(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
04 October 2018 (04.10.2018)

WIPO | PCT

(10) International Publication Number
WO 2018/181539 A1

(51) International Patent Classification:
G03G 15/00 (2006.01) *G03G 21/16* (2006.01)
B41J 29/13 (2006.01)

(21) International Application Number:
PCT/JP2018/012900

(22) International Filing Date:
28 March 2018 (28.03.2018)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

2017-063981	28 March 2017 (28.03.2017)	JP
2017-063982	28 March 2017 (28.03.2017)	JP
2017-063983	28 March 2017 (28.03.2017)	JP

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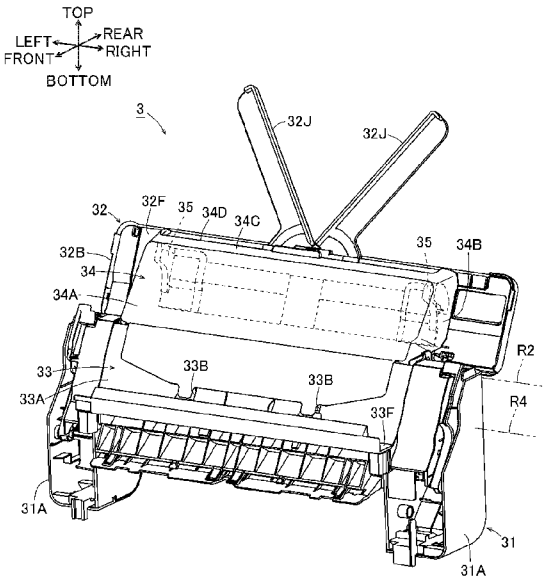
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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,

(54) Title: SHEET SUPPLY TRAY AND IMAGE FORMING APPARATUS

[Fig. 2]



(57) Abstract: A sheet supply tray (3) includes: a sheet supporting portion (32) having a sheet supporting surface (32C, 32F); a first cover (33); and a second cover (34). The first cover (33) has a first engagement portion (33B). The second cover (34) covers the sheet supporting surface (32C, 32F) and includes a second engagement portion (34E) engageable with the first engagement portion. One of the first and second engagement portions (33B, 34E) is a protrusion, and remaining one is a recess. The recess is detachably attachable to the protrusion and pivotally movably engaged with the protrusion so that the second cover (34) is detachably attachable to the first cover (33) in a predetermined direction and is pivotally movable relative to the first cover (33) between a first position covering the sheet supporting surface (32C, 32F) and a second position exposing the sheet supporting surface (32C, 32F) to an outside.

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MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

Description

Title of Invention: SHEET SUPPLY TRAY AND IMAGE FORMING APPARATUS

Technical Field

[0001] The present disclosure relates to a sheet supply tray and an image forming apparatus provided with the same.

Background Art

[0002] There is conventionally known an image forming apparatus configured to form an image on a sheet and provided with a sheet supply tray on its rear side. The sheet supply tray is configured to support one or a plurality of sheets obliquely to supply the sheet into the image forming apparatus. One such sheet supply tray is configured to be capable of supporting at least one sheet and has a sheet supply portion exposed to an outside.

[0003] In one such the image forming apparatus, the sheet supply tray may have a collapsible sheet supporting portion as disclosed in Japanese patent application publication No. 2016-210578 (PTL 1). When the sheet supply tray is not used, the sheet supporting portion is folded to cover an upper portion of the sheet supply tray.

[0004] When such conventional image forming apparatus is used in a dusty environment, dust may enter a housing of the image forming apparatus through the sheet supply portion of the sheet supply tray, in particular, in a state where the sheet supporting portion remains open. The dust entering into the housing may adhere to a roller, a gear, and the like of a drive section, which increases a load applied to the drive section and causes malfunction of the drive section. In order to prevent dust from entering the housing of the image forming apparatus through the sheet supply portion, it is conceivable to provide a dust proof cover for covering the sheet support tray.

[0005] Here, it is preferable that one such dust proof cover is detachable. By detaching the dust proof cover during transportation of the image forming apparatus, the image forming apparatus can be reduced in size. In addition, damage to the dust proof cover can be avoided. Further, in an environment free from dust, the image forming apparatus can be used in a state where the dust proof cover is detached. Thus, the image forming apparatus can be used in a compact size.

[0006] It is also preferable that such a dust proof cover is pivotally movable. With such a dust proof cover, sheets can be replenished onto the sheet supply tray without detaching the dust proof cover. This enhances convenience of users.

[0007] For example, Japanese patent application publication No. 2002-128365 (PTL 2) discloses a configuration for detachably and pivotally movably attaching a dust proof

cover to a housing of an image forming apparatus by inserting projecting portions formed at a lower end portion of the dust proof cover into through-holes formed in the housing.

Citation List

Patent Literature

[0008] PTL 1: Japanese Patent Application Publication No. 2016-210578
PTL 2: Japanese Patent Application Publication No. 2002-128365

Summary of Invention

Technical Problem

[0009] In the image forming apparatus disclosed in PTL 2, in order for the dust proof cover to be pivotally movable, gaps are required between the through-holes and the corresponding projecting portions. However, dust may enter the housing through these gaps. Thus, such gaps lower dust proof performance.

[0010] Further, in the image forming apparatus disclosed in PTL 2, the dust proof cover may accidentally fall onto a space between the housing and the sheet supply tray since the dust proof cover is configured to be detachable. If a reading unit provided at an upper portion of the housing is open in this state, the dust proof cover may be damaged as a result of getting caught between the reading unit and the sheet supply tray.

[0011] Further, it is conceivable that a pivotally movable dust proof cover is provided in the image forming apparatus disclosed in PTL 1. In this case, the sheet supporting portion may be folded toward the dust proof cover while the dust proof cover is attached. This configuration causes a problem in that the dust proof cover may be damaged as a result of getting caught between the reading unit and the sheet supply tray if a reading unit provided at an upper portion of the housing is open while the sheet supporting portion is folded.

Solution to Problem

[0012] In view of the foregoing, it is an object of the disclosure to provide a sheet supply tray that enables a dust proof cover to be detachably and pivotally movably attached while achieving high dust proof performance, and to provide an image forming apparatus provided with the sheet supply tray.

[0013] It is another object of the disclosure to provide an image forming apparatus capable of avoiding damage to a dust proof cover even if an upper housing of the image forming apparatus is open in a state where the dust proof cover is attached and where the sheet supporting portion is folded toward the dust proof cover.

[0014] It is still another object of the disclosure to provide an image forming apparatus capable of avoiding damage to a dust proof cover even if an upper housing of the image forming apparatus is open in a state where the dust proof cover is positioned out

of a prescribed position.

[0015] In order to attain the above and other objects, according to one aspect, the disclosure provides a sheet supply tray including: a sheet supporting portion; a first cover; and a second cover. The sheet supporting portion is positioned at one side surface of a housing of an image forming apparatus. The sheet supporting portion has a sheet supporting surface on which a sheet to be conveyed into the housing is supported. The sheet supporting surface has a portion. The first cover has one surface facing the portion of the sheet supporting surface and an opposite surface opposite to the one surface. The opposite surface has a first engagement portion. The second cover includes a second engagement portion engageable with the first engagement portion. The second cover is positioned between the sheet supporting surface and the one side surface and configured to cover at least a part of the sheet supporting surface. One of the first engagement portion and the second engagement portion is a protrusion, and remaining one of the first engagement portion and the second engagement portion is a recess. The recess is attachable to and detachable from the protrusion and pivotally movably engaged with the protrusion so that the second cover is attachable to and detachable from the first cover in a predetermined direction and is pivotally movable relative to the first cover between a first position where the second cover covers the sheet supporting surface and a second position where the sheet supporting surface is exposed to an outside.

[0016] It is preferable that the first engagement portion is the recess opening upward and extending in a widthwise direction parallel to the sheet supporting surface and orthogonal to a conveying direction of the sheet. The recess has a shape capable of receiving the protrusion. The second engagement portion is positioned at a lower end portion of the second cover, and is the protrusion having a columnar shape extending in the widthwise direction.

[0017] It is preferable that the second cover includes: a main cover positioned facing the sheet supporting surface, the main cover having side portions in a widthwise direction parallel to the sheet supporting surface and orthogonal to a conveying direction of the sheet; and a pair of side covers extending from each of the side portions of the main cover toward the sheet supporting surface.

[0018] It is preferable that the sheet supply tray further includes a pair of side guides provided at the sheet supporting surface and movable toward and away from each other in the widthwise direction. The pair of side guides is configured to adjust a widthwise position of the sheet supported on the sheet supporting surface. The pair of side covers is positioned outside of the pair of side guides in the widthwise direction in a state where the pair of side guides provide a maximum distance therebetween in the widthwise direction.

[0019] It is preferable that the sheet supporting surface has widthwise ends in the widthwise direction, and the pair of side covers is positioned inside of the widthwise ends of the sheet supporting surface in the widthwise direction.

[0020] It is preferable that the sheet supply tray further includes a sheet introduction portion provided at an upper end portion of the second cover. The sheet introduction portion has an inclined surface facing the sheet supporting surface. The inclined surface has a lower end and an upper end positioned farther from the sheet supporting surface than the lower end is from the sheet supporting surface.

[0021] It is preferable that the sheet supply tray further includes a positioning portion provided at an upper end portion of each of the pair of side covers at a position facing the sheet supporting surface. The positioning portion is configured to abut on the sheet supporting surface in a state where the second cover is at the first position.

[0022] It is preferable that the first engagement portion has a first portion, a bottom portion, and a second portion in combination to provide the recess. The first portion is positioned closer to the one side surface of the housing than the second portion is to the housing. The first portion has a height from the bottom portion capable of avoiding interference with a locus of the second engagement portion during pivotal movement of the second cover about a point of contact with the first cover as a fulcrum in a case where an external force is applied to the second cover at the first position in a direction away from the second position.

[0023] It is preferable that the first portion is a sloped surface sloping downward toward the bottom portion.

