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(54) **IMAGE FORMING DEVICE**

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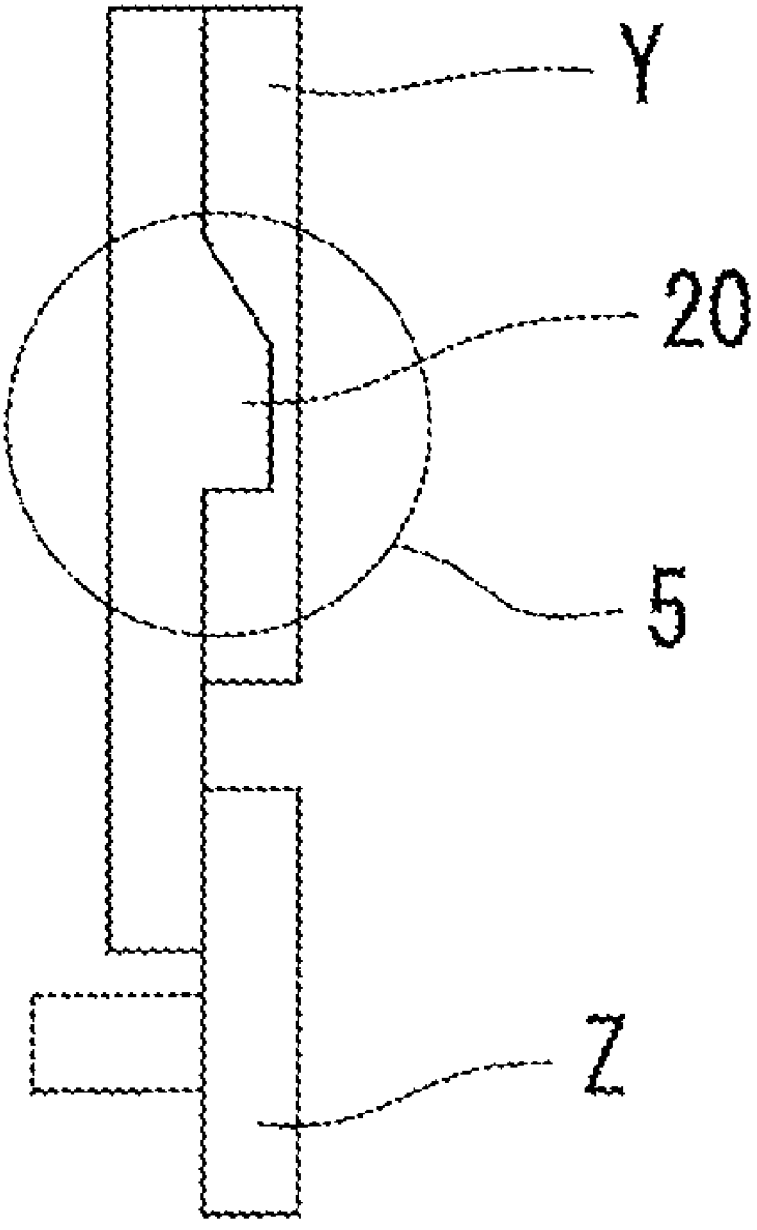
CPC ***G03G 21/1619*** (2013.01)

(57) **ABSTRACT**

An image forming device is provided with a rear face including a plurality of divided exterior plates. The plurality of exterior plates includes the exterior plates adjacent to each other in the lateral direction. A joint line of the exterior plates adjacent to each other in the lateral direction has a spigot joint shape, and a protrusion that discharges water to the outside is provided at a groove having the spigot joint shape.



