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(54) INDOOR UNIT OF AIR CONDITIONER AND METHOD OF MANUFACTURING THE INDOOR UNIT

INNENRAUMEINHEIT FÜR KLIMAANLAGE UND VERFAHREN ZUR HERSTELLUNG DER INNENRAUMEINHEIT

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Description

TECHNICAL FIELD

[0001] The present invention relates to an indoor unit of an air conditioner and a manufacturing method thereof.

BACKGROUND ART

[0002] Recently, efforts have been made to improve the design of an indoor unit of an air conditioner (for example, refer to JP-A-2002-355175). In making these efforts, there have been proposed methods such as one for mounting a design panel to a main body of an indoor unit (such a design panel may be directly mounted to the main body or mounted to a front panel if such a front panel is provided). In addition, among design panels to which such a method is applied, there is a design panel which is transparent and a color scheme and/or pattern is given on the backside thereof (for example, refer to JP-A-2002-355175).

[0003] Incidentally, when molding such a design panel, the design panel is often integrally molded with a mounting portion (such as a clip or a hinge) for mounting the design panel to the main body or a front panel. However, when a transparent design panel is molded and the panel is given a color scheme or pattern on its backside surface and the mounting portion, it often creates a difference in visual effects between a portion on the front side opposite the mounting portion and the remaining flat portion. In addition, when this difference in visual effects is excessively large, the design of the front panel as a whole may be hampered.

[0004] Further, EP-A-1 271 065 discloses an indoor unit of an air conditioner having the features defined in the preamble of claim 1.

DISCLOSURE OF THE INVENTION

[0005] An object of the present invention is to obviate the risk that the design of the front panel and the like of an indoor unit may be hampered by a mounting portion and the like mounted to the main body.

[0006] An indoor unit of an air conditioner according to a first aspect of the present invention comprises a main body and a first design panel. The first design panel is transparent and has a mounting portion and a design layer. The mounting portion is integrally provided with the first design panel at a backside portion of the first design panel so as to be mounted to the main body. The design layer is provided on the backside surface of the first design panel. In addition, this design layer is at least given a color scheme. On the front side surface of the first design panel, at least a portion opposite the mounting portion is subjected to a concealing process. Note that the "concealing process" here is a process for concealing the mounting portion, and the process includes, for example, surface treatment process, surface covering process, and cutting process.

[0007] Here, on the front side surface of the first design panel, at least the portion opposite the mounting portion is concealed. Consequently, it is possible to conceal the mounting portion, for example, by applying a design, which is completely different from the design of the remaining flat portion, to the portion on the front side opposite the mounting portion (and also to other portions on the front side). Thus, if the front side portion opposite the mounting portion (and also to other portions on the front side) can be designed such that it harmonizes with the design of the flat portion to conceal the mounting portion, it is possible to obviate the risk that the mounting portion and the like mounted to the main body may hamper the design of the front panel of the indoor unit and the like.

[0008] An indoor unit of an air conditioner according to a second aspect of the present invention is the indoor unit of the air conditioner according to the first aspect of the present invention, wherein the main body has a front panel. In addition, the mounting portion is integrally provided with the first design panel at the backside portion of the first design panel so as to be mounted the front panel.

[0009] Here, even in the case where the indoor unit of the air conditioner is provided with the front panel, if the front side portion opposite the mounting portion (and also to other portions on the front side) can be designed such that it harmonizes with the design of the flat portion to conceal the mounting portion, it is possible to obviate the risk that the mounting portion and the like mounted to the main body may hamper the design of the front panel of the indoor unit and the like.

[0010] An indoor unit of an air conditioner according to a third aspect of the present invention is the indoor unit of the air conditioner according to the first or the second aspect of the present invention, wherein a surface treatment process is performed as the concealing process. Note that the "surface treatment process" mentioned here is a process such as embossing with a grain pattern, knurling, and painting. Here, the "embossing with a grain pattern" is a process for forming a three-dimensional pattern on the surface. In case of embossing a resin with a grain pattern, a method such as embossing a metal mold for resin molding with a grain pattern in advance is employed. The "knurling" is a process for forming a three-dimensional horizontal stripe pattern or a three-dimensional vertical stripe pattern on the surface. In case of knurling a resin, a method such as knurling a metal mold for resin molding in advance is employed.

[0011] Here, the surface treatment process is performed as the concealing process. Therefore, the mounting portion can be easily concealed.

[0012] An indoor unit of an air conditioner according to a fourth aspect of the present invention is the indoor unit of the air conditioner according to the third aspect of the present invention, wherein embossing with a grain pattern is performed as the surface treatment process.

[0013] Here, embossing with a grain pattern is performed as the surface treatment process. By embossing with a grain pattern, in advance, a portion of a metal mold corresponding to a front side surface portion of the first design panel opposite the mounting portion, the mounting portion can be concealed at the same time when the first design panel is molded. Thus, the object can be easily achieved without increasing the number of steps for manufacturing the first design panel.

[0014] An indoor unit of an air conditioner according to a fifth aspect of the present invention is the indoor unit of the air conditioner according to the third aspect of the present invention, wherein knurling is performed as the surface treatment process.

[0015] Here, knurling is performed as the surface treatment process. By knurling, in advance, a portion of a metal mold corresponding to a front side surface portion of the first design panel opposite the mounting portion, the mounting portion can be concealed at the same time when the first design panel is molded. Thus, the object can be easily achieved without increasing the number of steps for manufacturing the first design panel.

[0016] An indoor unit of an air conditioner according to a sixth aspect of the present invention is the indoor unit of the air conditioner according to the first or the second aspect of the present invention, wherein a surface covering process is performed as the concealing process. Note that the "surface covering process" here is affixing a different panel or a sticker.

[0017] Here, the surface covering process is performed as the concealing process. Therefore, the mounting portion can be easily concealed.

[0018] An indoor unit of an air conditioner according to a seventh aspect of the present invention is the indoor unit of the air conditioner according to the first or the second aspect of the present invention, wherein an inclination process is performed as the concealing process. Note that the "inclination process" here is a process by which, on the front side surface of the first design panel, at least a surface of the portion opposite the mounting portion is inclined relative to a surface of other portions. In addition, on the front side surface of the first design panel, a surface that includes the portion opposite the mounting portion may be inclined relative to a surface of other portions.

[0019] Here, the inclination process is performed as the concealing process. Incidentally, when an indoor unit is a wall-hanging type indoor unit, such an indoor unit is typically installed higher than eye level. Additionally, at this time, the first design panel is typically approximately perpendicular to the floor surface. Assuming such a situation, on the front side surface of the first design panel, at least the surface of the portion opposite the mounting portion can be made inclined relative to a surface of other portions (typically, the surface is inclined from the backside of the first design panel to the front side thereof), so that the way light reflects will be different between the surface of the portion opposite the mounting portion and the surface of other portions, and the surface of the portion opposite the mounting portion will become difficult to be seen by a user. In addition, this shape of the first design panel can be easily obtained by making a metal mold into such a shape in advance. Therefore, the mounting portion can be easily concealed.

[0020] An indoor unit of the air conditioner according to an eighth aspect of the present invention is the indoor unit of the air conditioner according to the first or second aspect of the present invention, wherein the first design panel comprises a main panel and a sub-panel. The sub-panel inclines relative to the main panel. The mounting portion is provided integrally with the sub-panel at a backside portion.

[0021] Here, the sub-panel inclines relative to the main panel. The mounting portion is provided integrally with the sub-panel at the backside portion thereof. Incidentally, when an indoor unit is a wall-hanging type indoor unit, such an indoor unit is usually installed higher than eye level. Additionally, at this time, the main panel of the first design panel is typically approximately perpendicular to the floor surface. Given such a situation, the sub-panel can be made inclined relative to the main panel (the sub-panel is typically inclined from the front side of the main design panel to the reveres side thereof), so that the way light reflects will be different between the sub-panel and the main panel, and the mounting portion on the backside of the sub-panel will become difficult to be seen by a user. In addition, this shape of the first design panel can be easily obtained by making a metal mold into such a shape in advance. Therefore, the mounting portion can be easily concealed.

[0022] A method for manufacturing an indoor unit of an air conditioner according to a ninth aspect of the present invention is a method for manufacturing the indoor unit of the air conditioner according to the first aspect of the present invention, wherein the method comprises a first step and a second step. In the first step, on the front side surface of the first design panel, at least a portion opposite the mounting portion is concealed. In the second step, the first design panel is mounted to a front portion of the main body.

[0023] Here, in the case where the indoor unit of the air conditioner is manufactured according to this method for manufacturing, in the first step, on the front side surface of the first design panel, at least the portion opposite the mounting portion is concealed. Then, in the second step, the first design panel is mounted to the front portion of the main body. Consequently, it is possible to conceal the mounting portion by applying a design, which is completely different from the design of the remaining flat portion, to the portion on the front side opposite the mounting portion (and also to other portions on the front side). Thus, if the front side portion opposite the mounting portion (and also other portions on the front side) can be designed such that it harmonizes with the design of the flat portion to conceal the mounting portion, it is possible to obviate the risk that the mounting portion and the like

mounted to the main body may hamper the design of the front panel of the indoor unit and the like.

[0024] A method for manufacturing an indoor unit according to a tenth aspect of the present invention is a method for manufacturing the indoor unit of the air conditioner according to the first aspect of the present invention, wherein the method comprises a first step and a second step. In the first step, the first design panel is mounted to the main body. In the second step, on the front side surface of the first design panel, at least a portion opposite the mounting portion is concealed.

[0025] Here, in the case where the indoor unit of the air conditioner is manufactured according to this method for manufacturing, in the first step, the first design panel is mounted to the main body. Then, in the second step, on the front side surface of the first design panel, at least the portion opposite the mounting portion is concealed. Consequently, it is possible to conceal the mounting portion by applying a design, which is completely different from the design of the remaining flat portion, to the portion on the front side opposite the mounting portion (and also to other portions on the front side). Thus, if the front side portion opposite the mounting portion (and also other portions on the front side) can be designed such that it harmonizes with the design of the flat surface portion to conceal the mounting portion, it is possible to obviate the risk that the mounting portion and the like mounted to the main body may hamper the design of the front panel of the indoor unit and the like.

[0026] A method for manufacturing an indoor unit of an air conditioner according to an eleventh aspect of the present invention is the method for manufacturing an indoor unit of an air conditioner according to the tenth aspect of the present invention, wherein in the second step, on the front side surface of the first design panel, at least the portion opposite the mounting portion is covered by the second design panel. Note that the second design panel is at least given a color scheme.

[0027] Here, in the case where the indoor unit of the air conditioner is manufactured according to this method for manufacturing, in the second step, on the front side surface of the first design panel, at least the portion opposite the mounting portion is covered by the second design panel. Thus, if the second design panel can be designed such that the it harmonizes with the design of the flat portion on the first design panel, it is possible to obviate the risk that the mounting portion and the like mounted to the main body may hamper the design of the front panel of the indoor unit and the like.

BRIEF DESCRIPTION OF DRAWINGS

[0028]

Figure 1 is a general view of an air conditioner.
Figure 2 is a system diagram of a refrigerant circuit of the air conditioner.
Figure 3 is a side cross sectional view of an indoor unit according to a first embodiment.
Figure 4 is a perspective view showing parts of the configuration of an indoor unit casing according to the first embodiment.
Figure 5 is a flowchart showing a method for manufacturing the indoor unit of the air conditioner according to the first embodiment.
Figure 6 is a flowchart showing steps for manufacturing the indoor unit casing according to the first embodiment.
Figure 7 is a perspective view showing a design panel of the indoor unit according to the first embodiment.
Figure 8 is a perspective view showing a design panel of an indoor unit according to a modified example (3) of the first embodiment.
Figure 9 is a perspective view showing a design panel of an indoor unit according to a modified example (4) of the first embodiment.
Figure 10 is a perspective view showing a design panel of the indoor unit according to a modified example (5) of the first embodiment.
Figure 11 is a side cross sectional view of an indoor unit according to the second embodiment.
Figure 12 is a perspective view showing parts of the configuration of an indoor unit casing according to the second embodiment.
Figure 13 is a flowchart showing steps for manufacturing the indoor unit casing according to the second embodiment.
Figure 14 is a perspective view showing a design panel of an indoor unit according to a modified example (6) of the first embodiment.
Figure 15 is a vertical cross sectional view of the design panel of the indoor unit according to a modified example (6) of the first embodiment.
Figure 16 is a perspective view showing a design panel of an indoor unit according to a modified example (7) of the first embodiment.
Figure 17 is a vertical cross sectional view of the design panel of the indoor unit according to a modified example (7) of the first embodiment.