[0024] It is preferable that the first engagement portion has a first portion, a bottom portion, and a second portion in combination to provide the recess. The first portion is positioned closer to the one side surface of the housing than the second portion is to the housing. The first portion has a height from the bottom portion greater than a radius of the second engagement portion.

[0025] According to another aspect, the disclosure provides an image forming apparatus includes: a housing; an image forming portion accommodated in the housing and configured to form an image on a sheet; and the sheet supply tray described above.

[0026] It is preferable that the image forming apparatus further includes: a second housing positioned above the housing and pivotally movable about a first pivot axis between a covering position covering an upper portion of the housing and an exposing position exposing the upper portion to an outside. The sheet supply tray is positioned at side surfaces of the housing and the second housing at which the first pivot axis is positioned. The sheet supporting portion includes: a first sheet supporting portion and a second sheet supporting portion. The first sheet supporting portion has a first sheet supporting surface configured to support the sheet to be conveyed into the housing.

The second sheet supporting portion is connected to an upper end portion of the first sheet supporting portion and has a second sheet supporting surface configured to support the sheet to be conveyed into the housing. The second sheet supporting portion is pivotally movable about a second pivot axis parallel to the first pivot axis between a use position and a storage position. At the use position, the second sheet supporting surface is capable of supporting the sheet in cooperation with the first sheet supporting surface. At the storage position, a free end of the second sheet supporting portion is positioned closest to the second housing. The first cover is positioned facing the first sheet supporting surface. The second cover has a lower end portion engageable with a portion of the first cover. The portion of the first cover is positioned on the opposite surface. The second cover is pivotally movable about a third pivot axis parallel to the first pivot axis between the first position where the second cover covers the first sheet supporting surface and the second sheet supporting surface and the second position where the first sheet supporting surface and the second sheet supporting surface are exposed to the outside. The second cover and the second sheet supporting portion are configured such that, as a result of pressure application from the second housing to the second cover by the pivotal movement of the second housing from the covering position to the exposing position in a state where the second cover is at the second position and where the second sheet supporting portion is positioned between the use position and the storage position and where the free end of the second sheet supporting portion is in abutment with the second cover, (i) the second cover is in abutment with the free end of the second sheet supporting portion at an abutment position as a result of the pressure application; (ii) pressure application from the second cover to the second sheet supporting portion generates, at the abutment position, a force directed in a tangential direction in an imaginary circle whose center is at the third pivot axis as viewed in a direction of the first pivot axis; and (iii) the force has, at the abutment position, a component of force directed in a tangential direction in an imaginary circle whose center is at the second pivot axis, the component of force being directed away from the second cover as viewed in a direction of the first pivot axis.

[0027] It is preferable that the image forming apparatus further including: a second housing positioned above the housing and pivotally movable about a first pivot axis between a covering position covering an upper portion of the housing and an exposing position exposing the upper portion to an outside. The sheet supply tray is positioned at side surfaces of the housing and the second housing at which the first pivot axis is positioned. The sheet supporting portion includes: a first sheet supporting portion and a second sheet supporting portion. The first sheet supporting portion has a first sheet supporting surface configured to support the sheet to be conveyed into the housing. The second sheet supporting portion is connected to an upper end portion of the first

sheet supporting portion and has a second sheet supporting surface configured to support the sheet to be conveyed into the housing. The second sheet supporting portion is pivotally movable about a second pivot axis parallel to the first pivot axis between a use position and a storage position. At the use position, the second sheet supporting surface is capable of supporting the sheet in cooperation with the first sheet supporting surface. At the storage position, a free end of the second sheet supporting portion is positioned closest to the second housing. The first cover is positioned facing the first sheet supporting surface. The second cover has a lower end portion engageable with a portion of the first cover. The portion of the first cover is positioned on the opposite surface. The second cover is pivotally movable about a third pivot axis parallel to the first pivot axis between the first position where the second cover covers the first sheet supporting surface and the second sheet supporting surface and the second position where the first sheet supporting surface and the second sheet supporting surface are exposed to the outside. The second cover and the second sheet supporting portion are configured such that, as a result of pressure application from the second housing to the second cover by the pivotal movement of the second housing from the covering position to the exposing position in a state where the second cover is at the second position and where the second sheet supporting portion is positioned between the use position and the storage position and where the free end of the second sheet supporting portion is in abutment with the second cover, (i) the second cover is in abutment with the free end of the second sheet supporting portion at an abutment position as a result of the pressure application; (ii) pressure application from the second cover to the second sheet supporting portion generates, at the abutment position, a force directed in a tangential direction in an imaginary circle whose center is at the third pivot axis as viewed in a direction of the first pivot axis; and (iii) the second pivot axis, the third pivot axis, and the abutment position in combination provide an imaginary triangle, the force being directed in a direction away from the imaginary triangle as viewed in a direction of the first pivot axis.

[0028] It is preferable that the second cover has a notched region, and the free end of the second sheet supporting portion is in abutment with the notched region in the state where the second cover is at the second position and where the second sheet supporting portion is positioned between the use position and the storage position and where the free end of the second sheet supporting portion is in abutment with the second cover.

[0029] It is preferable that as viewed in a direction of the first pivot axis, the second cover has an inflection point positioned in an upper portion of the notched region and protruding toward the second sheet supporting surface.

[0030] It is preferable that the image forming apparatus further includes: a second housing positioned above the housing and pivotally movable about a first pivot axis between a

covering position covering an upper portion of the housing and an exposing position exposing the upper portion to an outside. The sheet supply tray is positioned at side surfaces of the housing and the second housing at which the first pivot axis is positioned. The sheet supporting surface of the sheet supporting portion is sloped. The second cover is positioned between the sheet supporting surface and the side surfaces of the housing and the second housing. The second cover further includes an extension portion extending toward the sheet supporting surface. The second cover and the first cover are configured such that, as a result of pressure application from the second housing to the second cover by the pivotal movement of the second housing from the covering position to the exposing position in a state where the second engagement portion is disengaged from the first engagement portion so that the second cover is at a third position where the second cover is positioned on the first cover, (i) as a result of the pressure application, the second housing at a first abutment position is in abutment with the second cover and the extension portion is in abutment with the first cover at a second abutment position; and (ii) the pressure application to the second cover generates a force directing from the first abutment position to the second abutment position, the force being directed upward relative to a normal line perpendicular to an abutment surface of the first cover and passing through the second abutment position.

[0031] It is preferable that the extension portion has a lower portion having a curved shape recessed in a direction away from the second engagement portion.

[0032] It is preferable that the second engagement portion is configured to be movable to a height capable of being engaged with the first engagement portion by pivotal movement of the second housing from the covering position to the exposing position while the second cover is at the third position.

[0033] It is preferable that the abutment surface of the first cover is sloped downward toward the housing.

[0034] It is preferable that the first engagement portion is the recess opening upward and extending in a widthwise direction parallel to the sheet supporting surface and orthogonal to a conveying direction of the sheet, the recess having a shape capable of receiving the protrusion. The second engagement portion is positioned at a lower end portion of the second cover, and is the protrusion having a columnar shape and extending in the widthwise direction. The abutment surface of the first cover has a lower end positioned below a diametrical center of the columnar shape in a state where the second cover is at the third position.

Advantageous Effects of Invention

[0035] According to the present disclosure, the second cover is detachable from the first cover. Hence, during transportation of the image forming apparatus, the image forming

apparatus can be made more compact by detaching the second cover. Moreover, damage to the second cover can be avoided. Further, the image forming apparatus may be used at a smaller size if the second cover is detached while the image forming apparatus is in use. Further, the second cover is pivotally movable. Thus, sheets can be replenished without detaching the second cover, thereby enhancing the usability of the image forming apparatus. In addition, since the first engagement portion is not a through-hole, high dustproof performance can be achieved.

[0036] Further, according to the present disclosure, even if the second housing is opened while the second sheet supporting portion is nearly at the storage position, the second housing moving toward the exposing position pushes the second cover to pivotally move the second cover toward the first position. The second cover moving toward the first position then pushes the second sheet supporting portion to pivotally move the second sheet supporting portion toward the use position. Therefore, the second cover can avoid being crushed between the second housing and the second sheet supporting portion. Accordingly, damage to the second cover can be avoided.

[0037] Still further, according to the present disclosure, even if the second housing is opened when the second cover has been dropped and caught between the second housing and the first cover, the second cover is lifted upward along the abutment surface of the first cover. This configuration can avoid the second cover from being crushed between the second housing and the first cover, and thus damage to the second cover can be avoided.

Brief Description of Drawings

[0038] [fig.1]Fig. 1 is a perspective view of a multifunction peripheral according to one embodiment;

[fig.2]Fig. 2 is a perspective view of a rear sheet supply tray provided in the multifunction peripheral according to the embodiment;

[fig.3]Fig. 3 is a perspective view of a dust proof cover of the rear sheet supply tray according to the embodiment, as viewed from a front side thereof;

[fig.4]Fig. 4 is a perspective view of the dust proof cover according to the embodiment, as viewed from a rear side thereof;

[fig.5]Fig. 5 is a side cross-sectional view of the rear sheet supply tray according to the embodiment, in a state where the dust proof cover is at a first position;

[fig.6]Fig. 6 is an enlarged view of a part of the rear sheet supply tray in Fig. 5;

[fig.7]Fig. 7 is a side cross-sectional view of the rear sheet supply tray according to the embodiment, in a state where the dust proof cover is at a second position;

[fig.8]Fig. 8 is a right side view of a part of the multifunction peripheral according to the embodiment, illustrating a state where a second housing of the multifunction pe-

ripheral is at a covering position and where a second sheet supporting portion of the rear sheet supply tray is positioned between a second use position and a second storage position;

[fig.9]Fig. 9 is a right side view of a part of the multifunction peripheral according to the embodiment, illustrating a state where the second housing is being pivotally moved toward an exposing position from the state illustrated in Fig. 8;

[fig.10]Fig. 10 is a right side view of a part of the multifunction peripheral according to the embodiment, illustrating a state where the second housing has been moved to the exposing position from the state illustrated in Fig. 9;

[fig.11]Fig. 11 is a side cross-sectional view of a part of the multifunction peripheral according to the embodiment, illustrating a state where the second housing is at the covering position and where the dust proof cover is at a third position;

[fig.12]Fig. 12 is a side cross-sectional view of a part of the multifunction peripheral according to the embodiment, illustrating a state where the second housing is being pivotally moving toward the exposing position from the state illustrated in Fig. 11;

[fig.13]Fig. 13 is a side cross-sectional view of a part of the multifunction peripheral according to the embodiment, illustrating a state where the second housing is being pivotally moving toward the exposing position from the state illustrated in Fig. 12;

[fig.14]Fig. 14 is a perspective view of a dust proof cover according to a first modification to the embodiment, as viewed from a front side thereof;

[fig.15]Fig. 15 is a side cross-sectional view of the dust proof cover according to the first modification;

[fig.16]Fig. 16 is an explanatory diagram for a lower cover of a rear sheet supply tray according to a second modification to the embodiment; and

[fig.17]Fig. 17 is a right side view of a dust proof cover according to a third modification to the embodiment.