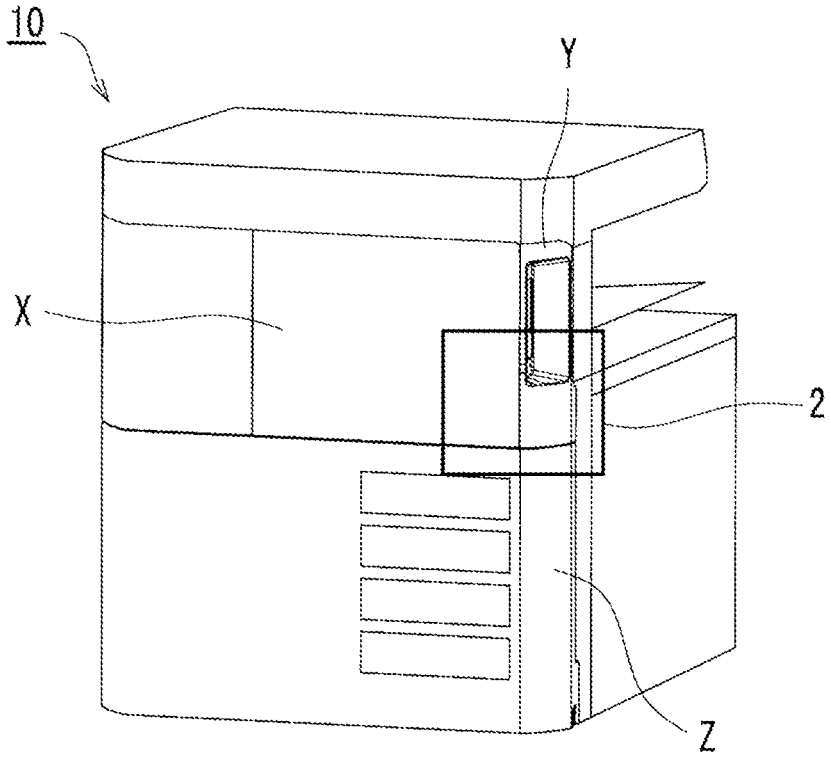


FIG. 1

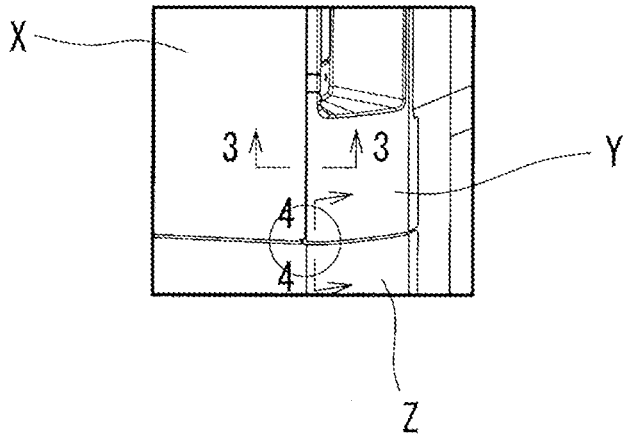


FIG. 2

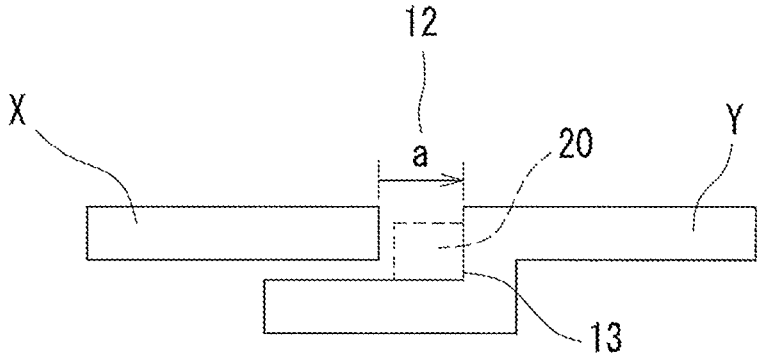


FIG. 3

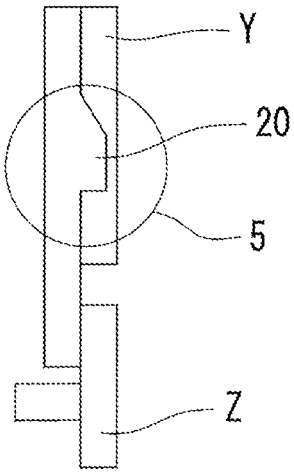


FIG. 4

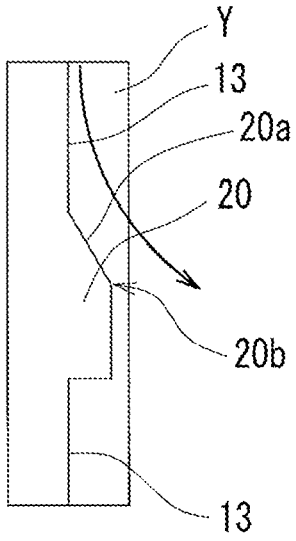


FIG. 5