DESCRIPTION OF THE REFERENCE SYMBOLS

[0029]

25a	front grill (main body)
26a	front panel (front panel)
26b	front panel (first design panel)
27a, 27b	paint layer (design layer)
71, 74	hinge (mounting portion)
80, 81	decoration panel (first design panel)
81a	main panel
81b	sub-panel
85	cover part (second design panel)
91b, 92	mounting clip, mounting portion
261, 262	painted portion (backside surface)

BEST MODE FOR CARRYING OUT THE INVENTION

<First Embodiment>

<Entire Configuration of the Air Conditioner>

[0030] Figure 1 shows an external appearance of an air conditioner 1 according to a first embodiment.

[0031] This air conditioner 1 comprises a wall-hanging indoor unit 2 to be mounted to a wall surface in the room, and an outdoor unit 3 to be installed outdoors.

[0032] Inside the indoor unit 2 is housed an indoor heat exchanger and inside the outdoor unit 3 is housed an outdoor heat exchanger. These heat exchangers are connected to each other via a refrigerant pipe 4, thus constituting a refrigerant circuit.

<Schematic Configuration of the Refrigerant Circuit of the Air Conditioner>

[0033] Figure 2 shows the configuration of the refrigerant circuit of the air conditioner 1. This refrigerant circuit mainly comprises an indoor heat exchanger 20, an accumulator 31, a compressor 32, a four-way switching valve 33, an outdoor heat exchanger 30, and a motor-operated expansion valve 34.

[0034] The indoor heat exchanger 20 provided inside the indoor unit 2 exchanges heat with the air with which it comes in contact. In addition, the indoor unit 2 is provided with a cross flow fan 21 that takes in the indoor air, passes the air through the indoor heat exchanger 20 for heat exchange, and then discharges the air into the room. The cross flow fan 21 is formed in a cylindrical shape, is provided with blades at its circumferential surface in the direction of the rotational axis, and generates air flow in the direction perpendicular to the rotational axis. This cross flow fan 21 is rotatably driven by an indoor fan motor 22 provided inside the indoor unit 2. The configuration of the indoor unit 2 is described in detail later.

[0035] The outdoor unit 3 comprises the compressor 32, the four-way switching valve 33 connected to a discharge side of the compressor 32, the accumulator 31 connected to an inlet side of the compressor 32, the outdoor heat exchanger 30 connected to the four-way switching valve 33, and the motor-operated expansion valve 34 connected to the outdoor heat exchanger 30. The motor-operated expansion valve 34 is connected to a pipe 41 via a filter 35 and a liquid shutoff valve 36, and is connected to one end of the indoor heat exchanger 20 via this pipe 41. In addition, the four-way switching valve 33 is connected to a pipe 42 via a gas shutoff valve 37, and is connected to the other end of the indoor heat exchanger 20 via this pipe 42. These pipes 41, 42 are identified as the refrigerant pipe 4 shown in Figure 1. In addition, the outdoor unit 3 comprises a propeller fan 38 for externally discharging air after its heat has been exchanged by the outdoor heat exchanger 30. The propeller fan 38 is rotatably driven by a fan motor 39.

<Configuration of the Indoor Unit>

[0036] Figure 3 shows a side cross section of the indoor unit 2.

[0037] The indoor unit 2 comprises components such as the abovementioned cross flow fan 21 and the indoor heat exchanger 20, and an indoor unit casing 23a that houses them.

[0038] The cross flow fan 21 is rotatably driven around the central axis by the indoor fan motor 22, consequently generating air flow, in which air is taken in from inlet ports 251, passed through the indoor heat exchanger 20, and discharged from an outlet 252 into the room. The cross flow fan 21 is disposed generally in the center of the indoor unit 2 in the side view.

[0039] The indoor heat exchanger 20 is mounted such that it surrounds the front, top, and upper rear portions of the cross flow fan 21. With the indoor heat exchanger 20, heat is exchanged between the air, which is taken in from the inlet ports 251 and passed through to the cross flow fan 21 by driving of the cross flow fan 21, and a refrigerant that flows inside a heat transfer pipe. The indoor heat exchanger 20 has a generally reverse V cross section in the side view.

(Configuration of the Indoor Unit Casing 23a)

[0040] The indoor unit casing 23a mainly comprises a bottom frame 24, a front grill 25a, and a front panel 26a. Note that a decoration panel 80 for a decoration purpose is mounted to this front panel 26a.

[0041] The bottom frame 24 constitutes the rear side of the indoor unit 2 and covers the back of the indoor heat exchanger 20 and the cross flow fan 21.

[0042] The front grill 25a is formed such that it covers the top, side, and bottom portions of the indoor unit 2, and a front panel 26a is mounted at the front portion of the front grill 25a (refer to Figure 4). The top portion of the front grill 25a is provided with the inlet ports 251 which comprise a plurality of slit-shaped openings. The inlet ports 251 are provided generally across the top portion of the front grill 25a. The front side of the bottom portion of the front grill 25a is provided with the outlet 252, which comprises an opening along the longitudinal direction of the indoor unit 2. Additionally, the outlet 252 is provided with a horizontal flap 253 by which the air to be discharged into the room is guided. This horizontal flap 253 is provided such that it can freely rotate around a shaft, which is parallel to the longitudinal direction of the indoor unit 2. The horizontal flap 253 is capable of opening and closing the outlet 252 by being rotated by a flap motor (not shown).

[0043] The front panel 26a is arranged at the front portion of the indoor unit 2. The front panel 26a is formed as a separate body from the front grill 25a and is mounted such that it covers the front portion of the front grill 25a. The front side of the front panel 26a is constituted by two surfaces separated vertically by a step provided horizon-

tally, and each surface is formed in a generally flat shape with a smooth texture without an opening such as a concave or convex portion, a hole, or a slit. In addition, the step portion defines an opening, and the air inside the room is also taken in by this opening (refer to the solid white arrow A1 in Figure 3). Note that this front panel 26a is, as shown in Figure 4, mounted to the front grill 25a via hinges 71. In addition, this front panel 26a can open and close by these hinges 71.

[0044] The decoration panel 80 is formed as a separate body from the front panel 26a and is attached such that the decoration panel 83 covers the surface lower than the horizontal step of the front panel 26a. This decoration panel 80 is formed from a transparent resin, and a painted portion 261 which covers the entire backside of the decoration panel 80 is provided with a paint layer 27a that is given a color scheme, pattern, and the like. This paint layer 27a is formed by applying paint on the entire backside of the decoration panel 80. Note that this decoration panel 80 is integrally molded with the mounting clips 91b (refer to Figure 7), which enable the decoration panel 80 to be mounted to the front panel 26a.

[0045] The front portion of the front grill 25a is provided with openings 254. Various filters 50, 51, 52 are provided between the front portion of the front grill 25a and the front panel 26a, so that the openings 254 are covered by the filters 50, 51, 52. These filters 50, 51, 52 comprise the air filter 50, the air cleaning filter 51, and the photocatalytic filter 52. The air filter 50 is capable of removing dust and dirt from the air that passes therethrough.

[0046] The air filter 50 is provided such that it covers from the front portion to the top portion of the front grill 25a. A portion of the air filter 50, which lies against the top portion of the front grill 25a, is located immediately below the inlet ports 251 provided at the top portion.

[0047] The air cleaning filter 51 is provided at a position which is the upper front portion of the front grill 25a and the inner side the air filter 50. The air cleaning filter 51 is capable of removing dust, cigarette smoke, pollen, and the like, which are finer than the air filter 50.

[0048] The photocatalytic filter 52 is provided at the lower front portion of the front grill 25a, and is capable of removing a malodor component and hazardous gas from the air that passes therethrough. A malodor component is a component such as formaldehyde, acetaldehyde, ammonia, and hydrogen sulfide, which is a cause of malodor generated from cigarettes, raw garbage, building materials, and the like. A hazardous gas is a harmful component such as nitrogen oxide and sulfur oxide, which is contained in vehicle exhaust emissions and the like. The photocatalytic filter 52 is formed in a sheet shape having a honeycomb structure, and contains a photocatalyst that is mainly composed of titanium dioxide. The photocatalyst has a powerful oxidizing power by being activated by light, and is capable of decomposing malodor components and hazardous gases and making them innocuous.

<Method for Manufacturing the Indoor Unit>

[0049] Next, a method for manufacturing the abovementioned indoor unit 2 is described.

[0050] The method for manufacturing the indoor unit 2 of this air conditioner 1 is, as shown in Figure 5, mainly constituted by step S1 of manufacturing the indoor unit casing 23a, step S2 of manufacturing other components, and step S3 of assembling them.

[0051] Step S1 of manufacturing the indoor unit casing 23a is, as shown in Figure 6, constituted by step S10 of manufacturing the front grill 25a, step S11 of manufacturing the bottom frame 24, step S12 of manufacturing the front panel 26a, and step S 13 of manufacturing the decoration panel 80.

[0052] In step S10 of manufacturing the front grill 25a, step S11 of manufacturing the bottom frame 24, and step S12 of manufacturing the front panel 26a, the front grill 25a, the bottom frame 24, and the front panel 26a are respectively integrally molded from a resin material or respectively assembled with parts molded from a resin material, and then manufactured.

[0053] Step S 13 of manufacturing the decoration panel 80 is constituted by step S 14 of forming the decoration panel 80 and step S 15 of painting. In step S 14 of molding the decoration panel 80, the decoration panel 80 is molded from a transparent resin material and thus the transparent decoration panel 80 is manufactured. Note that a resin material such as a transparent ABS, polystyrene, and the like is used as a transparent resin material in this invention. In addition, here, the mounting clips 91b (for mounting to the front panel 26a) is integrally molded (refer to Figure 7). Further, here, on the front side surface of the decoration panel 80, portions opposite the mounting clips 91b are given an embossed grain pattern as shown in Figure 7. This embossed grain pattern is obtained by forming a desired embossed grain pattern, in advance, on a metal mold for molding the decoration panel 80. In step S 15 of painting, painting is applied on the entire backside of the decoration panel 80. In this step S15 of painting, the paint layer 27a which is given a color scheme or pattern is provided in close contact with the painted portion 261 on the backside of the decoration panel 80. Note that, instead of painting, printing may be applied on the backside of the decoration panel 80.

[0054] In step S2 of manufacturing other components, the abovementioned indoor heat exchanger 20, cross flow fan 21, each of the filter 50, 51, 52, and the like are manufactured.

[0055] In step S3 of assembling, the above-mentioned components are assembled together, completing the indoor unit 2.

<Characteristics>

[0056] With the indoor unit 2 of the air conditioner 1 according to the first embodiment, on the front side surface of the decoration panel 80, the portions opposite the

mounting clips 91b are given an embossed grain pattern. Because of this, the portions on the front side opposite the mounting clips 91b can be designed such that it is completely different from the remaining flat portion on the front side. Therefore, if the portions on the front side opposite the mounting clips 91b can be designed such that they harmonizes with the design of the flat portion, it is possible to obviate the risk that the design of the front panel 26a of the indoor unit 2 may be hampered by the mounting clips 91b.

<Modified Examples>

(1)

[0057] On the front side surface of the decoration panel 80 according to the first embodiment, the portions opposite the mounting clips 91b are given an embossed grain pattern in step S 14 of forming the decoration panel 80; however, the embossed pattern does not necessarily need to be formed in this step S14 of forming the decoration panel 80. For example, this embossed grain pattern may be formed by applying a surface treatment process (embossing with a grain pattern) after step S 15 of painting.

(2)

[0058] With the decoration panel 80 according to the first embodiment, only the portions on the front side surface opposite the mounting clips 91b are given an embossed grain pattern; however, this embossed grain pattern may be formed so as to cover a certain area on the front side. In this regard, however, it is a must that the embossed grain pattern should be formed on the portions opposite the mounting clips 91b. For example, the embossed grain pattern may be formed on a certain portion of the outer peripheral frame of the front side surface.

(3)

[0059] On the front side surface of the decoration panel 80 according to the first embodiment, the portions opposite the mounting clips 91b are given an embossed grain pattern in step S 14 of forming the decoration panel 80; however, it does not necessarily need to be an embossed grain pattern. For example, these portions may be given a knurled pattern as shown in Figure 8 (in this case, forming a desired knurled pattern on a metal mold for molding the decoration panel 80 in advance will serve the purpose). In addition, this knurled pattern may be formed so as to cover a certain area on the front side. In this regard, however, it is a must that the knurled pattern should be formed on the portions opposite the mounting clips 91b. For example, the knurled pattern may be formed on a certain portion of the outer peripheral frame of the front side surface.