Description of Embodiments

[0039] A multifunction peripheral 1 as an example of an image forming apparatus according to one embodiment will be described with reference to the accompanying drawings, wherein like parts and components are designated by the same reference numerals to avoid duplicating description.

[0040] In the following descriptions, as illustrated in Fig. 1, a front-rear direction, a left-right direction, and an up-down direction are defined with respect to the multifunction peripheral 1 installed in an operable state.

[0041] <Overall Structure of Multifunction Peripheral>

[0042] The multifunction peripheral 1 illustrated in Fig. 1 has, for example, a printer function, a scanner function, a copy function, and a facsimile function. The multi-

function peripheral 1 includes a first housing 2 as an example of a housing, a second housing 4, and a rear sheet supply tray 3 as an example of a sheet supply tray.

[0043] The first housing 2 has a generally rectangular parallelepiped shape. The first housing 2 includes a printer section P, and a scanner section S disposed above the printer section P. The printer section P includes an image forming portion 20 including a recording head (not illustrated) and configured to form an image on a sheet 18. The printer section P is configured as a printer of an inkjet recording type. The scanner section S is configured as a flatbed scanner.

[0044] In the printer section P, an image is formed on a sheet 18, such as a recording sheet, based on image data. Such image data may be image data read by the scanner section S, or image data inputted from an external device, such as a computer, a digital camera or a USB memory, connected to the multifunction peripheral 1, or from one of various types of storage media, such as a memory card, mounted in the multifunction peripheral 1.

[0045] An opening 21 is formed in a front surface of the first housing 2 at a center portion thereof in the left-right direction. A front sheet supply tray 22 and a discharge tray 23 are provided at the first housing 2 so as to be accessible through the opening 21. The front sheet supply tray 22 is configured to support one or plurality of sheets 18 generally horizontally. The discharge tray 23 is formed on an upper surface of the front sheet supply tray 22. On the front surface of the first housing 2 is provided an operation panel 24. The operation panel 24 includes a display portion configured to display a status, functions, and the like of the multifunction peripheral 1, and an operation portion configured to receive an input operation for the multifunction peripheral 1. Incidentally, besides the front sheet supply tray 22, a front tray may be provided on the front surface of the first housing 2. In this case, the front tray may be configured to support one or a plurality of sheets 18 and to feed the sheets to the printer section P.

[0046] The second housing 4 has a generally rectangular parallelepiped shape, and has dimensions in the front-rear direction and the left-right direction that are approximately the same as those of an upper surface of the first housing 2. The second housing 4 is disposed above the first housing 2 so as to cover the upper surface of the first housing 2. The second housing 4 has a rear end portion connected to a rear end portion of the first housing 2 by two connecting portions 4A (see Fig. 8) through which a first pivot axis R1 extending in the left-right direction passes so that the second housing 4 is pivotally movable relative to the first housing 2 in the up-down direction. The connecting portions 4A may each include a pivot shaft portion and a support portion. The pivot shaft portion may be configured of a protrusion having a columnar shape, whereas the support portion may be configured of a recess or a groove having a

cylindrical shape. With this configuration, the second housing 4 is pivotally movable about the first pivot axis R1 between a covering position where the second housing 4 covers the upper surface of the first housing 2 and an exposing position where the upper surface of the first housing 2 is exposed to an outside.

[0047] The second housing 4 is provided with an automatic document feeder (ADF) configured to separate a plurality of sheets of documents one by one to convey the separated sheet to the scanner section S. The scanner section S can therefore automatically read the plurality of sheets of documents one by one.

[0048] The rear sheet supply tray 3 is provided on a rear surface of the first housing 2. In other words, the rear sheet supply tray 3 is positioned at one side surface of the first housing 2 at which the first pivot axis R1 is positioned. The rear sheet supply tray 3 is configured to support one or a plurality of sheets 18 and to convey the sheets 18 to the printer section P.

[0049] <Structure of Rear Sheet Supply Tray>

[0050] Fig. 2 is a perspective view of the rear sheet supply tray 3. Fig. 3 is a perspective view of a dust proof cover 34 of the rear sheet supply tray 3 as viewed from a front side thereof. Fig. 4 is a perspective view of the dust proof cover 34 as viewed from a rear side thereof. Fig. 5 is a side cross-sectional view of the rear sheet supply tray 3 in a state where the dust proof cover 34 is at a first position. Fig.6 is an enlarged view of a part of the rear sheet supply tray 3 in Fig. 5. Fig. 7 is a side cross-sectional view of the rear sheet supply tray 3 in a state where the dust proof cover 34 is at a second position.

[0051] As illustrated in Fig. 2, the rear sheet supply tray 3 includes a tray supporting portion 31, a sheet supporting portion 32, a lower cover 33 as an example of a first cover, and the dust proof cover 34 as an example of a second cover. The rear sheet supply tray 3 also includes a feed mechanism, such as a feed roller, configured to feed the sheets 18 supported on the sheet supporting portion 32 toward the printer section P. The feed mechanism is a known mechanism, and therefore, description of the feed mechanism is omitted.

[0052] <Tray Supporting Portion>

[0053] The tray supporting portion 31 is disposed on the rear surface of the first housing 2. The tray supporting portion 31 supports the sheet supporting portion 32 and the lower cover 33. The tray supporting portion 31 includes a pair of side wall portions 31A, and a rear wall portion 31B. The side wall portions 31A are spaced apart from each other in the left-right direction and positioned at left and right sides of the rear wall portion 31B. That is, the rear wall portion 31B is disposed between the side wall portions 31A.

[0054] <Sheet Supporting Portion>

[0055] As illustrated in Fig. 5, the sheet supporting portion 32 includes a first sheet

supporting portion 32A and a second sheet supporting portion 32B.

[0056] The first sheet supporting portion 32A is positioned between the side wall portions 31A and connected to the side wall portions 31A. The first sheet supporting portion 32A has a first sheet supporting surface 32C configured to support one or a plurality of sheets 18 to be conveyed into the first housing 2. The first sheet supporting portion 32A has a lower end portion pivotally movably connected to the side wall portions 31A by connecting portions 32D through which a fourth pivot axis R4 parallel to the first pivot axis R1 passes. The connecting portions 32D may each include a pivot shaft portion configured of a columnar-shaped protrusion, and a support portion configured of a cylindrical-shaped recess.

[0057] The second sheet supporting portion 32B is connected to an upper end portion of the first sheet supporting portion 32A. The second sheet supporting portion 32B has a second sheet supporting surface 32F configured to support one or a plurality of sheets 18 to be conveyed into the first housing 2. The second sheet supporting portion 32B has a lower end portion pivotally movably connected to the upper end portion of the first sheet supporting portion 32A by two connecting portions 32G through which a second pivot axis R2 parallel to the first pivot axis R1 passes. The connecting portions 32G may each include a pivot shaft portion configured of a columnar-shaped protrusion, and a support portion configured of a cylindrical-shaped recess.

[0058] With this configuration, the first sheet supporting portion 32A is pivotally movable about the fourth pivot axis R4 between a first use position (i.e., a position illustrated in Fig. 5) and a first storage position (not illustrated). At the first use position, the sheet 18 can be supported on the first sheet supporting surface 32C in cooperation with the second sheet supporting surface 32F at a second use position. The first sheet supporting surface 32C at the first use position is positioned closer than the second sheet supporting surface 32F at the second use position to the rear surface (one side surface) of the first housing 2. At the first storage position, a distal end 32E of the first sheet supporting surface 32C of the first sheet supporting portion 32A is positioned closest to the second housing 4. Specifically, at the first use position, the first sheet supporting portion 32A is inclined upward and rearward, and extends diagonally upward and rearward from the rear wall portion 31B.

[0059] Further, the second sheet supporting portion 32B is pivotally movable about the second pivot axis R2 between the second use position as an example of a use position (i.e., a position illustrated in Fig. 5) and a second storage position (not illustrated) as an example of a storage position. At the second use position, the sheet 18 can be supported on the second sheet supporting surface 32F in cooperation with the first sheet supporting surface 32C at the first use position. At the second storage position, a free end 32H of the second sheet supporting surface 32F of the second sheet supporting

portion 32B is positioned closest to the second housing 4. Specifically, at the second use position, the second sheet supporting portion 32B supported by the first sheet supporting portion 32A extends in a direction substantially parallel to the first sheet supporting portion 32A at the first use position.

[0060] Note that a combination of the first sheet supporting surface 32C and the second sheet supporting surface 32F is an example of a sheet supporting surface.

[0061] Incidentally, the sheet supporting portion 32 may have a configuration incapable of being stored at its storage position. For example, the first sheet supporting portion 32A and the second sheet supporting portion 32B may be integrally formed to provide a single sheet supporting portion, and may be fixed at its use position.