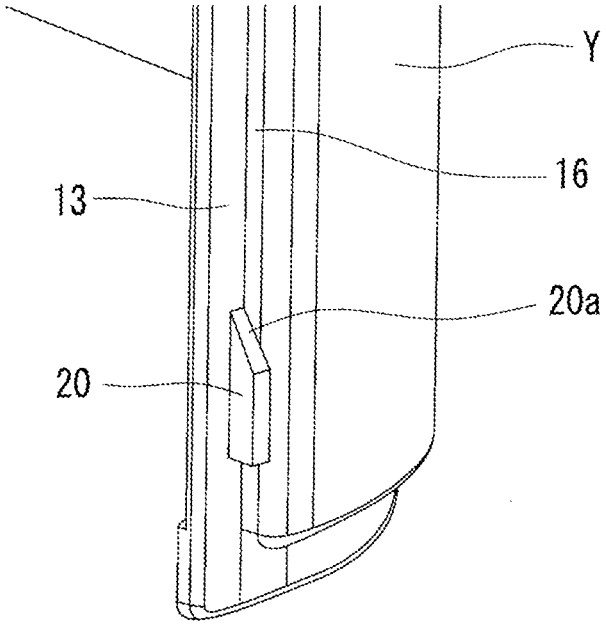


FIG. 6

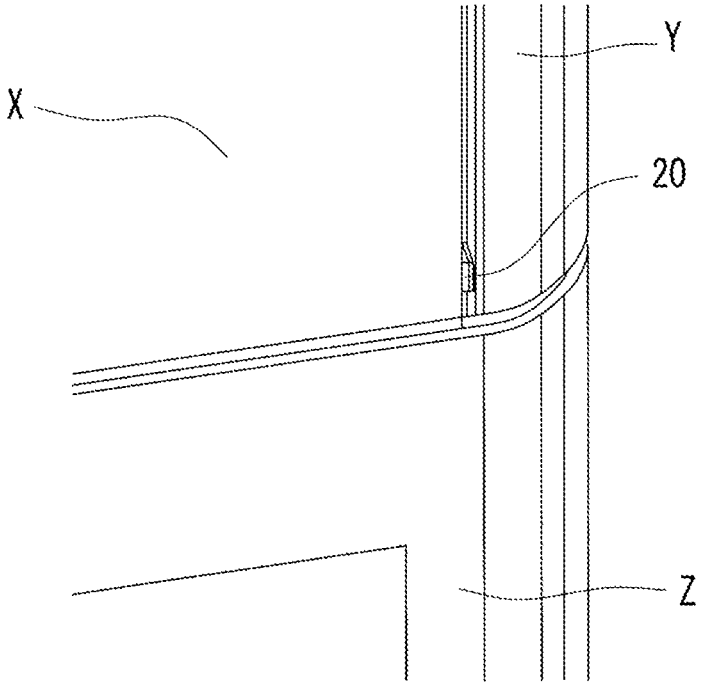


FIG. 7

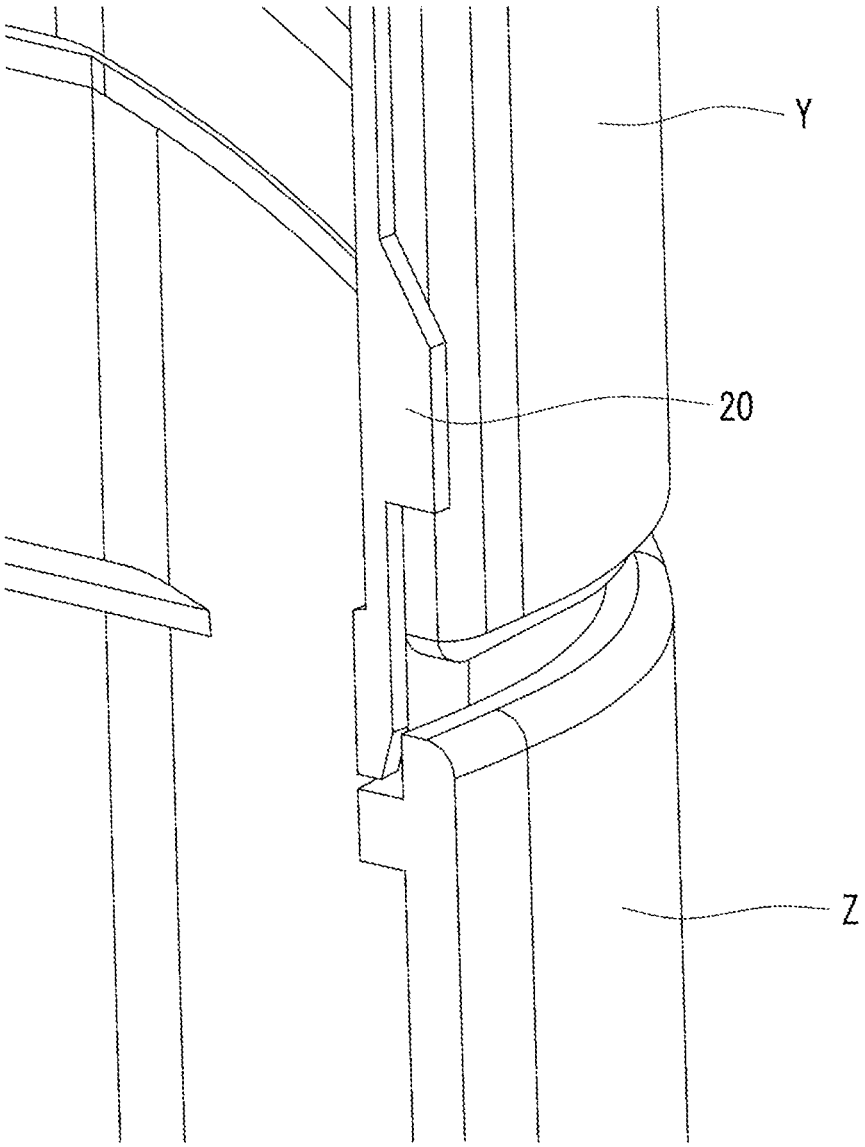


FIG. 8

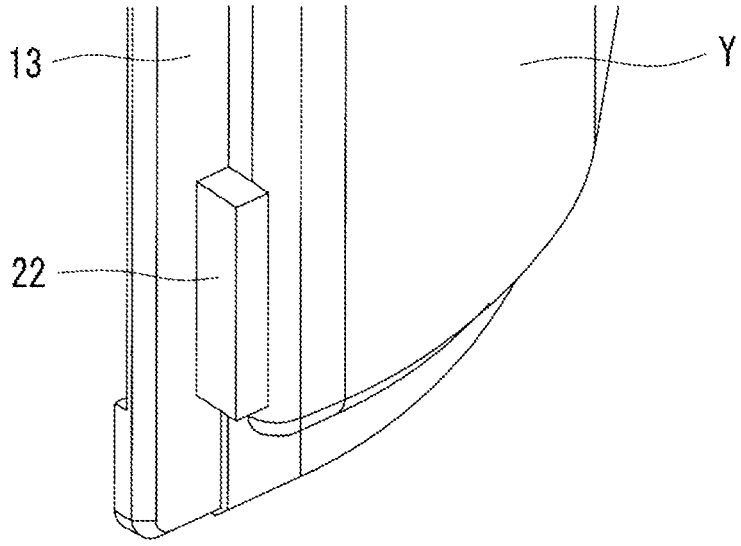


FIG. 9

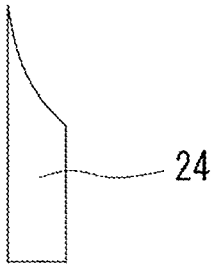


FIG. 10

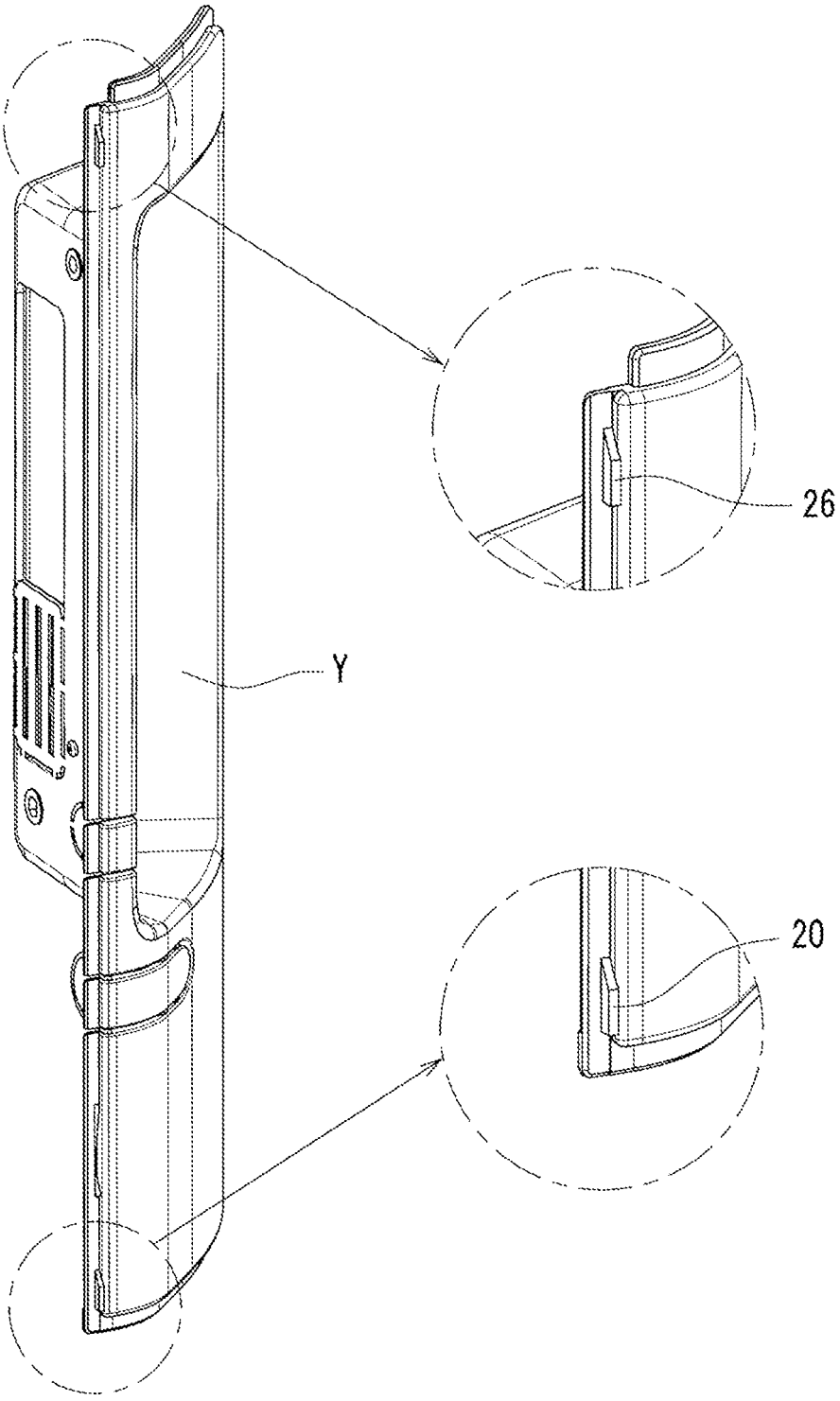