(4)

[0060] On the front side surface of the decoration panel 80 according to the first embodiment, the portions opposite the mounting clips 91b are given an embossed grain pattern; however, the embossed grain pattern does not necessarily need to be formed. For example, as shown in Figure 9, the portions may be simply painted (in this case, a typical metal mold may be used).

(5)

[0061] On the front side surface of the decoration panel 80 according to the first embodiment, the portions opposite the mounting clips 91b are given an embossed grain pattern; however, the embossed grain pattern does not necessarily need to be formed. For example, as shown in Figure 10, the portions may be simply covered by, for example, a cover part 85 (in this case, a typical metal mold may be used).

(6)

[0062] In the first embodiment, on the front side surface of the decoration panel 80, the portions opposite the mounting clips 91b are given an embossed grain pattern to conceal the mounting clips 91b; however, the mounting clips 91b may be concealed by forming a C cut surface by cutting a surface that includes the portions on the front surface of the decoration panel 80 opposite the mounting clips 91b as shown in Figure 14 and Figure 15. In so doing, the mounting clips 91b can be concealed by the way light reflects differently.

(7)

[0063] In the first embodiment, on the front side surface of the decoration panel 80, the portions opposite the mounting clips 91b are given an embossed grain pattern to conceal the mounting clips 91b; however, a mounting portion 92 may be concealed by adopting a decoration panel 81 as shown in Figures 16 and 17. As shown in Figures 16 and 17, this decoration panel 81 apparently comprises a main panel 81a, a sub-panel 81b, and the mounting portion 92 (these panels 81a, 81b and the mounting portion 92 are molded integrally). The sub-panel 81b is molded such that it inclines relative to the main panel 81a. In addition, the mounting portion 92 is molded at the backside of the sub-panel 81b such that it is perpendicular to the main panel 81a, and has openings 92a capable of fitting with projecting portions 92b that are provided on the front panel 26a. With the decoration panel 81 as described above, a difference between the way light reflects on the main panel 81a and on the sub-panel 81b can conceal the mounting portion 92.

<Second Embodiment>

<Entire Configuration of the Air Conditioner>

[0064] The entire configuration of an air conditioner according to a second embodiment is the same as the entire configuration of the air conditioner according to the first embodiment, excepting the front panel.

<Schematic Configuration of the Refrigerant Circuit of the Air Conditioner>

[0065] The schematic configuration of the refrigerant circuit of the air conditioner according to the second embodiment is the same as the schematic configuration of the refrigerant circuit of the air conditioner according to the first embodiment.

<Configuration of the Indoor Unit>

[0066] As shown in Figure 11, the configuration of the indoor unit according to the second embodiment is the same as the configuration of the indoor unit according to the first embodiment, excepting the configuration of the indoor unit casing.

(Configuration of the Indoor Unit Casing)

[0067] An indoor unit casing 23b mainly comprises a bottom frame 24, a front grill 25a, and a front panel 26b.

[0068] The bottom frame 24 constitutes the rear side of an indoor unit 2 and covers the back of an indoor heat exchanger 20 and a cross flow fan 21.

[0069] The front grill 25a is formed such that it covers the top portion, side portions, and bottom portion of the indoor unit 2, and a front panel 26a is mounted to the front portion of the front grill 25a (refer to Figure 12). Note that when the front panel 26b is mounted, an opening is provided at the top portion thereof. The air inside the room is also taken in by this opening (refer to the solid white arrow A2 in Figure 11). The top portion of the front grill 25a is provided with inlet ports 251 which comprise a plurality of slit-shaped openings. The inlet ports 251 are provided generally across the top portion of the front grill 25a. The front side of the bottom portion of the front grill 25a is provided with an outlet 252 which comprises an opening along the longitudinal direction of the indoor unit 2. Additionally, the outlet 252 is provided with a horizontal flap 253 by which the air to be discharged into the room is guided. This horizontal flap 253 is provided such that it can freely rotate around a shaft, which is parallel to the longitudinal direction of the indoor unit 2. The horizontal flap 253 is capable of opening and closing the outlet 252 by being rotated by a flap motor (not shown).

[0070] The front panel 26b is arranged at the front portion of the indoor unit 2. The front panel 26b is formed as a separate body from the front grill 25a and is mounted such that it covers the front portion of the front grill 25a. This front panel 26b is formed from a transparent resin, and a painted portion 262 which covers the entire backside of the front panel 26b is provided with a paint layer 27b that is given a color scheme, pattern, and the like. This paint layer 27b is formed by applying paint on the entire backside of the front panel 26b. Note that this front panel 26b is mounted to the front grill 25a via hinges 74. Also, this front panel 26b can open and close by these hinges 74.

<Method for Manufacturing the Indoor Unit>

[0071] Next, the method for manufacturing the indoor unit 2 according to the second embodiment is described. Note that the method for manufacturing the indoor unit according to the second embodiment is entirely the same as the method manufacturing the indoor unit according to the first embodiment, excepting manufacturing of the indoor unit casing. Therefore, here, only manufacturing of the indoor unit casing is described.

[0072] Step S1 of manufacturing the indoor unit casing 23b is, as shown in Figure 13, constituted by step S20 of manufacturing the front grill 25a, step S21 of manufacturing the bottom frame 24, and step S22 of manufacturing the front panel 26b.

[0073] In step S20 of manufacturing the front grill 25a and step S21 of manufacturing the bottom frame 24, the front grill 25a and the bottom frame 24 are respectively integrally molded from a resin material or respectively assembled from parts molded from a resin material, and then manufactured.

[0074] Step S22 of manufacturing the front panel 26b is constituted by step S23 of molding the front panel 26b and step S24 of painting. In step S23 of molding the front panel 26b, the front panel 26b is molded from a transparent resin material, and thus the transparent front panel 26b is manufactured. Note that a resin material such as a transparent ABS, polystyrene, and the like is used as a transparent resin material in this invention. In addition, here, the hinges 74 (for mounting to the front grill 25a) are integrally molded (refer to Figure 12). Further, here, on the front side surface of the front panel 26b, portions opposite the hinges 74 are given an embossed grain pattern as shown in Figure 12. This embossed pattern is obtained by forming a desired embossed grain pattern, in advance, on a metal mold for molding the front panel 26b. In step S24 of painting, painting is applied on the entire backside of the front panel 26b. In this step S24 of painting, the paint layer 27b which is given a color scheme, pattern, and the like is provided in close contact with the painted portion 262 of the backside of the front panel 26b. Note that, instead of painting, printing may be applied on the backside of the front panel 26b.

<Characteristics>

[0075] With the indoor unit 2 of the air conditioner 1 according to the second embodiment, on the front side

surface of the front panel 26b, the portions opposite the hinges 74 are given an embossed grain pattern. Because of this, the portions on the front side opposite the hinges 74 can be designed such that it is completely different from the remaining flat portion on the front side. Therefore, if the portions on the front side opposite the hinges 74 can be designed such that they harmonizes with the design of the flat portion, it is possible to obviate the risk that the design of the front panel 26b of the indoor unit 2 may be hampered by the hinges 74.

INDUSTRIAL APPLICABILITY

[0076] The indoor unit of the air conditioner according to the present invention obviates the risk that the design of the front panel of the indoor unit may be hampered by the mounting portion. In addition, with the method for manufacturing an indoor unit of an air conditioner according to the present invention, it is possible to manufacture an indoor unit having a highly attractive design. As a result, a more attractively designed indoor units than before can be provided to the market.

Claims

1. An indoor unit (2) of an air conditioner comprising:

a main body (25a, 26a); and
a transparent first design panel (26b, 80, 81) including a design layer (27a, 27b) having at least a color scheme applied thereto and provided on a surface (261, 262) of a backside portion of the first design panel (26b, 80, 81),

characterised in that:

the first design panel (26b, 80, 81) includes a mounting portion (74, 91b, 92) integrally provided at the backside so as to be mounted to the main body (25a, 26a); and
the first design panel (26b, 80, 81) has a front side surface on which at least a portion opposite the mounting portion (74, 91b, 92) has been subjected to a concealing process to conceal the mounting portion.

2. The indoor unit (2) of the air conditioner according to Claim 1, wherein
the main body (25a) has a front panel (26a), and
the mounting portion (91b) is integrally provided with the first design panel (80) at the backside portion of the first design panel (80) so as to be mounted to the front panel (26a).

3. The indoor unit of the air conditioner according to Claim 1 or 2, wherein
the concealing process is a surface treatment process.

4. The indoor unit of the air conditioner according to Claim 3, wherein
the surface treatment process is an embossing process.

5. The indoor unit of the air conditioner according to Claim 3, wherein
the surface treatment process is a knurling process.

6. The indoor unit of the air conditioner according to Claim 1 or 2, wherein
the concealing process is a surface covering process.

7. The indoor unit of the air conditioner according to Claim 1 or 2, wherein
the concealing process is an inclination process by which at least a surface of a portion on a front side surface of the first design panel opposite the mounting portion is inclined relative to a surface of other portions.

8. The indoor unit of the air conditioner according to Claim 1 or 2, wherein
the first design panel (81) comprises a main panel (81a) and a sub-panel (81b) inclining relative to the main panel, and
the mounting portion (92) is integrally provided at a backside portion of the sub-panel.

9. A method for manufacturing an indoor unit of an air conditioner to manufacture the indoor unit (2) of the air conditioner (1) according to Claim 1, the method comprising:

a first step of applying the concealing process to at least a portion on a front side surface of the first design panel (26b, 80) opposite the mounting portion (74, 91b); and
a second step of mounting the first design panel (26b, 80) to a front portion of the main body (25a, 26a).

10. A method for manufacturing an indoor unit of an air conditioner to manufacture the indoor unit (2) of the air conditioner (1) according to Claim 1, the method comprising:

a first step of mounting the first design panel (26b, 80) to the main body (25a, 26a); and
a second step of applying the concealing process to at least a portion on a front side surface of the first design panel (26b, 80) opposite the mounting portion (74, 91b).

11. The method for manufacturing an indoor unit of an

air conditioner according to Claim 10, wherein in the second step, on a front side surface of the first design panel (80), at least a portion opposite the mounting portion (91b) is covered by a second design panel (85) to which at least a color scheme is applied.

Patentansprüche

1. Innenraumeinheit (2) einer Klimaanlage, umfassend:

einen Hauptkörper (25a, 26a); und
eine transparente erste Designplatte (26b, 80, 81), die eine Designschicht (27a, 27b) umfasst, die mindestens ein darauf angewendetes Farbschema hat und an einer Fläche (261, 262) eines Rückseitenbereichs der ersten Designplatte (26b, 80, 81) bereitgestellt ist, **dadurch gekennzeichnet, dass**:

die erste Designplatte (26b, 80, 81) einen Montagebereich (74, 91b, 92) umfasst, der integral auf der Rückseite bereitgestellt ist, um am Hauptkörper (25a, 26a) montiert zu werden; und
die erste Designplatte (26b, 80, 81) eine Vorderseitenfläche hat, an welcher mindestens ein Bereich gegenüber dem Montagebereich (74, 91b, 92) einem Kaschierungsprozess unterzogen wurde, um den Montagebereich zu kaschieren.

2. Innenraumeinheit (2) der Klimaanlage nach Anspruch 1, wobei
der Hauptkörper (25a) eine Fronttafel (26a) hat und der Montagebereich (91b) integral mit der ersten Designplatte (80) am Rückseitenbereich der ersten Designplatte (80) bereitgestellt ist, um an der Fronttafel (26a) montiert zu werden.

3. Innenraumeinheit der Klimaanlage nach Anspruch 1 oder 2, wobei der Kaschierungsprozess ein Oberflächen-Behandlungsprozess ist.

4. Innenraumeinheit der Klimaanlage nach Anspruch 3, wobei der Oberflächen-Behandlungsprozess ein Prägeprozess ist.

5. Innenraumeinheit der Klimaanlage nach Anspruch 3, wobei der Oberflächen-Behandlungsprozess ein Rändelprozess ist.

6. Innenraumeinheit der Klimaanlage nach Anspruch 1 oder 2, wobei der Kaschierungsprozess ein Oberflächen-Abdeckungsprozess ist.

7. Innenraumeinheit der Klimaanlage nach Anspruch 1 oder 2, wobei der Kaschierungsprozess ein Neigungsprozess ist, mittels dessen mindestens eine Fläche eines Bereichs auf einer Vorderseitenfläche der ersten Designplatte gegenüber dem Montagebereich relativ zu einer Fläche von anderen Bereichen geneigt wird.