[0062] As illustrated in Fig. 2, a pair of side guides 35 is provided on the second sheet supporting surface 32F. The side guides 35 are movable in the left-right direction and configured to align and regulate the position of the sheets 18 in a widthwise direction. In the rear sheet supply tray 3, the side guides 35 are moved in the left-right direction according to a widthwise size of the sheets 18 supported by the first sheet supporting surface 32C and the second sheet supporting surface 32F, enabling various types of sheets 18 having different sheet widths to be supported by the first sheet supporting surface 32C and the second sheet supporting surface 32F.

[0063] In the present embodiment, each of the pair of side guides 35 is movable in the left-right direction. However, the pair of side guides 35 may have a configuration such that one of the pair of side guides 35 is stationary and fixed to the second sheet supporting surface 32F while the other of the pair of side guides 35 is movable in the left-right direction relative to the one of the pair of side guides 35.

[0064] Incidentally, in the rear sheet supply tray 3, the left-right direction coincides with a direction extending parallel to the first sheet supporting surface 32C and the second sheet supporting surface 32F and orthogonal to a conveying direction of the sheets 18, and the widthwise direction coincides with the left-right direction of the sheets 18.

[0065] The sheet supporting portion 32 further include auxiliary arms 32J. The auxiliary arms 32J extend from an upper end portion of the second sheet supporting portion 32B in a direction diagonally upward and along the second sheet supporting surface 32F. The auxiliary arms 32J are configured to support portions of the sheets 18 supported by the first sheet supporting surface 32C and the second sheet supporting surface 32F, the portions protruding further upward from the second sheet supporting surface 32F. The auxiliary arms 32J are movable between a position where the auxiliary arms 32J extend from the second sheet supporting portion 32B and a position where the auxiliary arms 32J are retracted in the second sheet supporting portion 32B.

[0066] <Lower Cover>

[0067] The lower cover 33 is disposed between the pair of side wall portions 31A, facing the

first sheet supporting surface 32C. The first sheet supporting surface 32C is an example of a portion of the sheet supporting surface. The lower cover 33 is supported by the pair of side wall portions 31A at a position away from the first sheet supporting surface 32C. The lower cover 33 serves to prevent a foreign object such as dust from entering the first housing 2 through a feed opening 36 and the like formed in the rear sheet supply tray 3.

[0068] The lower cover 33 has one surface facing the first sheet supporting surface 32C, and an opposite surface opposite to the one surface. The opposite surface constitutes a front surface 33A of the lower cover 33. The front surface 33A is substantially parallel to the first sheet supporting surface 32C. In other words, the front surface 33A is a sloped surface sloping downward toward the first housing 2. Put another way, the front surface 33A is sloped such that its lower end is positioned closer to the first housing 2 than its upper end is to the first housing 2. A pair of first engagement portions 33B is formed on the front surface 33A at its lower end portion. The first engagement portions 33B are spaced apart from each other in the left-right direction. The first engagement portions 33B are respectively engageable with second engagement portions 34E of the dust proof cover 34 (described later) to detachably and pivotally movably support the dust proof cover 34.

[0069] As illustrated in Figs. 5 and 6, each of the first engagement portions 33B is a recess opening upward and extending in the left-right direction. The first engagement portion 33B has a shape capable of receiving the second engagement portion 34E. The recess has a front portion 33C (an example of a first portion), a bottom portion 33D, and a rear portion 33E (an example of a second portion). The front portion 33C extends in the up-down direction and is positioned closer to the first housing 2 than the rear portion 33E is to the first housing 2. The bottom portion 33D extends in a horizontal direction. The rear portion 33E extends in the up-down direction and is positioned closer to the first sheet supporting portion 32A than the front portion 33C is to the first sheet supporting portion 32A. The front portion 33C, the bottom portion 33D, and the rear portion 33E are smoothly connected together. The rear portion 33E has an upper end connected to a portion of the front surface 33A. Hence, the first engagement portions 33B do not penetrate the thickness of the lower cover 33 toward the first sheet supporting portion 32A. Since the first engagement portions 33B do not penetrate the thickness of the lower cover 33 toward the first sheet supporting portion 32A, an external foreign object such as dust can be prevented from entering the first housing 2 through the first engagement portions 33B. Accordingly, high dustproof performance can be achieved.

[0070] <Dust Proof Cover>

[0071] As illustrated in Figs. 1 and 2, the dust proof cover 34 is positioned between the first

and second sheet supporting surfaces 32C and 32F and the rear surfaces of the first and second housings 2 and 4, and configured to at least partly cover the first sheet supporting surface 32C and the second sheet supporting surface 32F. The dust proof cover 34 serves to prevent a foreign object such as dust from entering the first housing 2 through the feed opening 36 and the like. The dust proof cover 34 includes a main cover 34A, a pair of side covers 34B, and an end wall 34C. The main cover 34A is positioned facing the second sheet supporting surface 32F and the front surface 33A of the lower cover 33. The side covers 34B is disposed at left and right ends of the main cover 34A and extending from the left and right ends of the main cover 34A toward the second sheet supporting surface 32F. The end wall 34C is disposed at an upper end of the main cover 34A and extending from the upper end of the main cover 34A toward the second sheet supporting surface 32F. An upper end of the dust proof cover 34 and an upper end of the second sheet supporting surface 32F are positioned at substantially the same height.

[0072] Since the dust proof cover 34 is provided with the side covers 34B and the end wall 34C, a foreign object such as dust can be prevented from entering the first housing 2 from lateral and upper sides of the rear sheet supply tray 3.

[0073] The end wall 34C has one end portion (front end portion) and the other end portion (rear end portion) closer to and facing the second sheet supporting surface 32F. A rectangular-shaped notch 34D is formed in the end wall 34C at the other end portion thereof. The notch 34D extends in the left-right direction and is formed over a range of the sheet 18 having the maximum widthwise size that can be supported by the second sheet supporting surface 32F. Hence, the sheet 18 supported on the second sheet supporting surface 32F does not contact the end wall 34C. Accordingly, no conveying load is applied from the dust proof cover 34 to the sheet 18 while the sheet 18 is conveyed.

[0074] As illustrated in Figs. 3 and 4, a pair of second engagement portions 34E engageable with the pair of first engagement portions 33B is provided at a lower end portion of the main cover 34A. Each of the second engagement portions 34E is a protrusion having a columnar shape and extending outward in the left-right direction from the lower end portion of the main cover 34A. Since the first engagement portions 33B open upward, the second engagement portions 34E are attachable to and detachable from the first engagement portions 33B in the up-down direction.

[0075] With this configuration, the dust proof cover 34 is attachable to and detachable from the lower cover 33. Hence, during transportation of the multifunction peripheral 1, the dust proof cover 34 can be detached, and the first sheet supporting portion 32A and the second sheet supporting portion 32B can be folded in their storage positions. Thus, the multifunction peripheral 1 can be made more compact, and damage to the dust proof

cover 34 can be avoided. Further, the multifunction peripheral 1 can be used at a smaller size if the dust proof cover 34 is detached and the first sheet supporting portion 32A and the second sheet supporting portion 32B are folded in their storage positions while the multifunction peripheral 1 is in use.

[0076] The second engagement portions 34E are each the columnar shaped protrusion extending in the left-right direction and functions as a pivot shaft. Thus, tin a state where the second engagement portions 34E are engaged with the first engagement portions 33B, the second engagement portions 34E rotate in the first engagement portions 33B to pivotally move the dust proof cover 34 in the front-rear direction. At this time, an axis of the second engagement portion 34E (i.e., a straight line passing through centers of circles at left and right endfaces of the second engagement portion 34E) serves as a third pivot axis R3 parallel to the first pivot axis R1.

[0077] The dust proof cover 34 is pivotally movable about the third pivot axis R3 between a first position (i.e., a position illustrated in Fig. 5) where the dust proof cover 34 covers the first sheet supporting surface 32C and the second sheet supporting surface 32F and a second position (i.e., a position illustrated in Fig. 7) where the first sheet supporting surface 32C and the second sheet supporting surface 32F are exposed to an outside. The user can replenish sheets 18 onto the sheet supporting portion 32 by pivotally moving the dust proof cover 34 from the first position to the second position, without detaching the dust proof cover 34. Thus, usability in replenishing sheet 18 can be enhanced.

[0078] As illustrated in Fig. 6, the front portion 33C has a height H1 from the bottom portion 33D in the first engagement portion 33B. The height H1 is greater than a radius RA of the second engagement portion 34E. According to this configuration, the second engagement portions 34E are unlikely to become disengaged from the first engagement portions 33B, respectively, while the dust proof cover 34 pivotally moves about the third pivot axis R3.

[0079] By designing the fixed first engagement portions 33B in the form of a recess and the movable second engagement portions 34E in the form of a protrusion, the dust proof cover 34 can be stably supported and pivotally moved. In the present embodiment, the first engagement portions 33B are formed into a recess opening upward. However, there is no particular limitation on the opening direction of the recess as far as the dust proof cover 34 can be attached to and detached from the lower cover 33 in a predetermined direction. For example, the first engagement portions 33B each may be a recess that opens in a diagonally upward and frontward direction, in a diagonally upward and rightward direction, or in a diagonally upward and leftward direction.

[0080] In the present embodiment, the first engagement portion 33B is a recess while the second engagement portion 34E is a protrusion. However, the first engagement portion

33B may be a protrusion while the second engagement portion 34E may be a recess. Further, in the present embodiment, the recess has a shape extending in the left-right direction and capable of receiving the protrusion, while the protrusion has a columnar shape extending in the left-right direction. However, there is no particular limitation on the shape of the recess and the shape of the protrusion as far as the dust proof cover 34 is pivotally movable. For example, the recess may be formed into a curved shape. The recess may be a hemispherical recess, while the protrusion may have a hemispherical shape. Alternatively, the recessed may be a semicircular groove, while the protrusion may have a disk-like shape. Further, the first engagement portion 33B and the second engagement portion 34E may be a combination other than a recess and a protrusion as far as the dust proof cover 34 is attachable to and detachable from the lower cover 33 and pivotally movable relative to the lower cover 33, and also as far as the first engagement portion 33B does not penetrate the thickness of the lower cover 33 toward the first sheet supporting portion 32A.

