthermore, since the heating device **40** is shared by the drying mechanism **14** and the temperature adjusting mechanism **18**, the size of the drying apparatus **10** and the energy consumption can be reduced.

[0047] The resin member **92** is not disposed directly below the metal member **91** but is disposed behind the metal member **91** in the conveying direction along the conveyor line **2**. Therefore, the paint applied to the metal member **91** can be more reliably prevented from adhering to the resin member **91**. Although not illustrated, the conveying jigs **25** and **26** may instead be configured so that the resin member **92** is in front of the metal member **91** in the conveying direction.

Third Example

[0048] FIG. **5** illustrates the structure of a painting system **1** including a drying apparatus **10** according to a third example. In FIG. **5**, components similar to those in the above-described examples and modification are denoted by the same reference numerals, and description thereof is thus omitted.

[0049] In this example, the conveying mechanism includes a first conveyor **23** that conveys the first conveying jig **25** along the conveyor line **2** and a second conveyor **24** that conveys the second conveying jig **26** along the conveyor line **2**. The drying oven **11** is partitioned into the upper region **31** and the lower region **32** in a substantially sealed state by a single partition plate **12**. The structure of the first conveyor **23** is similar to that of the conveyor **22** according to the first example, and description thereof is thus omitted. The second conveyor **24** is disposed below the first conveyor **23** and extends along the floor surface **11***d* of the drying oven **11** of the drying apparatus **10**.

[0050] The second conveying jig **26**, which is separate from the first conveying jig **25**, is a carriage conveying jig including a carriage body **29** coupled with the second conveyor **24** and mounts **28***b* that are attached to the carriage body **29** and on which the resin member **92** is placed. The top plate **28***c* that covers the entire upper surface of the resin member **92** is attached to the carriage body **29** of the second conveying jig **26** after paint is applied to the resin member **92**. In the illustrated configuration, the rectangular-parallelepiped-shaped frame **28***a*, which includes the top plate **28***c*, is attached to the carriage body **29**. Similar to the first example, the first conveying jig **25** is a suspending conveying jig.

[0051] The first conveying jig **25** and the second conveying jig **26** are displaced from each other in the conveying direction so that the metal member **91** and the resin member **92** do not overlap in the vertical direction when the metal member **91** and the resin member **92** are conveyed.

[0052] In the drying apparatus **10** of this example, the upper region **31** and the lower region **32** are separated from each other by the partition plate **12** in a substantially sealed state. Therefore, the partition plate **12** has no gaps through which hot air in the upper region **31** flows into the lower region **32**, and the heating temperature in the lower region **32** can be easily adjusted by the temperature adjusting mechanism **18**.

[0053] Since the first conveying jig **25** and the second conveying jig **26** are separate components, conveyance time periods of the resin member **92** and the metal member **91** can be controlled so that the resin member **92** stays in the drying oven **11** shorter or longer than the metal member **91** does. Thus, the members **91** and **92** can be dried by heating them for more appropriate time periods.

[0054] The present invention is not limited to the above-described examples and modifications, and various changes are possible without departing from the spirit of the invention. For instance, the second conveying jig **26** may be configured to convey the resin member **92** along the conveyor line **2** in a suspended state by being moved by the conveyor **22** together with the first conveying jig **25** while being separate from the first conveying jig **25**. This second conveying jig **26** holds the resin member **92** below the metal member **91** at a position in front of or behind the first conveying jig **25** in the conveying direction.

1. A drying apparatus comprising:

a heating mechanism configured to heat an inside of a drying oven in which paint applied to a workpiece is dried,

wherein the inside of the drying oven is partitioned into an upper region and a lower region by a partition plate, the drying oven having an air passage that enables air to flow between the upper region and the lower region, and

wherein a metal member to which paint is applied is conveyed into the upper region, and a resin member to which paint is applied is conveyed into the lower region.

2. The drying apparatus according to claim **1**, wherein the heating mechanism is configured to heat the upper region.

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

an air duct that defines the air passage and is capable of supplying air from the upper region to the lower region.

4. The drying apparatus according to claim **3**, further comprising:

a temperature adjusting mechanism coupled to the air duct and configured to adjust a temperature of the air supplied to the lower region.

5. The drying apparatus according to claim **3**, further comprising:

an odor treatment mechanism configured to remove odor from air discharged from the lower region.

6. The drying apparatus according to claim **4**, further comprising:

an odor treatment mechanism configured to remove odor from air discharged from the lower region.

7. The drying apparatus according to claim **1**, further comprising:

a conveying mechanism configured to convey the metal member and the resin member together in the drying oven,

wherein the conveying mechanism comprises

a first conveying jig configured to suspend the metal member, and

a second conveying jig configured to suspend the resin member, and

wherein the second conveying jig is coupled to the first conveying jig at one end of the second conveying jig and extends from the upper region to the lower region through the partition plate.

8. The drying apparatus according to claim **2**, further comprising:

a conveying mechanism configured to convey the metal member and the resin member together in the drying oven,

wherein the conveying mechanism comprises

a first conveying jig configured to suspend the metal member, and

a second conveying jig configured to suspend the resin member, and

wherein the second conveying jig is coupled to the first conveying jig at one end of the second conveying jig and extends from the upper region to the lower region through the partition plate.

9. The drying apparatus according to claim **3**, further comprising:

a conveying mechanism configured to convey the metal member and the resin member together in the drying oven,

wherein the conveying mechanism comprises

a first conveying jig configured to suspend the metal member, and

a second conveying jig configured to suspend the resin member, and

wherein the second conveying jig is coupled to the first conveying jig at one end of the second conveying jig and extends from the upper region to the lower region through the partition plate.

10. The drying apparatus according to claim **4**, further comprising:

a conveying mechanism configured to convey the metal member and the resin member together in the drying oven,

wherein the conveying mechanism comprises

a first conveying jig configured to suspend the metal member, and

a second conveying jig configured to suspend the resin member, and

wherein the second conveying jig is coupled to the first conveying jig at one end of the second conveying jig and extends from the upper region to the lower region through the partition plate.

11. The drying apparatus according to claim **7**, wherein the second conveying jig comprises a top plate configured to cover an upper surface of the resin member.

12. The drying apparatus according to claim **8**, wherein the second conveying jig comprises a top plate configured to cover an upper surface of the resin member.

13. The drying apparatus according to claim **9**, wherein the second conveying jig comprises a top plate configured to cover an upper surface of the resin member.

14. The drying apparatus according to claim **10**, wherein the second conveying jig comprises a top plate configured to cover an upper surface of the resin member.

15. A drying method for drying paint by using the drying apparatus according to claim **1**, comprising:

drying the metal member and the resin member by conveying the metal member and the resin member at equal conveying speed in the drying oven.

16. A drying method for drying paint by using the drying apparatus according to claim **2**, comprising:

drying the metal member and the resin member by conveying the metal member and the resin member at equal conveying speed in the drying oven.

17. A drying method for drying paint by using the drying apparatus according to claim **3**, comprising:

drying the metal member and the resin member by conveying the metal member and the resin member at equal conveying speed in the drying oven.

18. A drying method for drying paint by using the drying apparatus according to claim **4**, comprising:

drying the metal member and the resin member by conveying the metal member and the resin member at equal conveying speed in the drying oven.

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