FIG. 11

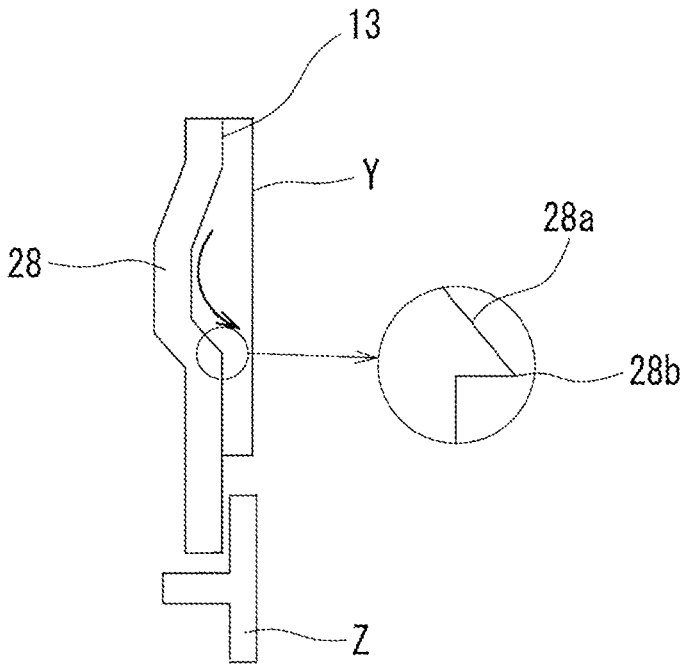


FIG. 12

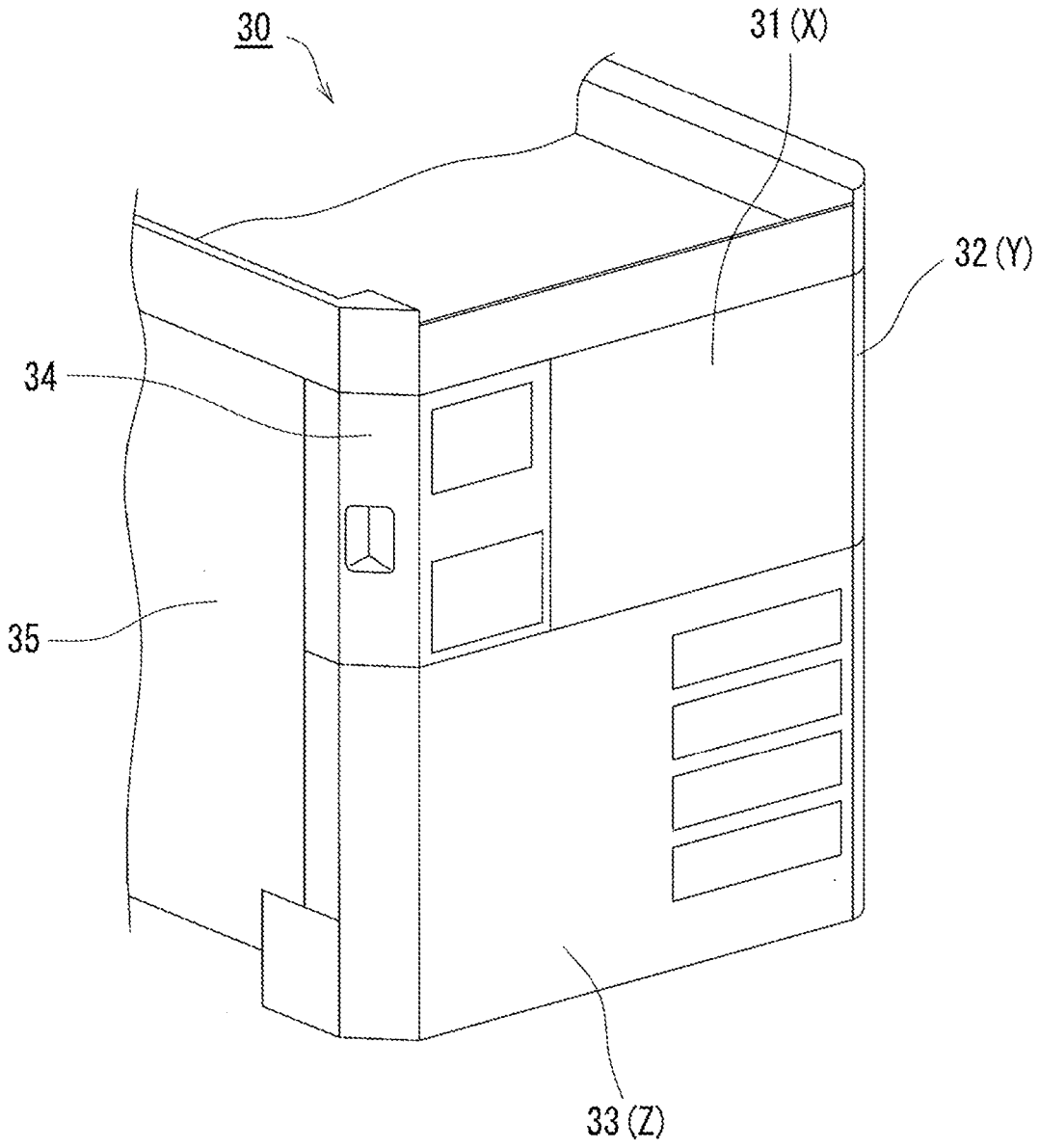


FIG. 13

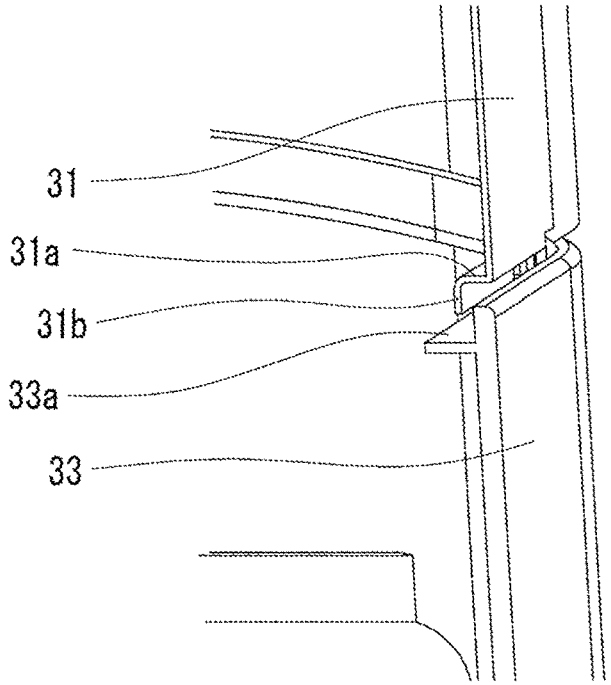


FIG. 14A

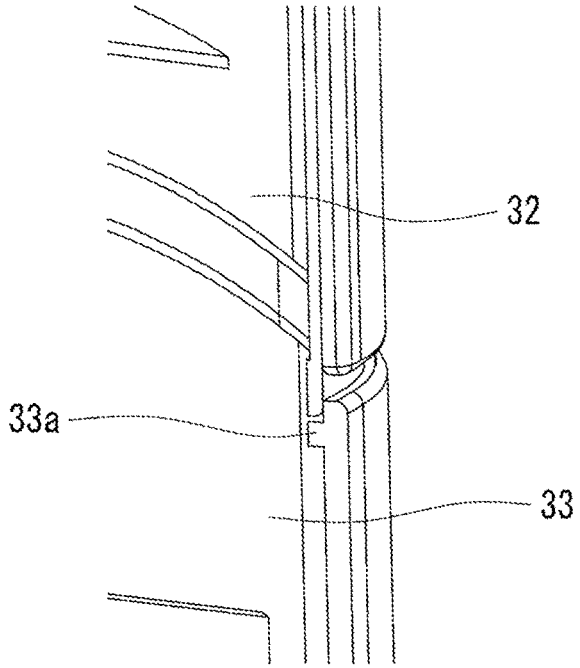


FIG. 14B

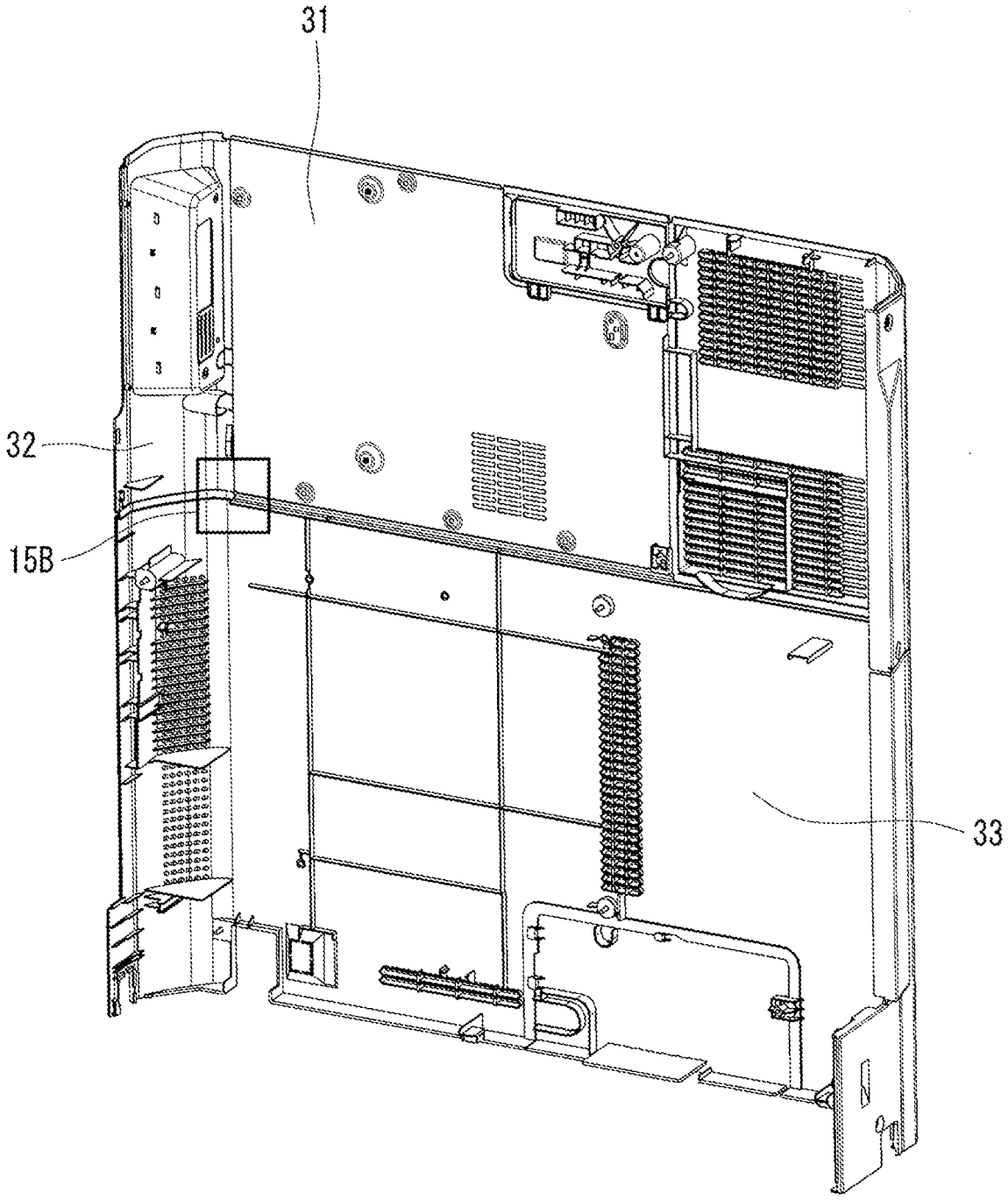