[0081] As illustrated in Fig. 2, the side covers 34B are positioned outside of the side guides 35 in the left-right direction in a state where the side guides 35 provide a maximum distance therebetween in the left-right direction, that is, when the rear sheet supply tray 3 is in a state capable of supporting the sheet 18 with a maximum widthwise size that can be supported by the rear sheet supply tray 3.

[0082] Therefore, even when the rear sheet supply tray 3 is supporting the sheet 18 having the maximum widthwise size that can be supported by the rear sheet supply tray 3, the dust proof cover 34 can cover the first sheet supporting surface 32C and the second sheet supporting surface 32F. Thus, a foreign object such as dust can be prevented from entering the first housing 2 through the feed opening 36 and the like regardless of the widthwise size of the sheet 18 being supported by the rear sheet supply tray 3.

[0083] Further, the side covers 34B are positioned inside of left and right ends of the first sheet supporting surface 32C and left and right ends of the second sheet supporting surface 32F in the left-right direction. In this configuration, no gap is formed in the left-right direction between widthwise ends of the rear sheet supply tray 3 and the side covers 34B, thereby enhancing the effect of preventing entry of a foreign object such as dust into the first housing 2.

[0084] As illustrated in Figs. 3 through 7, the dust proof cover 34 has a positioning portion 34G provided a an upper end portion of each of the side covers 34B at a position facing the second sheet supporting surface 32F. The positioning portion 34G is configured to abut on the second sheet supporting surface 32F when the dust proof cover 34 is at the first position. Each positioning portion 34G slightly protrudes rearward from the side cover 34B. When the dust proof cover 34 is at the first position, the dust proof cover 34 is fixed in position by the second engagement portions 34E po-

sitioned at the lower end portion of the dust proof cover 34 and the positioning portions 34G positioned at the upper end portion of the dust proof cover 34.

[0085] By thus disposing the positioning portions 34G at positions in the dust proof cover 34 remote from the second engagement portions 34E, positioning error can be reduced. Accordingly, gaps between the dust proof cover 34, and the second sheet supporting surface 32F and the lower cover 33 can be reduced, thereby enhancing dustproof performance.

[0086] <Structure for Avoiding Damage to Dust Proof Cover When Second Sheet Support Portion is Nearly at its Storage Position>

[0087] Fig. 8 is a right side view of a part of the multifunction peripheral 1, illustrating a state where the second housing 4 is at the covering position, and the second sheet supporting portion 32B is at a position between the second use position and the second storage position. Fig. 9 is a right side view of a part of the multifunction peripheral 1, illustrating a state where the second housing 4 is being pivotally moved from the position illustrated in Fig. 8 toward the exposing position. Fig. 10 is a right side view of a part of the multifunction peripheral 1, illustrating a state where the second housing 4 has been pivotally moved from the position illustrated in Fig. 9 to reach the exposing position.

[0088] The user may accidentally push the second sheet supporting portion 32B at the second use position frontward in a state where the dust proof cover 34 is attached to the multifunction peripheral 1. At this time, the dust proof cover 34 is pushed by the second sheet supporting portion 32B, and falls frontward. As a result, the multifunction peripheral 1 comes into a state illustrated in Fig. 8. Specifically, the second housing 4 is at the covering position, the dust proof cover 34 is at the second position, the first sheet supporting portion 32A is at the first use position, and the second sheet supporting portion 32B is at a position between the second use position and the second storage position. At this time, the main cover 34A of the dust proof cover 34 is in abutment with a rear end of the second housing 4 at a third abutment position C3, and the free end 32H of the second sheet supporting portion 32B is in abutment with the dust proof cover 34 at a fourth abutment position C4.

[0089] The dust proof cover 34 and the second sheet supporting portion 32B are configured as described below in order for the dust proof cover 34 not to be crushed between the second housing 4 and the second sheet supporting portion 32B and thus to avoid being damaged when the second housing 4 is opened from the above state.

[0090] When the second housing 4 illustrated in Fig. 8 starts opening, that is, when the second housing 4 starts pivotally moving from the covering position toward the exposing position, the second housing 4 pushes the dust proof cover 34 in abutment with the second housing 4 at the third abutment position C3. Accordingly, the dust

proof cover 34 starts pivotally moving from the second position toward the first position, and pushes the second sheet supporting portion 32B in abutment with the dust proof cover 34 at the fourth abutment position C4. Pressure application from the dust proof cover 34 to the second sheet supporting portion 32B generates, at the fourth abutment position C4, a force F1 in a tangential direction in an imaginary circle whose center is at the third pivot axis R3.

[0091] In this state, the force F1 can be resolved into a first component of force F2 directed in an tangential direction in an imaginary circle whose center is at the second pivot axis R2 and a second component of force F3 directed in a direction toward the second pivot axis R2, as viewed in a direction of the first pivot axis R1, that is, in a direction perpendicular to a surface of a drawing sheet of Fig. 8. Here, the first component of force F2 is directed away from the third pivot axis R3 in the tangential direction in the imaginary circle whose center is at the second pivot axis R2. Assuming that θ represents an angle between the force F1 and the second component of force F3, with θ being a positive angle in a clockwise direction in Fig. 8, the following formula holds: $F2 = F1\sin\theta > 0$. Thus, θ is greater than 0 ($\theta > 0$).

[0092] Since the first component of force F2 is directed in a direction in which the second sheet supporting portion 32B pivotally moves toward the second use position, the second sheet supporting portion 32B pivotally moves toward the second use position. As illustrated in Fig. 10, the second housing 4 moves into the exposing position, and the dust proof cover 34 moves into the first position, following the state illustrated in Figs. 8 and 9. While the second housing 4, the dust proof cover 34, and the second sheet supporting portion 32B are changing their respective positions as illustrated in Figs. 8 through 10, the first component of force F2 remains directed away from the third pivot axis R3 in the tangential direction in the imaginary circle whose center is at the second pivot axis R2.

[0093] Therefore, even if the second housing 4 is opened when the second sheet supporting portion 32B is nearly closed (that is, the second sheet supporting portion 32B is positioned between the second use position and the second storage position), the dust proof cover 34 can avoid being crushed between the second housing 4 and the second sheet supporting portion 32B. Accordingly, damage to the dust proof cover 34 can be avoided. If the first component of force F2 were a force directed in a direction in which the second sheet supporting portion 32B pivotally moves toward the second storage position, the dust proof cover 34 would get caught between the second housing 4 and the second sheet supporting portion 32B to be crushed by the same. In this case, the dust proof cover 34 would be likely to be damaged.

[0094] Further, as described above, the first component of force F2 is directed away from the third pivot axis R3 in the tangential direction in the imaginary circle whose center

is at the second pivot axis R2. In other words, as viewed in the direction of the first pivot axis R1, the force F1 is directed in a direction away from an imaginary triangle T provided by the second pivot axis R2, the third pivot axis R3, and the fourth abutment position C4.

[0095] Preferably, the side covers 34B of the dust proof cover 34 are each formed with a notched region 34H. The notched regions 34H may have a generally V-shape as illustrated in Fig. 9, for example. The free end 32H of the second sheet supporting portion 32B is in abutment with the notched regions 34H in a state where the dust proof cover 34 is at the second position and where the second sheet supporting portion 32B is positioned between the second use position and the second storage position and where the free end 32H of the second sheet supporting portion is in abutment with the dust proof cover 34. Since the dust proof cover 34 has the notched regions 34H abuttable with the second sheet supporting portion 32B, damage to the dust proof cover 34 can be avoided while reducing the dust proof cover 34 in size.

[0096] Incidentally, in order to avoid damage to the dust proof cover 34, the third pivot axis R3 may be disposed close to the second pivot axis R2, for example. Further, in place of the notched regions 34H, the side covers 34B may each have a protruding portion extending in the up-down direction. In this case, the second sheet supporting portion 32B may brought into abutment with the protruding portions in a state where the second sheet supporting portion 32B has been slightly pivotally moved toward the second storage position.

[0097] <Structure For Avoiding Damage to Dust Proof Cover when Dust Proof Cover Has Been Detached from Lower Cover>

[0098] Fig. 11 is a side cross-sectional view of a part of the multifunction peripheral 1, illustrating a state where the second housing 4 is at the covering position, and the dust proof cover 34 is at a third position. Fig. 12 is a side cross-sectional view of a part of the multifunction peripheral 1, illustrating a state where the second housing 4 is being pivotally moving toward the exposing position from the state illustrated in Fig. 11. Fig. 13 is a side cross-sectional view of a part of the multifunction peripheral 1, illustrating a state where the second housing 4 is being pivotally moving toward the exposing position from the state illustrated in Fig. 12.

[0099] The following situations may be conceivable: a user may install the dust proof cover 34 at an improper position, or a user may accidentally disengage the second engagement portions 34E from the first engagement portions 33B when pivotally moving the dust proof cover 34 from the first position to the second position. In such a situation, as illustrated in Fig. 11, the lower end portion of the dust proof cover 34 may fall onto a groove portion 33F formed at a lower end portion of the lower cover 33 and extending in the left-right direction. A position of the dust proof cover 34 illustrated in

Fig. 11 will be referred to as a third position.

[0100] The dust proof cover 34 and the lower cover 33 are configured as described below in order for the dust proof cover 34 not to be crushed between the second housing 4 and the lower cover 33 and thus to avoid being damaged when the second housing 4 is opened from the state illustrated in Fig. 11.