8. Innenraumeinheit der Klimaanlage nach Anspruch 1 oder 2, wobei
die erste Designplatte (81) eine Hauptplatte (81a) und eine relativ zu der Hauptplatte geneigte Unterplatte (81b) umfasst, und
der Montagebereich (92) integral an einem Rückseitenbereich der Unterplatte bereitgestellt ist.

9. Verfahren zum Herstellen einer Innenraumeinheit einer Klimaanlage zum Herstellen der Innenraumeinheit (2) der Klimaanlage (1) nach Anspruch 1, wobei das Verfahren umfasst:

einen ersten Schritt des Anwendens des Kaschierungsprozesses auf mindestens einen Bereich auf einer Vorderseitenfläche der ersten Designplatte (26b, 80) gegenüber dem Montagebereich (74, 91b); und
einen zweiten Schritt des Montierens der ersten Designplatte (26b, 80) an einem Vorderbereich des Hauptkörpers (25a, 26a).

10. Verfahren zum Herstellen einer Innenraumeinheit einer Klimaanlage zum Herstellen der Innenraumeinheit (2) der Klimaanlage (1) nach Anspruch 1, wobei das Verfahren umfasst:

einen ersten Schritt des Montierens der ersten Designplatte (26b, 80) am Hauptkörper (25a, 26a); und
einen zweiten Schritt des Anwendens des Kaschierungsprozesses auf mindestens einen Bereich auf einer Vorderseitenfläche der ersten Designplatte (26b, 80) gegenüber dem Montagebereich (74, 91b).

11. Verfahren zum Herstellen einer Innenraumeinheit einer Klimaanlage nach Anspruch 10, wobei
in einem zweiten Schritt, auf einer Vorderseitenfläche der ersten Designplatte (80), mindestens ein Bereich gegenüber dem Montagebereich (91b) mittels einer zweiten Designplatte (85) bedeckt ist, auf welche mindestens ein Farbschema angewendet wird.

Revendications

1. Unité intérieure (2) d'un climatiseur comprenant :

un corps principal (25a, 26a) ; et

un premier panneau décoratif transparent (26b, 80, 81) comprenant une couche décorative (27a, 27b) sur laquelle est appliquée une combinaison de couleurs et prévue sur une surface (261, 262) d'une portion de côté arrière du premier panneau décoratif (26b, 80, 81),

caractérisé en ce que :

le premier panneau décoratif (26b, 80, 81) comprend une portion de montage (74, 91b, 92) prévue en une seule pièce au niveau du côté arrière pour son montage sur le corps principal (25a, 26a) ; et
le premier panneau décoratif (26b, 80, 81) possède une surface latérale avant sur laquelle au moins une portion opposée à la portion de montage (74, 91b, 92) a été soumise à un procédé de dissimulation pour dissimuler la portion de montage.

2. Unité intérieure (2) du climatiseur selon la revendication 1, dans laquelle
le corps principal (25a) possède un panneau avant (26a), et la portion de montage (91b) est prévue en une seule pièce avec le premier panneau décoratif (80) au niveau de la portion de côté arrière du premier panneau décoratif (80) pour son montage sur le panneau avant (26a).

3. Unité intérieure du climatiseur selon la revendication 1 ou 2, dans laquelle le procédé de dissimulation est un procédé de traitement de surface.

4. Unité intérieure du climatiseur selon la revendication 3, dans laquelle le procédé de traitement de surface est un procédé de gaufrage.

5. Unité intérieure du climatiseur selon la revendication 3, dans laquelle le procédé de traitement de surface est un procédé de moletage.

6. Unité intérieure du climatiseur selon la revendication 1 ou 2, dans laquelle le procédé de dissimulation est un procédé de revêtement de surface.

7. Unité intérieure du climatiseur selon la revendication 1 ou 2, dans laquelle
le procédé de dissimulation est un procédé d'inclinaison par lequel au moins une surface d'une portion sur une surface latérale avant du premier panneau décoratif à l'opposé de la portion de montage est inclinée par rapport à une surface d'autres portions.

8. Unité intérieure du climatiseur selon la revendication 1 ou 2, dans laquelle
le premier panneau décoratif (81) comprend un panneau principal (81a) et un panneau secondaire (81b) qui s'incline par rapport au panneau principal; et
la portion de montage (92) est prévue en une seule pièce à une portion du côté arrière du panneau secondaire.

9. Procédé de fabrication d'une unité intérieure d'un climatiseur pour la fabrication de l'unité intérieure (2) du climatiseur (1) selon la revendication 1, le procédé comprenant :

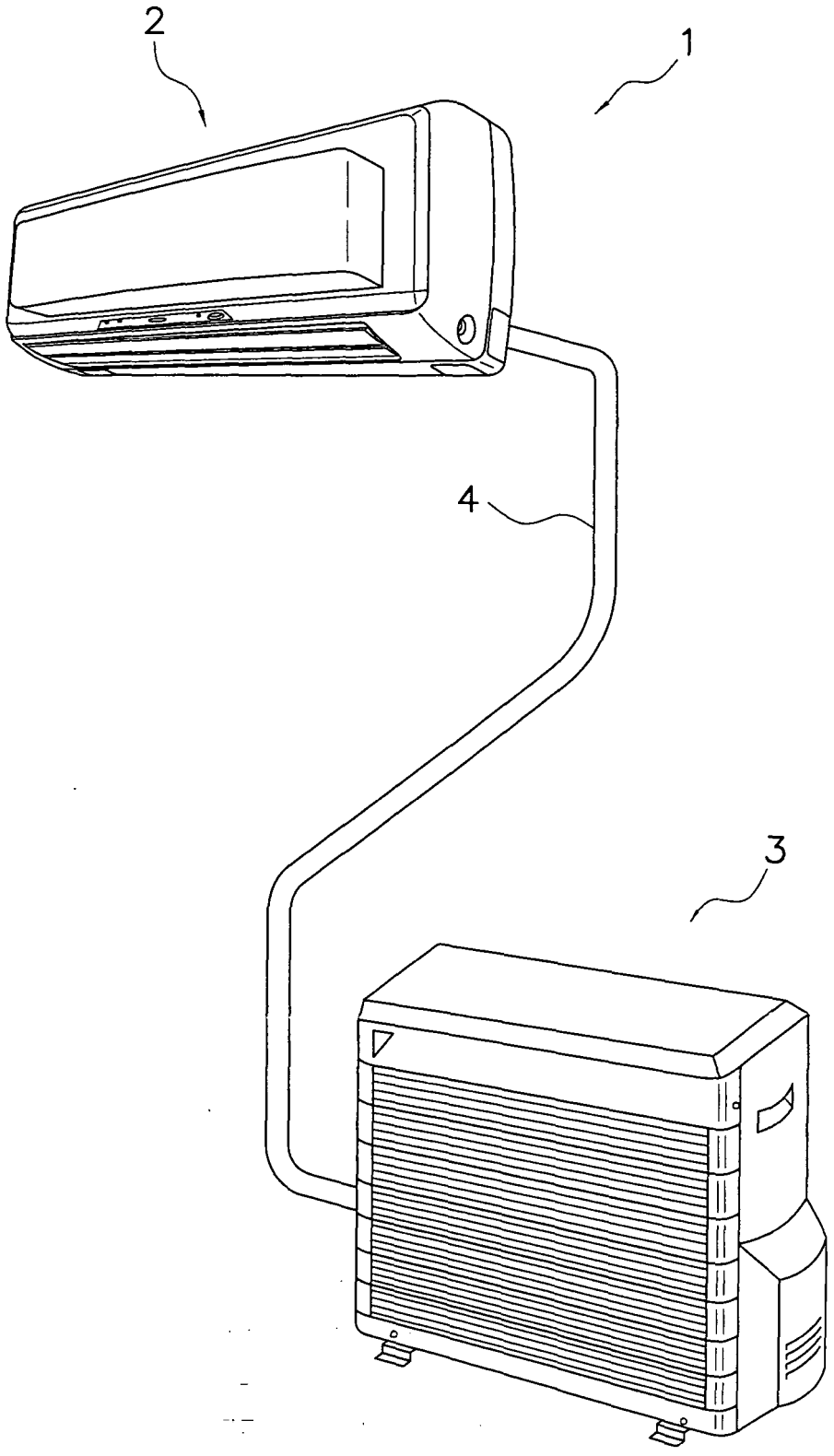
une première étape d'application du procédé de dissimulation à au moins une portion sur une surface latérale avant du premier panneau décoratif (26b, 80) à l'opposé de la portion de montage (74, 91b) ; et
une seconde étape de montage du premier panneau décoratif (26b, 80) sur une portion avant du corps principal (25a, 26a).

10. Procédé de fabrication d'une unité intérieure d'un climatiseur pour la fabrication de l'unité intérieure (2) du climatiseur (1) selon la revendication 1, le procédé comprenant :

une première étape de montage du premier panneau décoratif (26b, 80) sur le corps principal (25a, 26a) ; et
une seconde étape d'application du procédé de dissimulation à au moins une portion sur une surface latérale avant du premier panneau décoratif (26b, 80) à l'opposé de la portion de montage (74, 91b).

11. Procédé de fabrication d'une unité intérieure d'un climatiseur selon la revendication 10, dans lequel
dans la seconde étape, sur une surface latérale avant du premier panneau décoratif (80), au moins une portion opposée à la portion de montage (91b) est recouverte par un second panneau décoratif (85) sur lequel est appliquée au moins une combinaison de couleurs.