FIG. 15A

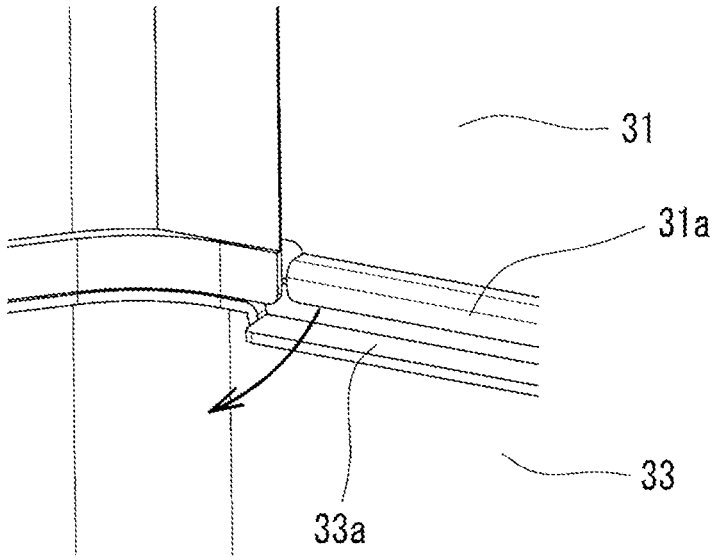


FIG. 15B

IMAGE FORMING DEVICE

TECHNICAL FIELD

[0001] The disclosure relates to an image forming device including an exterior component capable of preventing infiltration of water from the outside.