[0101] When the second housing 4 starts pivotally moving from the covering position illustrated in Fig. 11 toward the exposing position, the rear end of the second housing 4 pushes the main cover 34A of the dust proof cover 34, and the multifunction peripheral 1 comes into a state illustrated in Fig. 12. Specifically, the second housing 4 is at a position slightly opened from the covering position, and the dust proof cover 34 is at the third position. At this time, the main cover 34A of the dust proof cover 34 is in abutment with the rear end of the second housing 4 at a first abutment position C1, and extension portions 34J of the dust proof cover 34 are in abutment with the front surface 33A of the lower cover 33 at a second abutment position C2. The extension portions 34J each extend rearward from a lower end portion of the side cover 34B. Each of the extension portions 34J has a lower portion having a curved shape recessed in a direction away from the second engagement portion 34E.

[0102] In a state illustrated in Fig. 12, the rear end of the second housing 4 pushes the main cover 34A of the dust proof cover 34, thereby generating a force F4 directing from the first abutment position C1 to the second abutment position C2. The force F4 is directed upward relative to a normal line N perpendicular to an abutment surface of the lower cover 33 and passing through the second abutment position C2. Here, the front surface 33A constitutes the abutment surface.

[0103] Hence, the force F4 is directed in a direction such that the extension portions 34J move upward along the front surface 33A of the lower cover 33 while pressing against the front surface 33A. The dust proof cover 34 therefore moves upward along the front surface 33A. Here, the front surface 33A of the lower cover 33 is a sloped surface such that its lower end is closer to the first housing 2 than its upper end is to the first housing 2. Accordingly, resistance to the dust proof cover 34 at the second abutment position C2 can be reduced. Therefore, resistance to the dust proof cover 34 when the dust proof cover 34 moves upward can be reduced. As illustrated in Fig. 13, the extension portions 34J ride up onto an upper end portion 33G of the lower cover 33 continuous with the front surface 33A of the lower cover 33.

[0104] Thereafter, the extension portions 34J move rearward and downward along an upper surface 33H of the lower cover 33 while the second housing 4 pivotally moves to the exposing position. The upper surface 33H extends diagonally rearward and downward from the upper end portion 33G. After the second housing 4 has reached the exposing position, the curved shape of the lower portions of the extension portions 34J allows

the extension portions 34J to maintain engagement with the upper end portion 33G of the lower cover 33. Hence, the dust proof cover 34 is supported at a position close to the first position, while riding up on the lower cover 33.

[0105] Thus, even if the second housing 4 is opened when the dust proof cover 34 has fallen onto the groove portion 33F, the dust proof cover 34 is not crushed between the second housing 4 and the lower cover 33, and thus damage to the dust proof cover 34 can be avoided.

[0106] Further, since the lower portion of each extension portion 34J has a curved shape recessed in a direction away from the second engagement portion 34E, the extension portions 34J are engageable with the upper end portion 33G of the lower cover 33. Hence, the dust proof cover 34 can be supported at a position close to the first position. Accordingly, the dust proof cover 34 does not move when the second housing 4 is pivotally moved from the covering position toward the exposing position once the dust proof cover 34 is supported on the lower cover 33 as a result of the engagement between the extension portions 34J and the upper end portion 33G. Therefore, resistance acting on the second housing 4 when the second housing 4 is opened can be reduced.

[0107] Further, while the second housing 4 pivotally moves from the position illustrated in Fig. 13 to the exposing position, the dust proof cover 34 moves toward the position closed to the first position. This movement causes the second engagement portions 34E to move upward to the height engageable with the corresponding first engagement portions 33B. At this time, if the first engagement portions 33B and the second engagement portions 34E are positioned at the same position in the left-right direction, the second engagement portions 34E can engage with the corresponding first engagement portions 33B. Accordingly, the dust proof cover 34 moves to the first position and becomes operable in a normal way. In this manner, when the dust proof cover 34 has fallen onto the groove portion 33F, the dust proof cover 34 may happen to move to the first position automatically in conjunction with the movement of the second housing 4 to the exposing position, which is convenient for the user.

[0108] Incidentally, in the embodiment, the front portion 33C of the first engagement portion 33B constituting a part of the front surface 33A extends in the up-down direction as illustrated in Figs. 11 through 13. Further, a surface closer to the first sheet supporting surface 32C (i.e. rear surface) of the groove portion 33F also constituting a part of the front surface 33A extends in the up-down direction as illustrated in Figs. 11 through 13. However, the rear surface of the groove portion 33F may be a sloped surface similar to the sloped portion of the front surface 33A. In this case, the second engagement portions 34E move upward along the sloped surfaces of the groove portion 33F when the dust proof cover 34 moves as illustrated in Figs. 11 through 13.

Therefore, resistance acting on the dust proof cover 34 when the dust proof cover 34 moves upward can be reduced.

[0109] In a state illustrated in Fig. 12, the front surface 33A including the sloped surface of the groove portion 33F preferably extends such that a lower end of the front surface 33A is positioned below a diametrical center of the columnar shape of the second engagement portions 34E. With this configuration, when the second housing 4 is opened in a state where the dust proof cover 34 is at the third position, that is, in a state where the dust proof cover 34 has fallen onto the groove portion 33F, the second engagement portions 34E can be reliably brought into abutment with the sloped front surface 33A, which reduces resistance acting on the dust proof cover 34 when the dust proof cover 34 is moved upward along the front surface 33A.

[0110] <First Modification>

[0111] Next, a first modification to the embodiment will be described with reference to Figs. 14 and 15, wherein like parts and components are designated by the same reference numerals as those of the first embodiment to avoid duplicating description.

[0112] In the above-described embodiment, the notch 34D is formed in the end wall 34C of the dust proof cover 34. The notch 34D is effective in terms of reducing the conveying load to the sheet 18 when the sheet 18 is conveyed. However, in terms of enhancing dustproof performance, it is preferable not to provide the notch 34D in the end wall 34C. Not providing the notch 34D in the dust proof cover 34, however, involves a problem of increased load to the sheet 18 when the sheet 18 is conveyed and, in addition, necessitates troublesome work of opening the dust proof cover 34 every time one or a plurality of sheets 18 is replenished onto the rear sheet supply tray 3. A dust proof cover 54 according to the first modification is configured to be capable of easily replenishing one or a plurality of sheets 18 while enhancing dustproof performance.

[0113] Fig. 14 a perspective view of the dust proof cover 54 according to the first modification as viewed from a front side thereof. Fig. 15 is a side cross-sectional view of the dust proof cover 54.

[0114] The dust proof cover 54 includes an end wall 54C disposed at the upper end of the main cover 34A and extending from the upper end of the main cover 34A toward the second sheet supporting surface 32F. Unlike the dust proof cover 34 according to the above-described embodiment, the notch 34D is not formed in the end wall 54C. Instead, a sheet introduction portion 54A is provided at a rear end of the end wall 54C at a left-right center portion thereof. The sheet introduction portion 54A has a plate-like shape that extends in the left-right direction. The sheet introduction portion 54A may extend in the left-right direction to right and left ends of the end wall 54C.

[0115] As illustrated in Fig. 15, the sheet introduction portion 54A has an inclined surface 54B on its rear side. The inclined surface 54B faces the second sheet supporting

surface 32F and is inclined such that its upper end is positioned farther from the second sheet supporting surface 32F than its lower end is from the second sheet supporting surface 32F. Thus, the inclined surface 54B protrudes frontward and upward from the rear end of the end wall 54C.

[0116] When the user replenishes one or a plurality of sheets 18 onto the rear sheet supply tray 3, the inclined surface 54B of the sheet introduction portion 54A is pushed by lower ends of the sheets 18 as illustrated in Fig. 15. At this time, a force directed in a frontward direction is applied to the sheet introduction portion 54A. This force pivotally moves the dust proof cover 54 toward the second position, thereby forming a gap between the dust proof cover 54 and the second sheet supporting surface 32F. Hence, the user can replenish the sheets 18 onto the sheet supporting portion 32 while inserting the sheets 18, through this gap, along the second sheet supporting surface 32F. Accordingly, this configuration can reduce a burdensome task of opening the dust proof cover 54 by hand when replenishing the sheets 18 onto the rear sheet supply tray 3.

[0117] <Second Modification>

[0118] Next, a second modification to the embodiment will be described with reference to Fig. 16, wherein like parts and components are designated by the same reference numerals as those of the first embodiment to avoid duplicating description.

[0119] According to the second modification, the rear sheet supply tray 3 includes a lower cover 63, in place of the lower cover 33.

[0120] The lower cover 63 has a configuration such that damage to the dust proof cover 34 can be avoided even if the dust proof cover 34 at the first position is pressed against the lower cover 63. Fig. 16 is an explanatory diagram for explaining the configuration of the lower cover 63 according to the second modification. Fig. 16 illustrates a cross-section of the rear sheet supply tray 3 at the same position as Fig. 5.

[0121] The lower cover 63 according to the second modification differs from the lower cover 33 according to the embodiment in that the lower cover 63 has first engagement portions 63B each having a front portion 63C whose shape is different from the front portion 33C of the first engagement portion 33B.

[0122] Each of the first engagement portions 63B is a recess opening upward and extending in the left-right direction. The first engagement portion 63B has a shape capable of receiving the second engagement portion 34E. The recess has the front portion 63C (an example of a first portion), the bottom portion 33D, and the rear portion 33E. The front portion 63C extends diagonally frontward and upward and is positioned closer to the first housing 2 than the rear portion 33E is to the first housing 2. The bottom portion 33D extends in the horizontal direction. The rear portion 33E extends in the up-down direction and is positioned closer to the first sheet supporting portion 32A than the

front portion 63C is to the first sheet supporting portion 32A. The front portion 63C, the bottom portion 33D, and the rear portion 33E are smoothly connected together.

[0123] The front portion 63C has a height H2 from the bottom portion 33D. The height H2 is set so as to be capable of avoiding interference with a locus TY of the second engagement portion 34E during pivotal movement of the dust proof cover 34 about a point of contact TA with the lower cover 63 as a fulcrum in a case where an external force is applied to the dust proof cover 34 at the first position in a direction away from the second position, that is, in a rearward direction.