Fig. 1



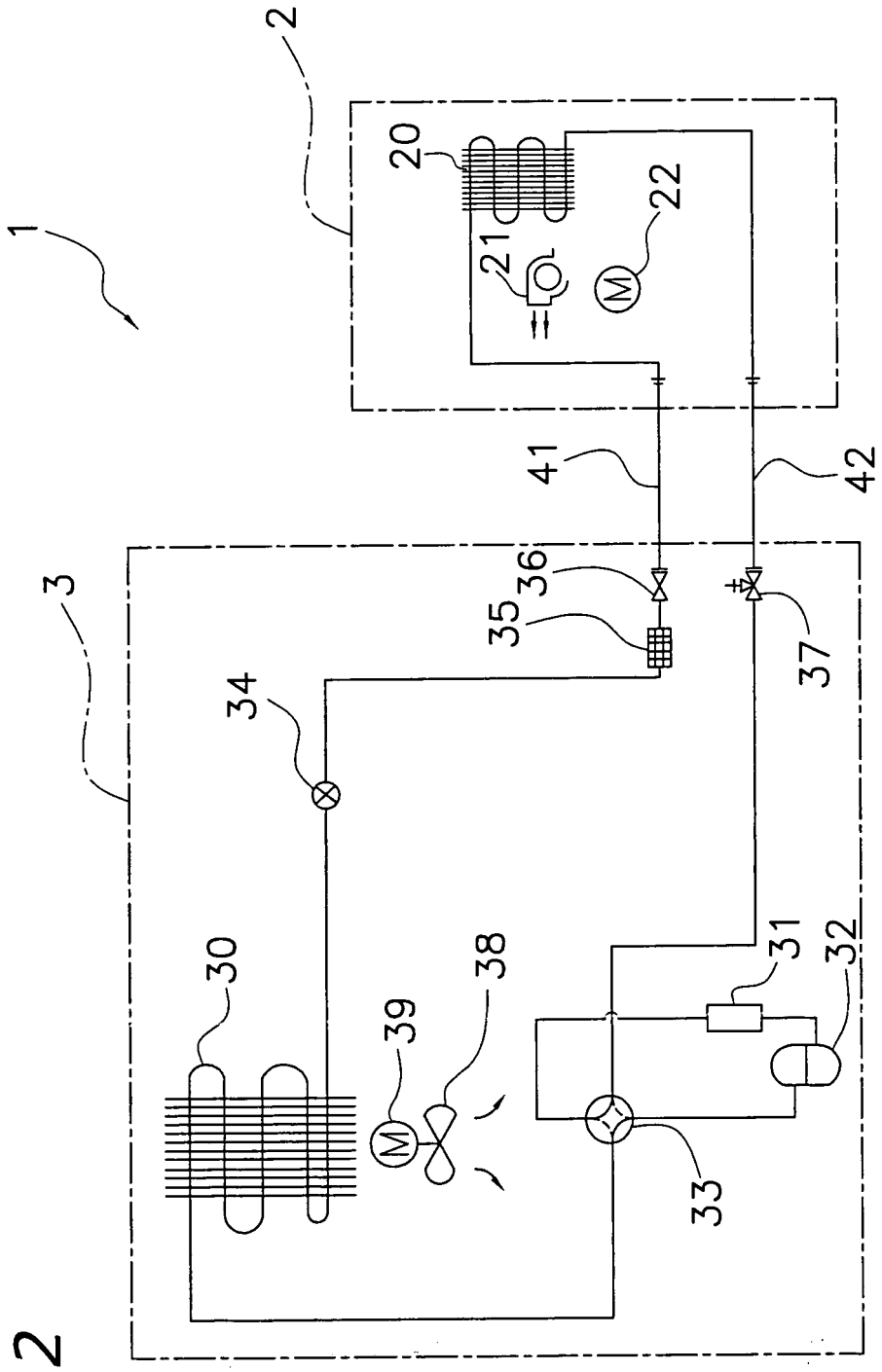
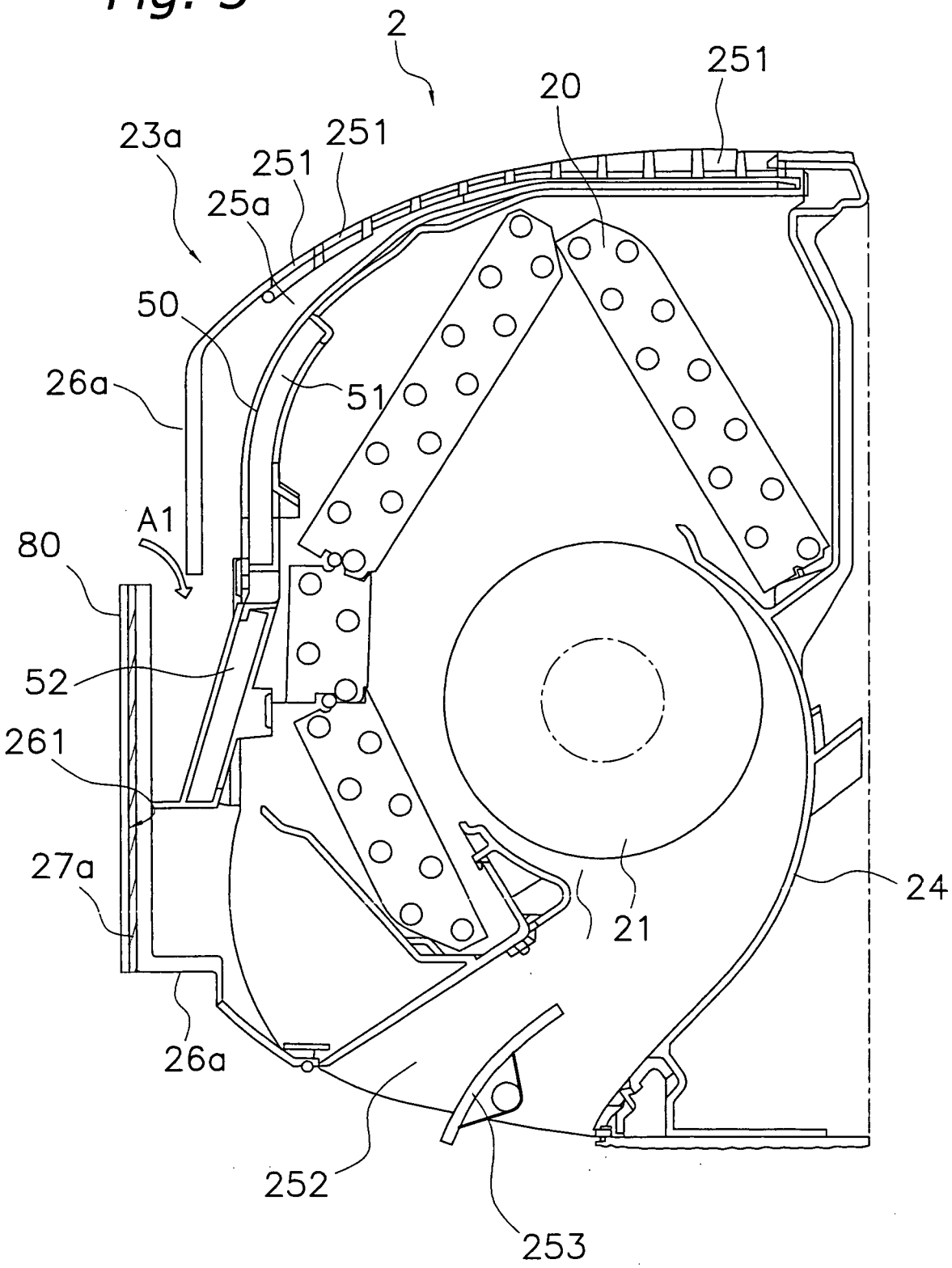


Fig. 2

Fig. 3


2
251
20
23a
251
251
25a
50
51
26a
A1
80
52
261
27a
24
21
26a
252
253

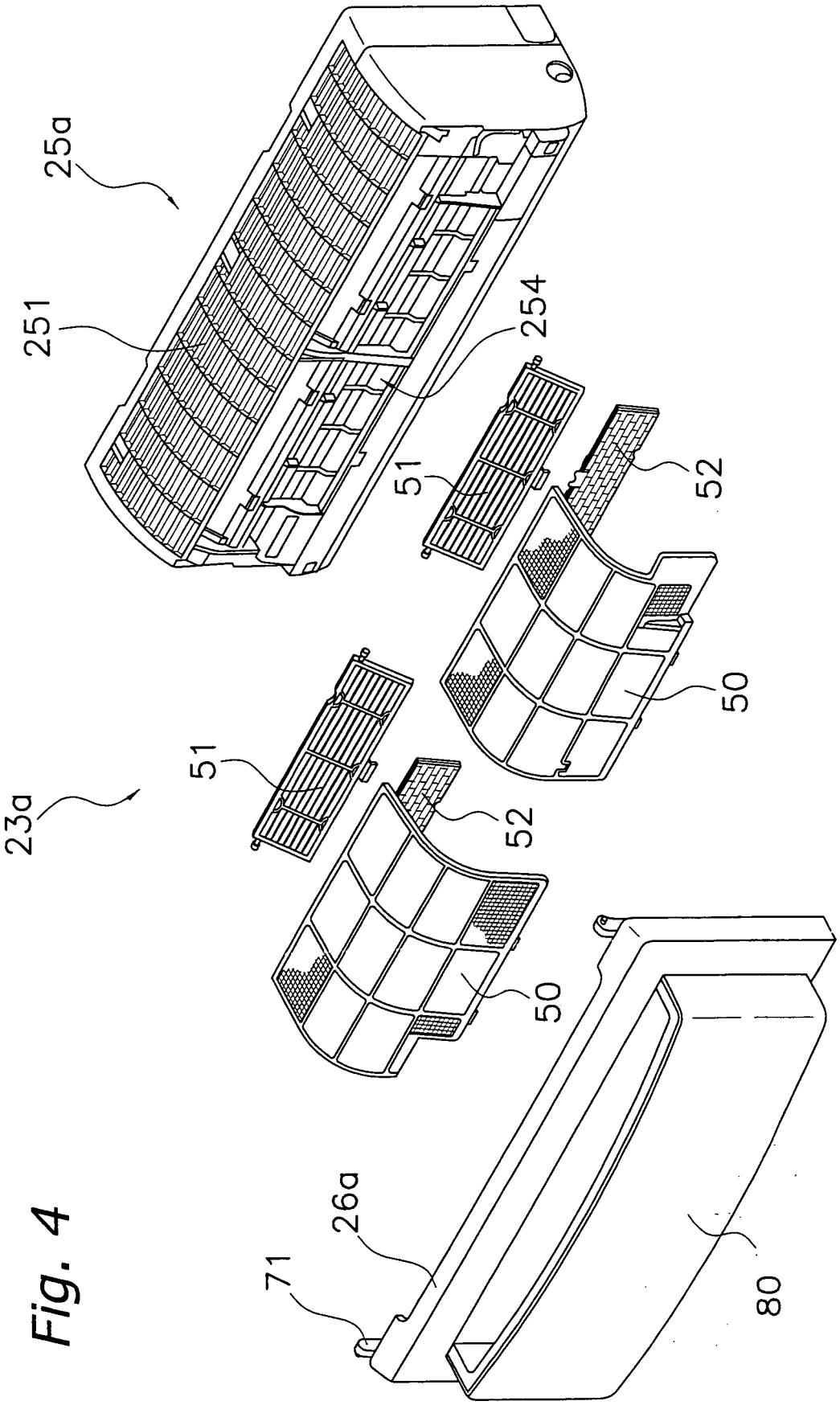
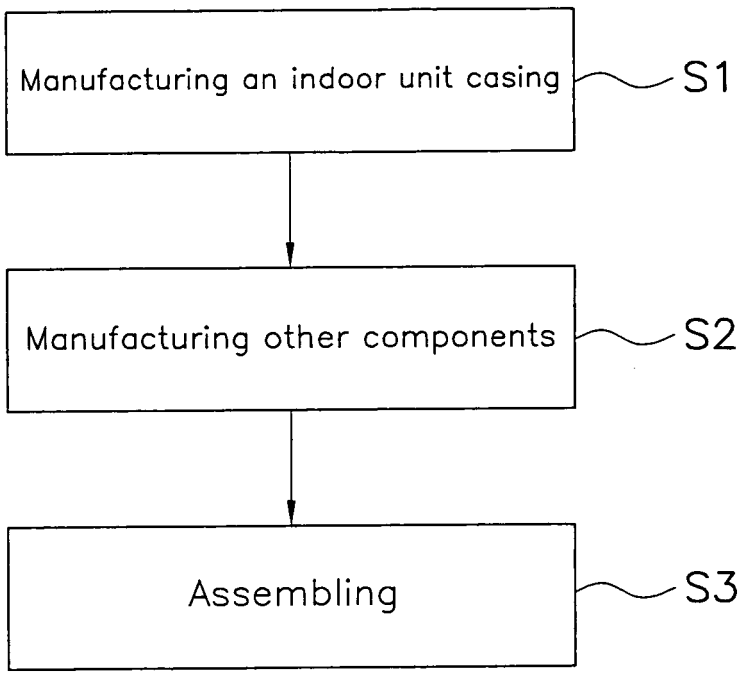


Fig. 4

Fig. 5


Manufacturing an indoor unit casing
S1
Manufacturing other components
S2
Assembling
S3

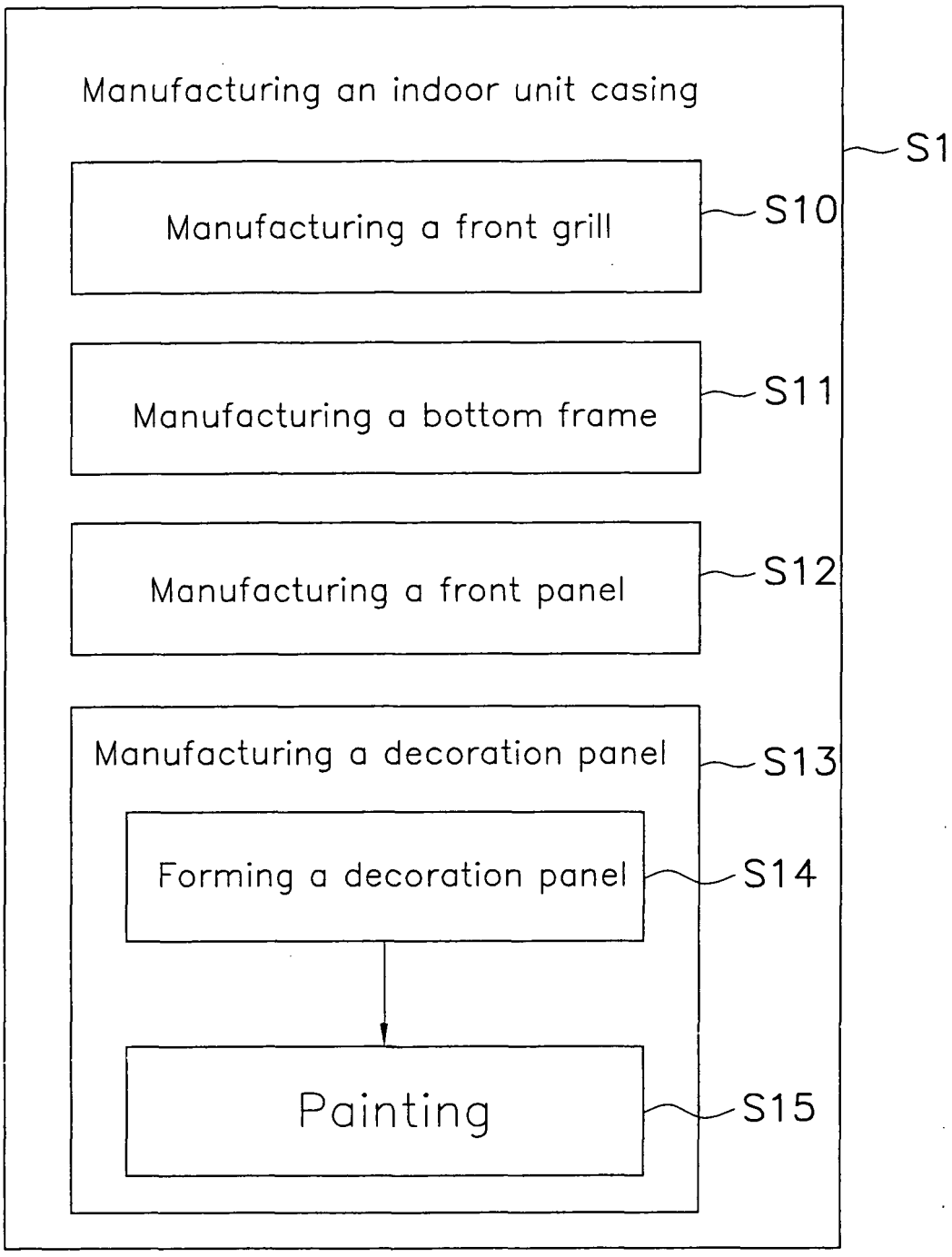

Manufacturing an indoor unit casing
S1
Manufacturing a front grill
S10
Manufacturing a bottom frame
S11
Manufacturing a front panel
S12
Manufacturing a decoration panel
S13
Forming a decoration panel
S14
Painting
S15