BACKGROUND ART

[0002] As a structure of a housing of a known image forming device, for example, a housing fitting structure is known that maintains the aesthetics of a device, and that prevents the device from being damaged even when an external force is applied thereto. As a structure of a joint line between exterior components, this housing fitting structure has a configuration that prevents infiltration of foreign matter through a gap. In this configuration, since an upper exterior plate is overlaid on the outer side of a lower exterior plate, even when a spigot joint shape is used, this configuration is highly resistant to the infiltration of water.

[0003] Meanwhile, in general, it is desirable that the upper exterior plate be overlaid with the lower exterior plate so that the upper exterior plate is disposed on the inner side of the lower exterior plate, for the purpose of maintenance and the like of the image forming device. Such an image forming device will be described. FIG. **13** is a perspective view illustrating a rear face **30** of such an image forming device, and the rear face **30** includes an upper left exterior plate **31**, an upper right exterior plate **32** connected to the upper left exterior plate **31** on the right side in the lateral direction, and a lower exterior plate **33** provided below the upper left exterior plate **31** and the upper right exterior plate **32**, each of which is a portion of a rear cabinet. In FIG. **13**, a portion **35** is connected to a corner portion **34** on the left side in the lateral direction, and the corner portion **34** is formed, on the left side in the lateral direction, to be continuous with the upper left exterior plate **31** and the lower exterior plate **33** connected to the lower end of the upper left exterior plate **31** of the rear cabinet. Thus, the portion **35** is structured to be able to be opened and closed when a paper jam or the like occurs, and the portion **35** is not fixed like the above-described exterior plates **31** to **33**.

[0004] FIG. **14**A and FIG. **14**B are enlarged perspective views of a connecting portion between the upper left exterior plate **31**, the upper right exterior plate **32**, and the lower exterior plate **33** illustrated in FIG. **13**, and are diagrams illustrating states in which these exterior plates **31** to **33** are connected to each other in a spigot joint shape. As illustrated in FIG. **14**A, a step portion **31***a* extending toward the inner side of the upper left exterior plate **31**, and an angled portion **31***b* extending downward from an inner end portion of the step portion **31***a* are provided at a lower end portion of the upper left exterior plate **31**, and the lower exterior plate **33** is attached to the step portion **31***a* from the outer side. Further, a protrusion **33***a* extending toward the inner side in the horizontal direction so as to receive the angled portion **31***b* is provided at an upper end portion of the lower exterior plate **33**. Similarly, as illustrated in FIG. **14**B, the upper right exterior plate **32** has a similar configuration, and the protrusion **33***a* extending toward the inner side in the horizontal direction so as to receive a step portion of the upper right exterior plate **32** is provided at the upper end portion of the lower exterior plate **33**.

[0005] FIG. **15**A is a perspective view of the rear cabinet when viewed from the inner side thereof, and is a perspective view illustrating a portion at which the three upper and lower exterior plates **31** to **33** are connected to each other. FIG. **15**B is an enlarged perspective view of a portion indicated by a rectangle **15**B in FIG. **15**A.

[0006] As illustrated in FIG. **14**A to FIG. **15**B, the connecting portion between the upper left exterior plate **31**, the upper right exterior plate **32**, and the lower exterior plate **33** of the rear cabinet has a configuration in which the exterior plates **31**, **32**, **33** are overlaid with each other in the spigot joint shape so that the lower exterior plate **33** is easily detached. In other words, the connecting portion between the upper left exterior plate **31** and the upper right exterior plate **32** of the rear cabinet forms a groove extending downward from above, and a spigot joint overlaid portion between these upper exterior plates **31**, **32** and the lower exterior plate **33** forms lateral grooves intersecting each other. Thus, an intersecting section of the three exterior plates forms an inverted T-shaped groove. Therefore, water flowing from above is divided in the lateral direction at an intersecting section at which three exterior plates X, Y, and Z intersect each other. Thus, the water easily infiltrates into the inside from the outside, as indicated by an arrow in FIG. **15**B.

SUMMARY

Technical Problem

[0007] The rear face of the known image forming device is configured as described above. Since the intersecting portion of the exterior plates is formed in the inverted T-shape, when water flows through the grooves formed by the exterior plates, the inverted T-shaped grooves serve as water channels, and a larger amount of water flows therethrough more vigorously than when normal exterior plates are used. When the water reaches a lower portion of the inverted T-shape, the water spreads laterally. Since the force of the water is strong, the water enters the inside of a main body of the image forming device through a gap of a joint line of the exterior plates, and water droplets adhere to electrical components such as a substrate. In order to cope with this problem, for example, countermeasure sheets have been added, and a design incorporating a water channel preventing the water droplets from adhering to important components has been adopted. However, with these countermeasures, there have been problems in that costs are increased, and a degree of freedom in internal design is reduced.

[0008] The disclosure has been made to solve the above-described problems, and an object of the disclosure is to provide an image forming device capable of reducing costs and increasing a degree of freedom in internal design.

Solution to Problem

[0009] An image forming device according to the disclosure includes a fixed rear face. The rear face includes a plurality of divided exterior plates, the plurality of exterior plates includes exterior plates adjacent to each other in a lateral direction, a joint line of the exterior plates adjacent to each other in the lateral direction has a spigot joint shape, and a member that discharges water to the outside is provided at the spigot joint-shaped portion.

[0010] The member that discharges the water to the outside is preferably a protrusion.

[0011] More preferably, the protrusion is provided at a lower portion of the joint line of the exterior plates adjacent to each other in the lateral direction.

[0012] The protrusion may be provided with an inclined surface to easily guide the water to the outside, and a height of the protrusion may be lower than a height of the adjacent exterior plate.

[0013] A plurality of the protrusions may be provided at the joint line.

[0014] According to an embodiment of the disclosure, the member that discharges the water to the outside is a recess.

Advantage Effects of Disclosure

[0015] According to the disclosure, since a member that discharges water to the outside, such as a protrusion, is provided at a joint line of exterior plates adjacent to each other in the lateral direction, infiltration of water can be prevented. Thus, it becomes unnecessary to add any sheet or take any design measure for preventing infiltration of water droplets into a device main body (such as addition of a waterproof sheet or design of a water channel), and it is possible to provide an image forming device capable of achieving a cost reduction and increasing a degree of freedom in internal design.

[0016] The above-described objects, other objects, features, and advantages of the disclosure will be further obvious from the detailed description of examples given below with reference to the drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0017] FIG. **1** is a perspective view illustrating a rear face of an image forming device according to a first embodiment of the disclosure.

[0018] FIG. **2** is an enlarged perspective view illustrating a portion surrounded by a rectangle in FIG. **1**.

[0019] FIG. **3** is a cross-sectional view of a portion indicated by arrows **3-3** in FIG. **2**.