[0124] In this modification, the point of contact TA is positioned on an upper end portion 33G of the lower cover 63. The front portion 63C is a sloped surface sloping downward from its upper end toward the bottom portion 33D and extending along the locus TY. With the sloped surface, the height H2 of the front portion 63C can be increased. Hence, the second engagement portions 34E are less likely to become disengaged from the first engagement portions 63B while the multifunction peripheral 1 is in normal use.

[0125] Further, with this configuration, the dust proof cover 34 comes into contact with the lower cover 63 at the point of contact TA when the dust proof cover 34 at the first position is accidentally pressed toward the sheet supporting portion 32. At this time, as illustrated by dashed double-dotted lines in Fig. 16, an upper portion of the dust proof cover 34 pivotally moves rearward about the point of contact TA as a fulcrum to press the sheet supporting portion 32, while a lower portion of the dust proof cover 34 pivotally moves frontward about the point of contact TA.

[0126] Since the front portion 63C has such a height capable of avoiding interference with a locus TY of the second engagement portions 34E, the second engagement portions 34E can move along the locus TY. Consequently, each of the second engagement portions 34E disengages from corresponding one of the first engagement portions 63B. In other words, the dust proof cover 34 is detached from the lower cover 63. Hence, damage to the dust proof cover 34 can be avoided.

[0127] <Third Modification>

[0128] Next, a third modification to the embodiment will be described with reference to Fig. 17, wherein like parts and components are designated by the same reference numerals as those of the first embodiment to avoid duplicating description.

[0129] According to the third modification, the rear sheet supply tray 3 includes a dust proof cover 74, in place of the dust proof cover 34. The dust proof cover 74 has a configuration so as to be capable of suppressing a foreign object such as dust from entering the first housing 2 through notched regions 74H of side covers 74B. Fig. 17 is a right side view of the dust proof cover 74 according to the third modification. The dust proof cover 74 according to the third modification differs from the dust proof

cover 34 according to the embodiment in that the side covers 74B are each formed with the notched region 74H having a shape different from that of the notched region 34H of the side cover 34B.

[0130] As illustrated in Fig. 17, as viewed in the direction of the first pivot axis R1, the side cover 74B has an inflection point Z. Specifically, the inflection point Z is positioned in an upper portion of the notched region 74H above the fourth abutment position C4 and protrudes toward the second sheet supporting surface 32F. Incidentally, the number of inflection points Z may be two, or greater.

[0131] Providing the inflection point Z in the notched region 74H can make an area in the dust proof cover 74 notched by the notched regions 74H smaller than that in the dust proof cover 34 notched by the notched regions 34H according to the embodiment illustrated by a dashed double-dotted line in Fig. 17. Therefore, a foreign object such as dust can be more suppressed from entering the first housing 2 through the notched regions 74H.

[0132] <Operational Advantages>

[0133] The rear sheet supply tray 3 includes the sheet supporting portion 32 positioned at one side surface of the first housing 2. The sheet supporting portion 32 has the sheet supporting surface 32C, 32F on which the sheet 18 to be conveyed into the first housing 2 is supported. The sheet supporting surface 32C, 32F has a portion 32C. Further, the rear sheet supply tray 3 includes the lower cover 33 having one surface facing the portion of the sheet supporting surface 32C, 32F and an opposite surface (specifically, the front surface 33A) opposite to the one surface. The opposite surface has a first engagement portion 33B. Further, the rear sheet supply tray 3 includes the dust proof cover 34 including the second engagement portion 34E engageable with the first engagement portion 33B. The dust proof cover 34 is positioned between the sheet supporting surface 32C, 32F and the one side surface of the first housing 2, and configured to cover at least a part of the sheet supporting surface 32C, 32F. One of the first engagement portion 33B and the second engagement portion 34E is a protrusion, and remaining one of the first engagement portion 33B and the second engagement portion 34E is a recess. The recess is attachable to and detachable from the protrusion and pivotally movably engaged with the protrusion so that the dust proof cover 34 is attachable to and detachable from the lower cover 33 in a predetermined direction and is pivotally movable relative to the lower cover 33 between the first position where the dust proof cover 34 covers the sheet supporting surface 32C, 32F and the second position where the sheet supporting surface 32C, 32F is exposed to an outside.

[0134] According to the above-described configuration, the dust proof cover 34 is detachable from the lower cover 33. Hence, during transportation of the multifunction peripheral 1, the multifunction peripheral 1 can be made more compact by detaching the

dust proof cover 34. Moreover, damage to the dust proof cover 34 can be avoided. Further, the multifunction peripheral 1 may be used at a smaller size if the dust proof cover 34 is detached while the multifunction peripheral 1 is in use. Further, the dust proof cover 34 is pivotally movable between the first position and the second position. Thus, sheets 18 can be replenished without detaching the dust proof cover 34, thereby enhancing the usability of the multifunction peripheral 1. In addition, since the first engagement portions 33B are not through-holes, high dustproof performance can be achieved.

[0135] According to the rear sheet supply tray 3 described above, the first engagement portion 33B is the recess opening upward and extending in a widthwise direction parallel to the sheet supporting surface 32C, 32F and orthogonal to a conveying direction of the sheet 18. The recess has a shape capable of receiving the protrusion. The second engagement portion 34E is positioned at a lower end portion of the dust proof cover 34 and is the protrusion having a columnar shape extending in the widthwise direction.

[0136] By thus designing the fixed first engagement portions 33B in the form of a recess and the movable second engagement portions 34E in the form of a protrusion, the dust proof cover 34 can be stably supported and pivotally moved.

[0137] According to the rear sheet supply tray 3 described above, the dust proof cover 34 includes: the main cover 34A positioned facing the sheet supporting surface 32C, 32F, and the pair of side covers 34B extending toward the sheet supporting surface 32C, 32F from each of side portions of the main cover 34A in a widthwise direction parallel to the sheet supporting surface 32C, 32F and orthogonal to a conveying direction of the sheet 18.

[0138] This configuration can prevent a foreign object such as dust from entering the first housing 2 from lateral sides of the sheet supporting surface 32C, 32F.

[0139] According to the rear sheet supply tray 3 described above further includes a pair of side guides 35 provided at the sheet supporting surface 32C, 32F and movable toward and away from each other in the widthwise direction. The pair of side guides 35 is configured to adjust a widthwise position of the sheet 18 supported on the sheet supporting surface 32C, 32F. The pair of side covers 34B is positioned outside of the pair of side guides 35 in the widthwise direction in a state where the pair of side guides 35 provide a maximum distance therebetween in the widthwise direction. In other words, one of the pair of side covers 34B is positioned outside of one of the pair of side guides 35 in the widthwise direction, the one of the pair of side guides 35 being the closer of the pair of side guides 35 to the one of the side covers 34B, in a state where the pair of side guides 35 is separated from each other with the maximum distance in the widthwise direction.

[0140] Therefore, even when the sheet supporting surface 32C, 32F are supporting a sheet 18 with the maximum widthwise size that can be supported thereon, the dust proof cover 34 can cover the sheet support surface 32C, 32F.

[0141] According to the rear sheet supply tray 3 described above, the sheet supporting surface 32C, 32F has widthwise ends in the widthwise direction, and the pair of side covers 34B is positioned inside of the widthwise ends of the sheet supporting surface 32C, 32F in the widthwise direction.

[0142] In this configuration, no gap is formed in the left-right direction between the widthwise ends of the sheet supporting surface 32C, 32F and the side covers 34B, thereby enhancing the effect of preventing entry of a foreign object such as dust into the first housing 2.

[0143] According to the first modification, the rear sheet supply tray 3 includes the sheet introduction portion 54A provided at the upper end portion of the dust proof cover 54. The sheet introduction portion has the inclined surface 54B facing the sheet supporting surface 32C, 32F. The inclined surface 54B has a lower end and an upper end positioned farther from the sheet supporting surface 32C, 32F than the lower end is from the sheet supporting surface 32C, 32F.

[0144] When sheets 18 are replenished onto the rear sheet supply tray 3, the lower ends of the sheets 18 push the inclined surface 54B of the sheet introduction portion 54A to open the dust proof cover 54. The user thus need not open the dust proof cover 54 by hand when replenishing the sheets 18 onto the rear sheet supply tray 3.

[0145] The rear sheet supply tray 3 described above includes the positioning portion 34G provided at an upper end portion of each of the pair of side covers 34B at a position facing the sheet supporting surface 32C, 32F. The positioning portion 34G is configured to abut on the sheet supporting surface 32C, 32F in a state where the dust proof cover 34 is at the first position.

[0146] By disposing the positioning portions 34G at an upper end portion of the dust proof cover 34 remote from a lower end portion thereof at which the second engagement portions 34E as the pivot shaft portions are disposed, positioning error can be reduced.

[0147] According the second modification, the first engagement portion 63B includes the front portion 63C, the bottom portion 33D, and the rear portion 33E in combination to provide the recess. The front portion 63C is positioned closer to the one side surface of the first housing 2 than the rear portion 33E to the first housing 2. The front portion 63C has the height H2 from the bottom portion 33D capable of avoiding interference with a locus of the second engagement portion 34E during pivotal movement of the dust proof cover 34 about the point of contact TA with the lower cover 33 as a fulcrum in a case where an external force is applied to the dust proof cover 34 at the first position in a direction away from the second position.

[0148] When the dust proof cover 34 is accidentally pressed, the second engagement portions 34E disengage from the first engagement portions 63B, respectively, thereby detaching the dust proof cover 34 from the lower cover 63. Hence, damage to the dust proof cover 34 can be avoided.

[0149] According to the second modification, the front portion 63C is a sloped surface sloping downward toward the bottom portion 33D.

[0150] Since the front portion 63C is a sloped surface, the height H2 of the front portion 63C from the bottom portion 33D can be increased. With this configuration, the second engagement portions 34E are less likely to become disengaged from the first engagement portions 63B while the multifunction peripheral 1 is in normal use.