Fig. 6

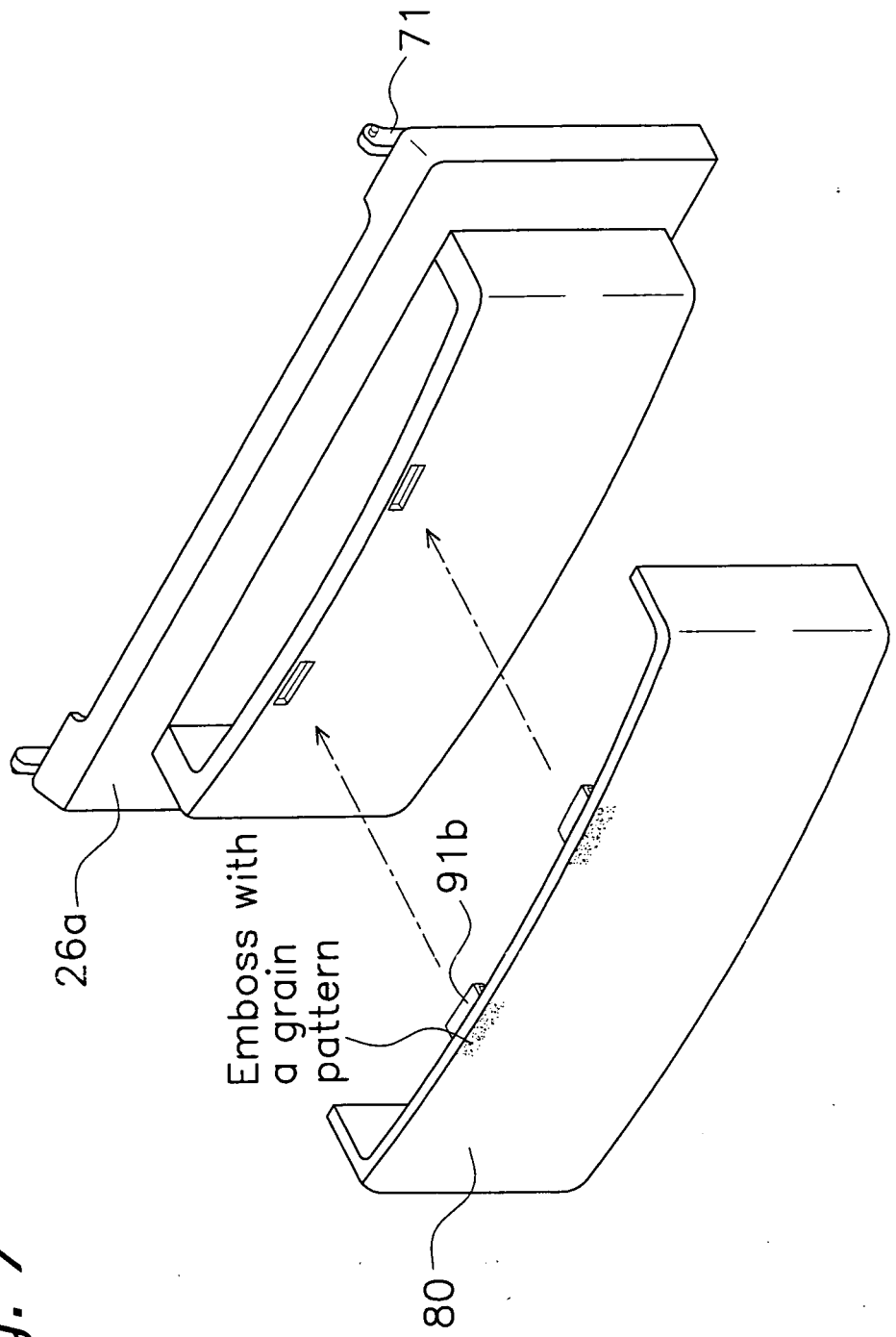


Fig. 7

Fig. 8

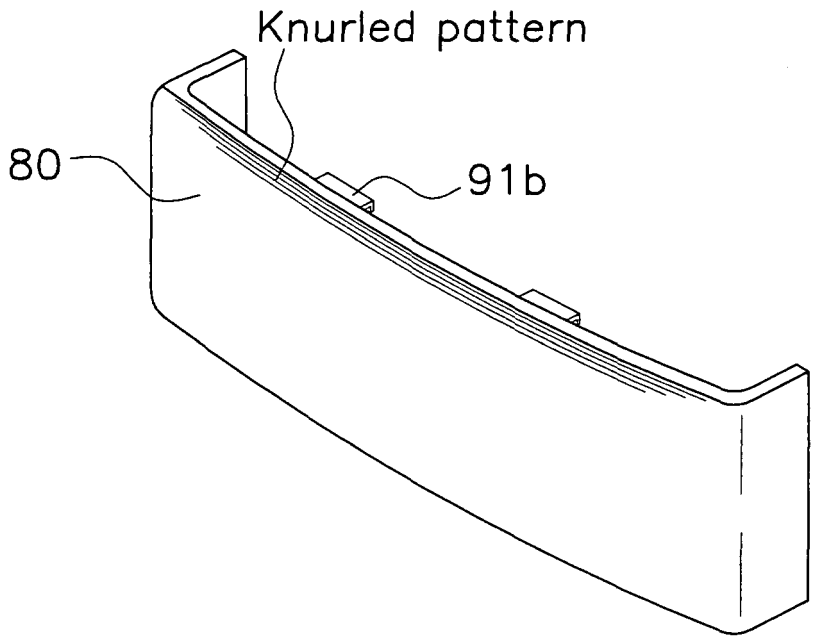
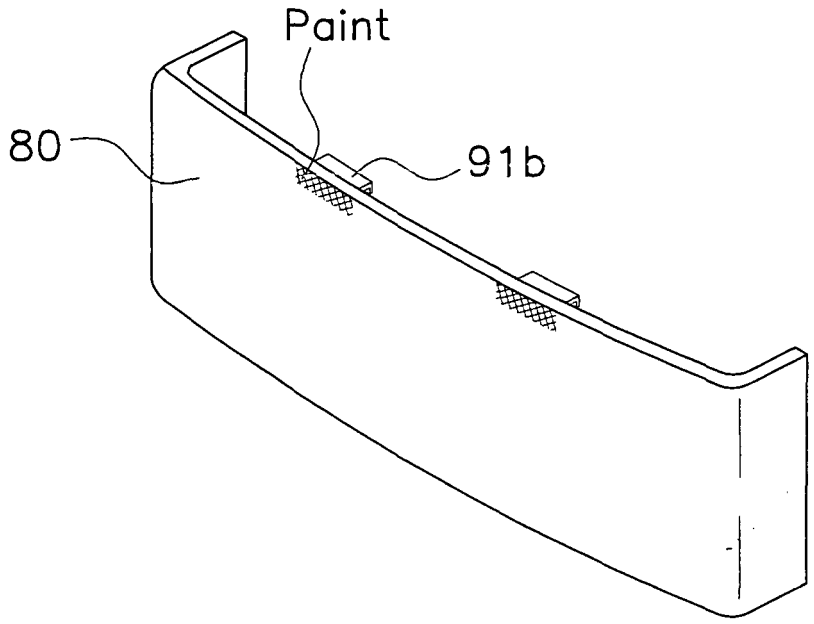