[0020] FIG. **4** is a cross-sectional view of a portion indicated by arrows **4-4** in FIG. **2**.

[0021] FIG. **5** is an enlarged cross-sectional view of a portion surrounded by a circle and indicated by **5** in FIG. **4**.

[0022] FIG. **6** is a perspective view of a protrusion illustrated in FIG. **4** when viewed from the outside of a connecting portion of an exterior plate Y.

[0023] FIG. **7** is a perspective view of a connecting portion of exterior plates X, Y, and Z when viewed from the outside.

[0024] FIG. **8** is an enlarged perspective view of a protrusion provided at a connecting portion of the exterior plates Y, Z when viewed in a state in which the exterior plate X is removed.

[0025] FIG. **9** is a perspective view illustrating another shape of the protrusion.

[0026] FIG. **10** is a perspective view illustrating yet another shape of the protrusion.

[0027] FIG. **11** is a perspective view illustrating a state in which a plurality of the protrusions are provided.

[0028] FIG. **12** is a perspective view illustrating a state in which a recess is provided as a member that discharges water to the outside.

[0029] FIG. **13** is a perspective view illustrating a known rear face of an image forming device.

[0030] FIG. **14**A is an enlarged perspective view of a portion indicated by the exterior plates X, Z in FIG. **13**.

[0031] FIG. **14**B is an enlarged perspective view of a portion indicated by the exterior plates Y, Z in FIG. **13**.

[0032] FIG. **15**A is a perspective view illustrating a rear cabinet when viewed from the inside.

[0033] FIG. **15**B is an enlarged perspective view of a portion surrounded by a rectangle in FIG. **15**A.

DESCRIPTION OF EMBODIMENTS

First Embodiment

[0034] An embodiment according to the disclosure will be described below with reference to the drawings. First, a state in which exterior plates are attached to an image forming device according to the embodiment of the disclosure will be described. FIG. **1** is a perspective view illustrating a rear face **10** of an image forming device according to a first embodiment of the disclosure. As illustrated in FIG. **1**, the rear face **10** of the image forming device is formed by a fixed exterior component (exterior plate) divided into a plurality of components for maintainability, component influence, and the like. Here, the exterior plates of the rear face of the image forming device are referred to as a rear cabinet upper left plate (an exterior plate X, indicated by X in the drawings), a rear cabinet upper right plate (an exterior plate Y, indicated by Y in the drawings), and a rear cabinet lower plate (an exterior plate Z, indicated by Z in the drawings). Note that the exterior plate Z is provided below both the exterior plate X and the exterior plate Y.

[0035] FIG. **2** is an enlarged perspective view of a portion surrounded by a rectangle and indicated by **2** in FIG. **1**, FIG. **3** is a cross-sectional view of a portion indicated by arrows **3-3** in FIG. **2** (the upper side in the drawing is the outer surface thereof), FIG. **4** is a cross-sectional view of a portion indicated by arrows **4-4** in FIG. **2** (the right side in the drawing is the outer surface thereof), and FIG. **5** is an enlarged cross-sectional view of a portion surrounded by a circle and indicated by **5** in FIG. **4**.

[0036] As illustrated in FIGS. **2** to **5**, the exterior plate X and the exterior plate Y adjacent to each other in the lateral direction have a spigot joint shape forming a joint line having a gap **12** indicated by an arrow a in the drawing, and a groove **13** is formed in the vertical direction of the gap (connection section) **12**. Further, a cross section of a connecting portion between the exterior plate Y and the exterior plate Z in the vertical direction is configured as illustrated in FIG. **4**, and a protrusion **20** is provided as a member that discharges water to the outside at a bottom portion of the groove **13**. In addition, the lateral position of the protrusion **20** is indicated by a dotted line **20** in FIG. **3**.

[0037] Here, as illustrated in FIG. **5**, the protrusion **20** has an inclined surface **20***a* diagonally rising from the groove **13**, and as illustrated by an arrow in the drawing, water is guided to the outside along the inclined surface **20***a*. Note that the height of the protrusion **20** is lower than the depth of the groove **13**.

[0038] The reason why the protrusion **20** is provided at the groove **13**, as described above, is as follows. Based on a water injection test, it is known that the groove **13**, which extends in the vertical direction and is formed by the gap **12** of the connecting portion formed between the exterior plate X and the exterior plate Y connected to each other in the lateral direction, becomes a water channel and water flows

vigorously through the groove **13**. Thus, even when the spigot joint shape is adopted as illustrated in FIG. **3**, water may enter the inside of the rear face **10** of the image forming device from a point (a portion indicated by a circle in FIG. **2**) at which the exterior plates X, Y, and Z illustrated in FIG. **2** are overlaid with each other.

[0039] In order to prevent the infiltration of water, in the disclosure, the protrusion **20** that guides water to the outside is provided at the groove **13** having the spigot joint shape.

[0040] As described above, when water is splashed on the image forming device from the outside and flows along the rear face of the main body, the groove **13** constituting the vertical joint line of the exterior components arranged on the left and right sides becomes a water channel, and the water flows vigorously therethrough. In the disclosure, by providing the protrusion **20** at the groove **13**, the water can be guided to the outside of the machine (image forming device).

[0041] In particular, when another exterior plate is provided below the exterior components disposed on the left and right sides, and the joint line of the exterior plates forms an inverted T-shaped groove, if the water flows through the joint line and reaches a lower portion of the inverted T-shape, due to a strong force of water, the water enters the inside of the main body of the image forming device through the gap of the joint line of the exterior plates rather than spreading laterally. However, using the protrusion **20**, this infiltration of water can be prevented.

[0042] Next, the connecting portion of the exterior plates including the protrusion **20** will be described in detail. FIG. **6** is a perspective view, when viewed from the outside, illustrating a state in which the protrusion **20** illustrated in FIG. **4** is provided at the connecting portion between the exterior plate X and the exterior plate Y (however, the exterior plate X is not illustrated), FIG. **7** is a perspective view illustrating the connecting portion between the three exterior plates X, Y, and Z when viewed from the outside, and FIG. **8** is a cross-sectional view of the connecting portion illustrated in FIG. **7**, taken along a connecting portion between the protrusion **20** and the exterior plate X.

[0043] As illustrated in FIGS. **6** to **8**, the protrusion **20** having the inclined surface **20***a* is provided at a lower end portion of a joint line **16** of the exterior plate constituting the groove **13** (in this case, the exterior plate Y) among the two exterior plates X and Y connected to each other in the lateral direction. In this way, the protrusion **20** becomes inconspicuous, and does not affect the appearance of the image forming device. In addition, since there is also a flow of water laterally flowing into the water channel, effectiveness is increased when the protrusion **20** is positioned at a lower portion of the joint line **16**. Further, by providing the inclined surface **20***a*, the water can be more easily caused to flow to the outside.