Fig. 9



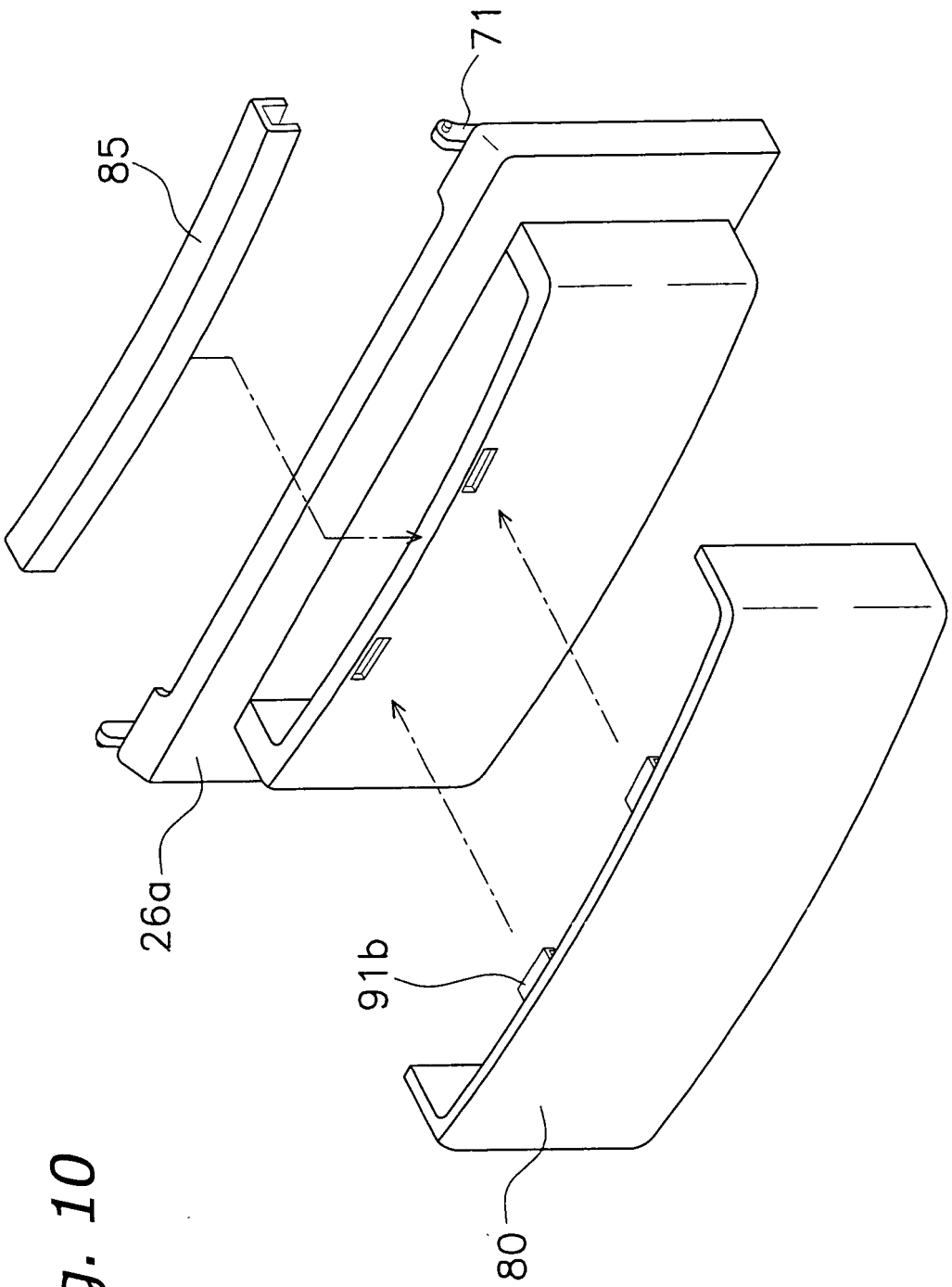
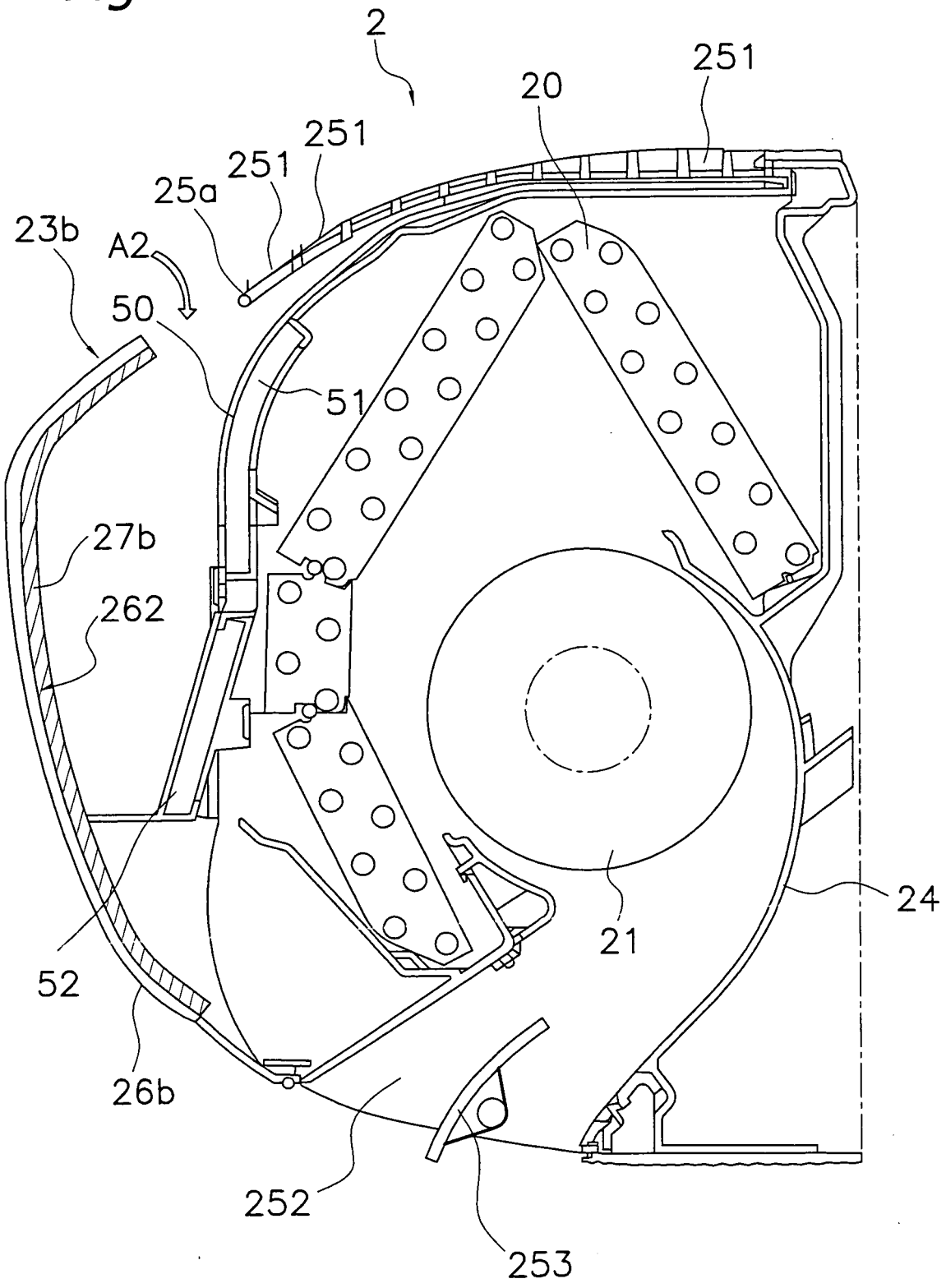


Fig. 10

Fig. 11



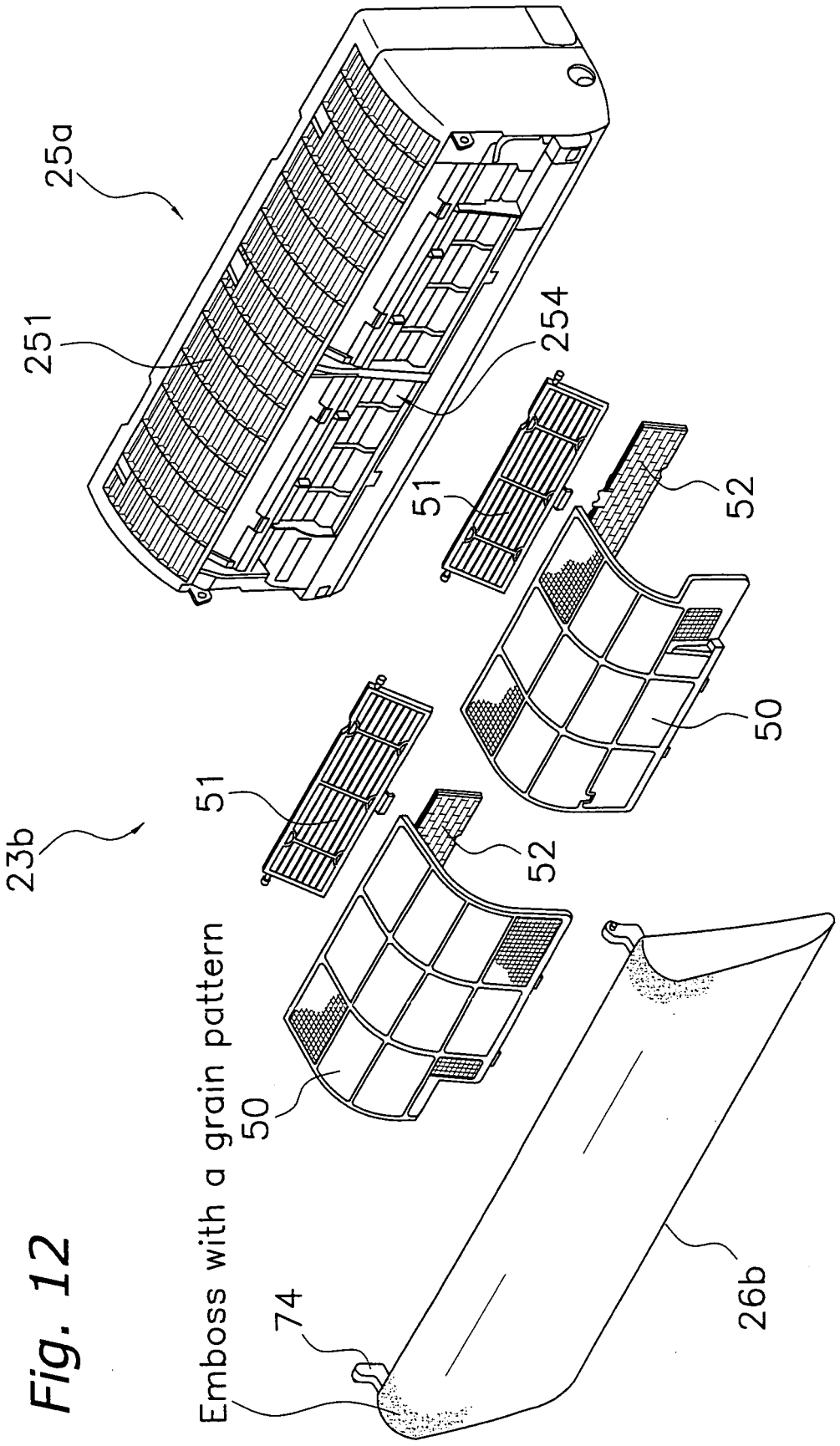

25a
251
254
51
52
50
23b
51
52
50
Emboss with a grain pattern
74
26b

Fig. 12

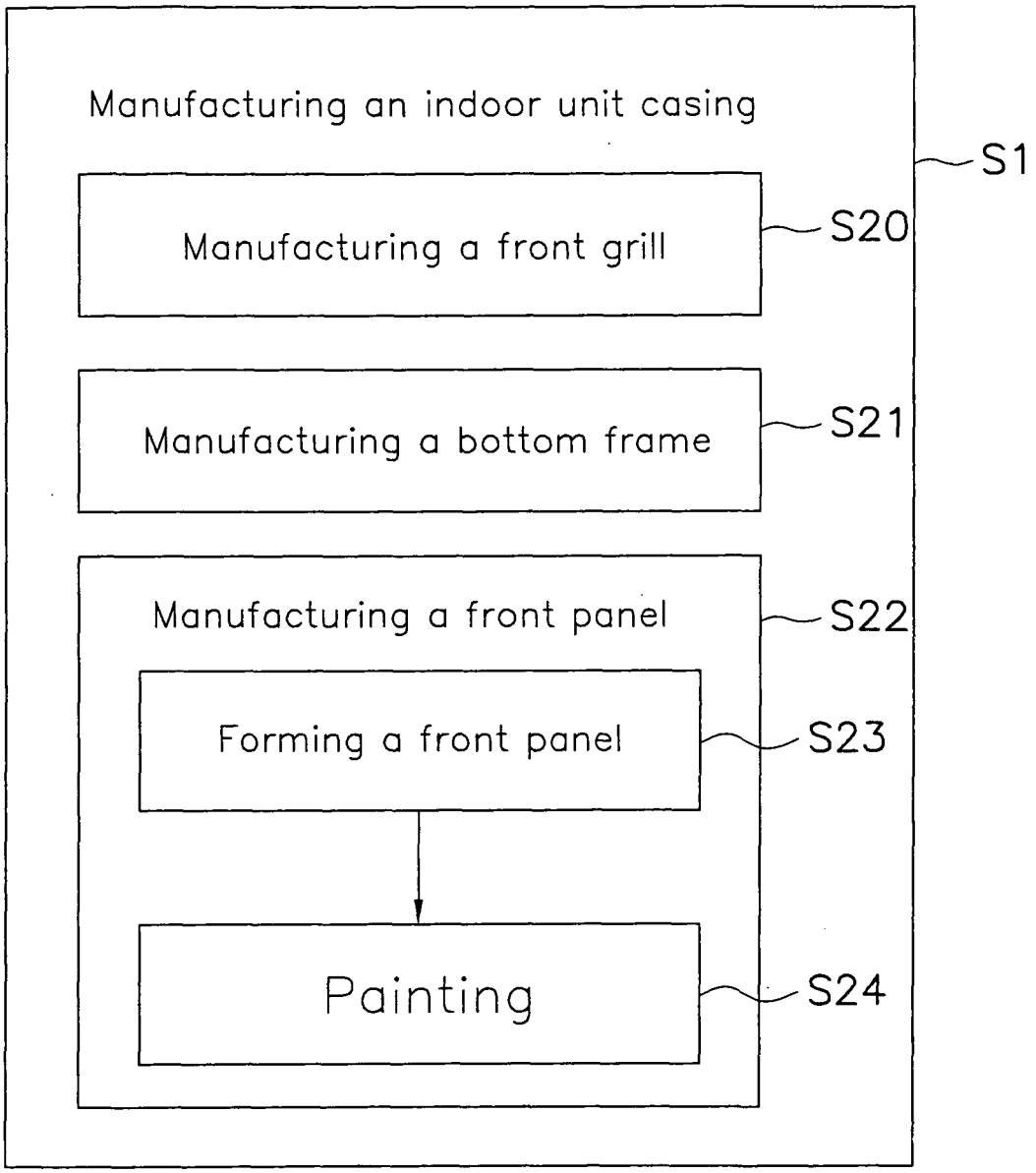

Manufacturing an indoor unit casing
S1
Manufacturing a front grill
S20
Manufacturing a bottom frame
S21
Manufacturing a front panel
S22
Forming a front panel
S23
Painting
S24