[0044] Further, as illustrated here, the protrusion **20** may be used for the purpose of positioning by being brought into contact with a side surface of the adjacent exterior plate (in this case, the exterior plate X).

[0045] Next, specific dimensions of the protrusion **20** will be described. Normally, the gap **12** has a width dimension a of 1 mm to 5 mm, and the protrusion also has a width dimension of 1 mm to 5 mm in accordance with the width dimension of the gap **12**. However, when the width of the groove is increased, the effect of the protrusion **20** discharging the water to the outside is reduced. Therefore, the width is preferably approximately 2mm.

[0046] Note that the inclination of the inclined surface **20***a* is preferably steep. For example, the inclination angle with respect to the horizontal direction is preferably 30 degrees or greater. In addition, an edge portion (indicated by **20***b* in FIG. **5**) at which the inclined surface **20***a* and a flat portion of an upper portion of the protrusion **20** intersect each other is linear, or has a small R (0.5 mm or less), so that when water flows down from above, the flow of the water can be drained. This is to prevent water droplets from traveling downward.

[0047] Next, another shape of the protrusion according to the disclosure will be described. FIG. **9** is a perspective view illustrating the other shape of the protrusion. As illustrated in FIG. **9**, in this embodiment, a protrusion **22** has a rectangular parallelepiped shape, and does not have an inclined portion inclined outward from above in the downward direction. Since the water flows in the groove **13** of a spigot joint portion, even when the rectangular parallelepiped shape illustrated in FIG. **9** is adopted, a certain degree of effect can be expected for the purpose of discharging the water to the outside of the machine (image forming device). However, there is a possibility that the water remains on the flat surface of the protrusion, or on a rising portion of the protrusion. Thus, in order to improve the effect, the inclined surface **20***a* is preferably formed as illustrated in FIG. **6**.

[0048] Next, yet another shape of the protrusion will be described. FIG. **10** is a perspective view illustrating the yet another shape of the protrusion. As illustrated in FIG. **10**, a protrusion **24** has an inclined surface formed in an arc shape and inclined from above in the downward direction. Even when the protrusion **24** has such a shape, the same effect as that of the embodiment described above can be obtained.

[0049] Next, the number of protrusions will be described. In the above-described embodiment, a case is described in which the single protrusion is provided at a lower end portion of an inwardly extending portion of the exterior plates X and Y adjacent to each other in the lateral direction, the inwardly extending portion forming the spigot joint portion. However, the number of protrusions is not limited to this example, and a plurality of the protrusions may be provided.

[0050] FIG. **11** is a diagram for describing the protrusions in this case. As illustrated in FIG. **11**, here, the protrusion **20** illustrated in FIG. **6** is provided at a lower portion of the exterior plate Y, and a similar protrusion **26** is further provided at an upper portion of the exterior plate Y. In this way, when a plurality of the protrusions **20**, **26** are disposed at the upper and lower portions as described above, an amount of water infiltrating into the machine (image forming device) is further reduced by discharging the water to the outside at a plurality of locations.

[0051] Further, by forming the protrusions having the same shape in the vertical direction, the protrusions can be used for positioning the adjacent exterior plates (the exterior plate X and the exterior plate Y in FIG. **7**, for example). In other words, the gap between the adjacent exterior plates can be maintained at a constant value.

[0052] Further, as illustrated in FIG. **8**, the lower end portion of the protrusion **20** is preferably provided so as to be in close proximity to the exterior plate Z.

Second Embodiment

[0053] Next, a second embodiment of the member that discharges the water to the outside will be described. In the embodiment described above, a case is described in which the protrusion is used as the member that discharges the water to the outside, but in this embodiment, a recess is provided as the member that discharges the water to the outside. FIG. **12** is a diagram for describing a case in which the recess, as the member that discharges the water to the outside, is provided instead of the protrusion **20** in FIG. **6**, and is a diagram illustrating a lower end portion of the recess.

[0054] As illustrated in FIG. **12**, in this embodiment, a recess **28** is formed in advance at a portion to be the groove **13** constituting the spigot joint shape. In this case, the recess **28** has the same predetermined thickness as that of the groove **13**, and is recessed from the surface of the adjacent exterior plate Y. The flow of water in this case is indicated by an arrow in FIG. **12**. As indicated by the arrow, the water flows from above along the surface of the recess **28**, is caused to flow toward the back, and is then directed to the outside.

[0055] Since the member that discharges the water to the outside is the recess **28**, the water can be discharged to the outside without generating a sense of something being out of place in terms of the appearance of the product.

[0056] Note that, here, as illustrated in an enlarged view indicated by a right arrow in FIG. **12**, the tip of an end portion **28***b* of the recess **28** preferably protrudes to the outside, the recess **28** having an inclined portion **28***a* inclined toward the outside. With this protrusion, water that has been directed toward the outside but has not been discharged to the outside is prevented from once again traveling downward along the groove **13**.

[0057] The disclosure may be embodied in other various forms without departing from the spirit or essential characteristics thereof. Thus, the above embodiments are merely examples and should not be interpreted as limiting. All modifications and changes equivalent in scope with the claims of the disclosure are included in the scope of the disclosure.

INDUSTRIAL APPLICABILITY

[0058] According to the disclosure, a useful image forming device is provided, since infiltration of water can be prevented by the shape of an exterior plate, making it possible to provide an image forming device capable of achieving a cost reduction and increasing a degree of freedom in internal design.

REFERENCE SIGNS LIST

[0059] **10**, **30** Rear face
[0060] **12** Gap
[0061] **13** Groove
[0062] **16** Joint line
[0063] **20**, **22**, **24**, **26** Protrusion
[0064] **28** Recess

1. An image forming device comprising
a fixed rear face,
wherein the rear face includes a plurality of divided exterior plates,
the plurality of exterior plates includes exterior plates adjacent to each other in a lateral direction,
a joint line of the exterior plates adjacent to each other in the lateral direction has a spigot joint shape, and
a member that discharges water to the outside is provided at the joint line of the exterior plates.

2. The image forming device according to claim **1**,
wherein the member that discharges the water to the outside is a protrusion protruding from the exterior plate.

3. The image forming device according to claim **2**,
wherein the protrusion is provided at a lower portion of the joint line of the exterior plates adjacent to each other in the lateral direction.

4. The image forming device according to claim **2**,
wherein the protrusion is provided with an inclined surface to easily guide the water to the outside, and
a height of the protrusion is lower than a height of the adjacent exterior plate.

5. The image forming device according to claim **2**,
wherein a plurality of the protrusions are provided at the joint line.

6. The image forming device according to claim **1**,
wherein the member that discharges the water to the outside is a recess.

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