Fig. 13

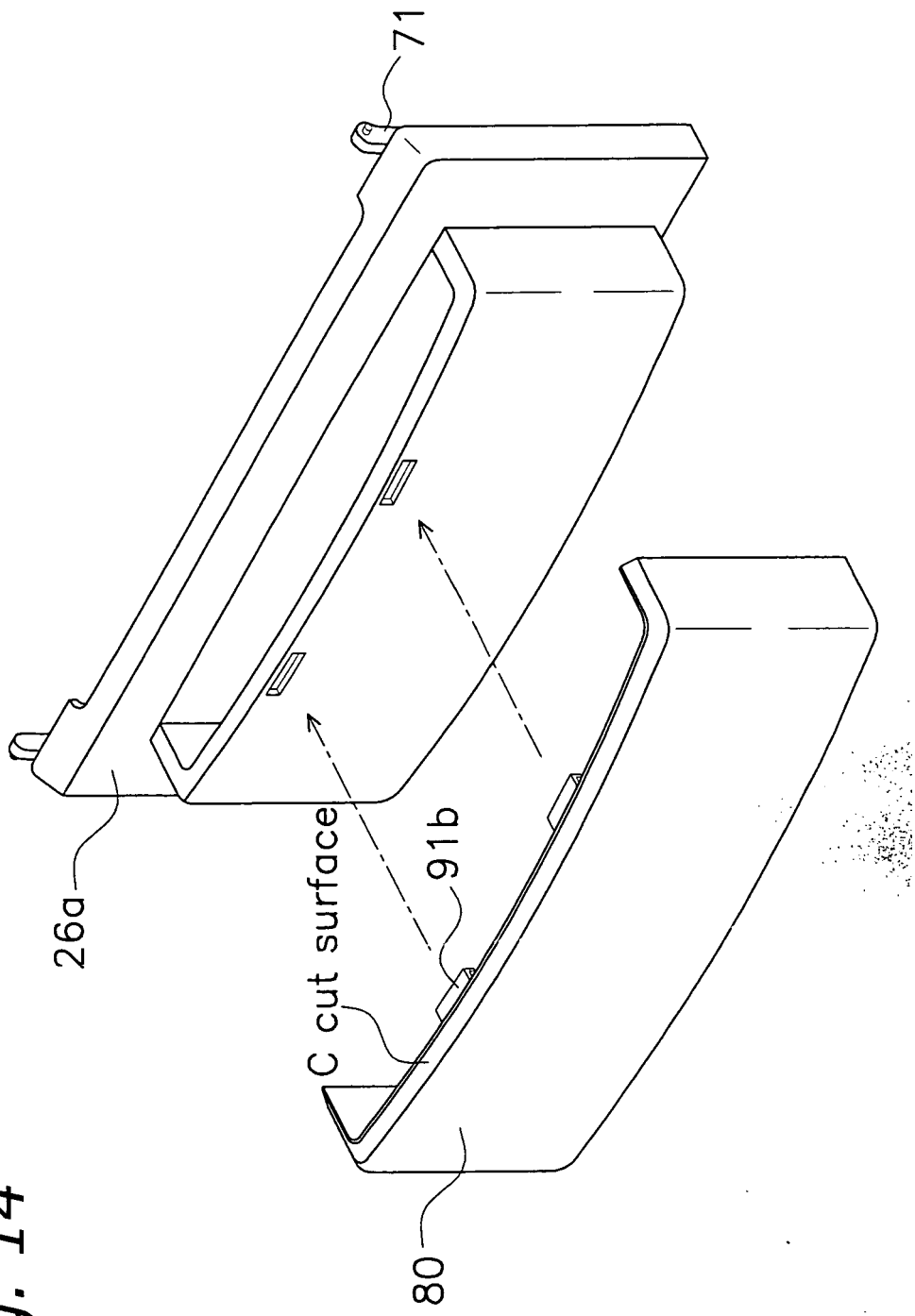
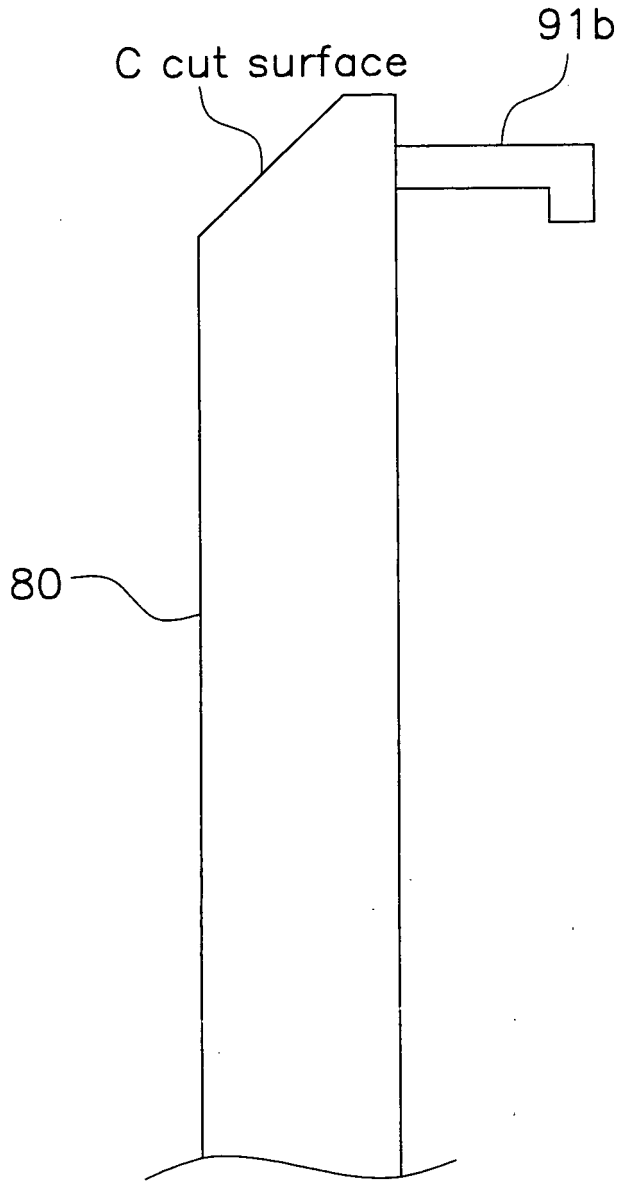


Fig. 14

Fig. 15



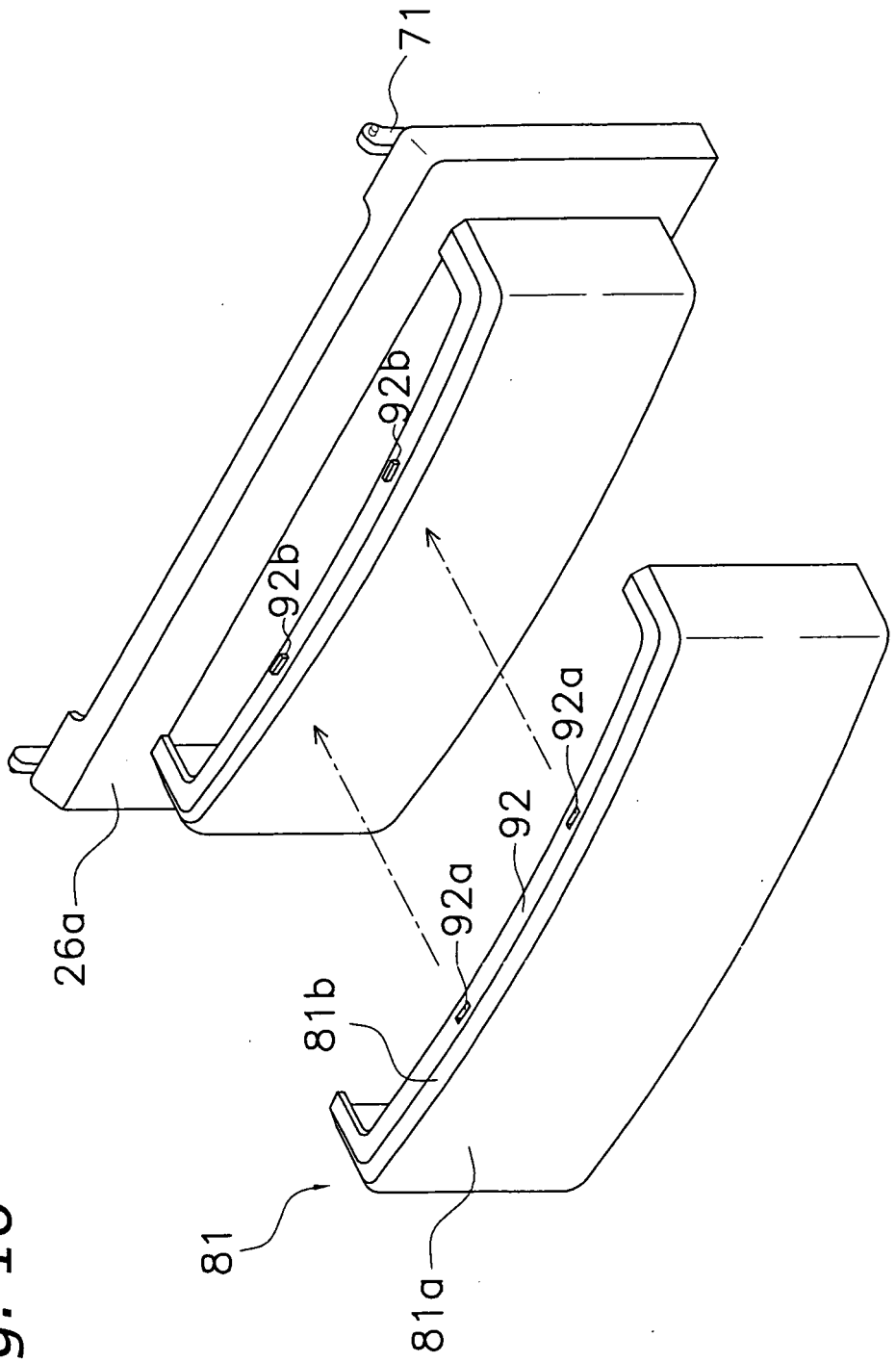
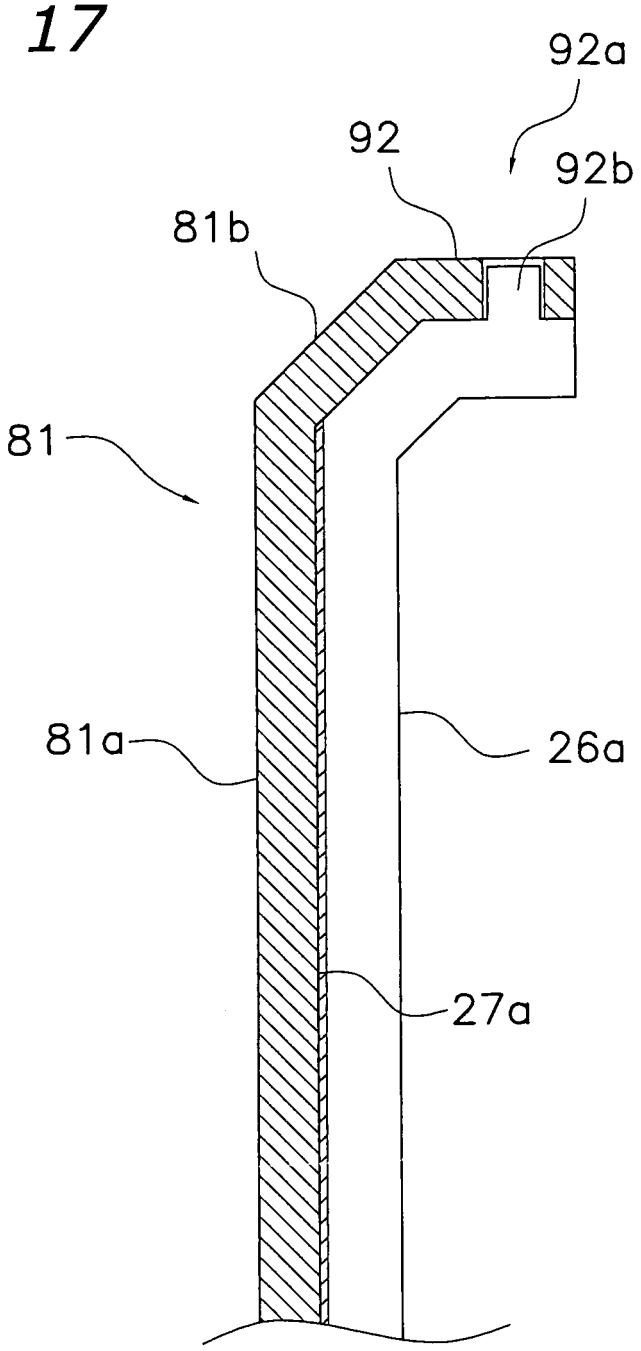


Fig. 16

Fig. 17



REFERENCES CITED IN THE DESCRIPTION

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- EP 1271065 A **[0004]**