[0151] According to the rear sheet supply tray 3 described above, the first engagement portion 33B includes the front portion 33C, the bottom portion 33D, and the rear portion 33E in combination to provide the recess. The front portion 33C is positioned closer to the one side surface of the first housing 2 than the rear portion 33E is to the first housing 2. The front portion 33C has the height H1 from the bottom portion 33D greater than the radius RA of the second engagement portion 34E.

[0152] According to this configuration, the second engagement portions 34E are less likely to become disengaged from the first engagement portions 33B during pivotal movement of the dust proof cover 34 about the third pivot axis R3.

[0153] The multifunction peripheral 1 described above includes the first housing 2, the image forming portion 20 accommodated in the first housing and configured to form an image on a sheet 18, and the rear sheet supply tray described above.

[0154] Hence, the rear sheet supply tray 3 is available for the multifunction peripheral 1.

[0155] The multifunction peripheral 1 described above includes the first housing 2, and the image forming portion 20 accommodated in the first housing 2 and configured to form an image on the sheet 18. The multifunction peripheral 1 further includes the second housing 4 positioned above the first housing 2 and pivotally movable about the first pivot axis R1 between the covering position covering the upper portion of the first housing 2 and the exposing position exposing the upper portion to an outside. The multifunction peripheral 1 further includes the rear sheet supply tray 3 positioned at the side surfaces of the first housing 2 and the second housing 4 at which the first pivot axis R1 is positioned. The rear sheet supply tray 3 includes the first sheet supporting portion 32A having the first sheet supporting surface 32C configured to support the sheet 18 to be conveyed into the first housing 2. The rear sheet supply tray 3 includes the second sheet supporting portion 32B connected to the upper end portion of the first sheet supporting portion 32A and has the second sheet supporting surface 32F configured to support the sheet 18 to be conveyed into the first housing. The second sheet supporting portion 32B is pivotally movable about the second pivot axis R2

parallel to the first pivot axis R1 between the second use position and the second storage position. At the second use position, the second sheet supporting surface 32F can support the sheet 18 in cooperation with the first sheet supporting surface 32C. At the second storage position, the free end 32H of the second sheet supporting portion 32B is positioned closest to the second housing 4. The rear sheet supply tray 3 further includes the lower cover 33 positioned facing the first sheet supporting surface 32C. The rear sheet supply tray 3 further includes the dust proof cover 34 having a lower end portion engageable with a portion of the lower cover 33, the portion of the lower cover 33 being positioned on the opposite surface (specifically, front surface 33A) of the lower cover 33. The dust proof cover 34 is pivotally movable about the third pivot axis R3 parallel to the first pivot axis R1 between the first position where the dust proof cover 34 covers the first sheet supporting surface 32C and the second sheet supporting surface 32F and the second position where the first sheet supporting surface 32C and the second sheet supporting surface 32F are exposed to the outside. The dust proof cover 34 and the second sheet supporting portion 32B are configured such that, as a result of pressure application from the second housing 4 to the dust proof cover 34 by the pivotal movement of the second housing 4 from the covering position to the exposing position in a state where the dust proof cover 34 is at the second position and where the second sheet supporting portion 32B is positioned between the second use position and the second storage position and where the free end 32H of the second sheet supporting portion 32B is in abutment with the second cover, (i) the dust proof cover 34 is in abutment with the free end 32H of the second sheet supporting portion 32B at the fourth abutment position C4 as a result of the pressure application; (ii) the pressure application from the dust proof cover 34 to the second sheet supporting portion 32B generates, at the fourth abutment position C4, the force F1 directed in the tangential direction in the imaginary circle whose center is at the third pivot axis R3 as viewed in the direction of the first pivot axis R1; and (iii) the force F1 has, at the fourth abutment position C4, the component of force F2 directed in the tangential direction in the imaginary circle whose center is at the second pivot axis R2, the component of force being directed away from the dust proof cover 34 as viewed in the direction of the first pivot axis R1.

[0156] According to this configuration, if the second housing 4 is opened while the second sheet supporting portion 32B is nearly at the second storage position, the second housing 4 moving toward the exposing position pushes the dust proof cover 34 to pivotally move the dust proof cover 34 toward the first position. The dust proof cover 34 moving toward the first position then pushes the second sheet supporting portion 32B to pivotally move the second sheet supporting portion 32B toward the second use position. Therefore, the dust proof cover 34 is not crushed between the second housing

4 and the second sheet supporting portion 32B. Accordingly, damage to the dust proof cover 34 can be avoided.

[0157] The structure of the multifunction peripheral 1 may also be described as follows: The multifunction peripheral 1 includes the first housing 2, and the image forming portion 20 accommodated in the first housing 2 and configured to form an image on the sheet 18. The multifunction peripheral 1 further includes the second housing 4 positioned above the first housing 2 and pivotally movable about the first pivot axis R1 between the covering position covering the upper portion of the first housing 2 and the exposing position exposing the upper portion to an outside. The multifunction peripheral 1 further includes the rear sheet supply tray 3 positioned at the side surfaces of the first housing 2 and the second housing 4 at which the first pivot axis R1 is positioned. The rear sheet supply tray 3 includes the first sheet supporting portion 32A having the first sheet supporting surface 32C configured to support the sheet 18 to be conveyed into the first housing 2. The rear sheet supply tray 3 includes the second sheet supporting portion 32B connected to the upper end portion of the first sheet supporting portion 32A and has the second sheet supporting surface 32F configured to support the sheet 18 to be conveyed into the first housing. The second sheet supporting portion 32B is pivotally movable about the second pivot axis R2 parallel to the first pivot axis R1 between the second use position and the second storage position. At the second use position, the second sheet supporting surface 32F can support the sheet 18 in co-operation with the first sheet supporting surface 32C. At the second storage position, the free end 32H of the second sheet supporting portion 32B is positioned closest to the second housing 4. The rear sheet supply tray 3 further includes the lower cover 33 positioned facing the first sheet supporting surface 32C. The rear sheet supply tray 3 further includes the dust proof cover 34 having a lower end portion engageable with a portion of the lower cover 33, the portion of the lower cover 33 being positioned on the opposite surface (specifically, the front surface 33A) of the lower cover 33. The dust proof cover 34 is pivotally movable about the third pivot axis R3 parallel to the first pivot axis R1 between the first position where the dust proof cover 34 covers the first sheet supporting surface 32C and the second sheet supporting surface 32F and the second position where the first sheet supporting surface 32C and the second sheet supporting surface 32F are exposed to the outside. The dust proof cover 34 and the second sheet supporting portion 32B are configured such that, as a result of pressure application from the second housing 4 to the dust proof cover 34 by the pivotal movement of the second housing 4 from the covering position to the exposing position in a state where the dust proof cover 34 is at the second position and where the second sheet supporting portion 32B is positioned between the second use position and the second storage position and where the free end 32H of the second sheet supporting

portion 32B is in abutment with the dust proof cover 34, (i) the dust proof cover 34 is in abutment with the free end 32H of the second sheet supporting portion 32B at the fourth abutment position C4 as a result of the pressure application; (ii) the pressure application from the dust proof cover 34 to the second sheet supporting portion 32B generates, at the fourth abutment position C4, the force F1 directed in the tangential direction in the imaginary circle whose center is at the third pivot axis R3 as viewed in the direction of the first pivot axis R1; and (iii) the second pivot axis R2, the third pivot axis R3, and the fourth abutment position C4 in combination provide the imaginary triangle T, the force F1 being directed in the direction away from the imaginary triangle T as viewed in the direction of the first pivot axis R1.

[0158] According to the multifunction peripheral 1 described above, the dust proof cover 34 has the notched region 34H. The free end 32H of the second sheet supporting portion 32B is in abutment with the notched region 34H in the state where the dust proof cover 34 is at the second position and where the second sheet supporting portion 32B is positioned between the second use position and the second storage position and where the free end 32H of the second sheet supporting portion 32B is in abutment with the dust proof cover 34.

[0159] Since the dust proof cover 34 has the notched region 34H abuttable with the second sheet supporting portion 32B, damage to the dust proof cover 34 can be further avoided while making the dust proof cover 34 compact.

[0160] According to the third modification, as viewed in the direction of the first pivot axis R1, the dust proof cover 74 has the inflection point Z positioned in the upper portion of each of the notched regions 74H and protruding toward the second sheet supporting surface 32F.

[0161] Providing the inflection point Z in the notched region 74H can make an area in the dust proof cover 74 notched by the notched regions 74H smaller. Therefore, a foreign object such as dust can be suppressed from entering into the first housing 2 through the notched regions 74H.

[0162] The multifunction peripheral 1 described above includes the first housing 2, and the image forming portion 20 accommodated in the first housing 2 and configured to form an image on the sheet 18. The multifunction peripheral 1 further includes the second housing 4 positioned above the first housing 2 and pivotally movable about the first pivot axis R1 between the covering position covering the upper portion of the first housing 2 and the exposing position exposing the upper portion to an outside. The multifunction peripheral 1 further includes the rear sheet supply tray 3 positioned at the side surfaces of the first housing 2 and the second housing 4 at which the first pivot axis R1 is positioned. The rear sheet supply tray 3 includes the sheet supporting portion 32 having the sloped sheet supporting surface 32C, 32F on which the sheet 18

to be conveyed into the first housing 2 is supported. The rear sheet supply tray 3 further includes the lower cover 33 having one surface facing the portion of the sheet supporting surface 32C, 32F and an opposite surface 33A opposite to the one surface. The opposite surface has the first engagement portion 33B. The rear sheet supply tray 3 further includes the dust proof cover 34. The dust proof cover 34 includes the second engagement portion 34E attachable to and detachable from the first engagement portion 33B and pivotally movably engageable with the first engagement portion 33B, and the extension portion 34J extending toward the sheet supporting surface 32C, 32F. The dust proof cover 34 is positioned between the sheet supporting surface 32C, 32F and the side surfaces of the first and second housings 2 and 4, and configured to cover at least a part of the sheet supporting surface 32C, 32F. The dust proof cover 34 is attachable to and detachable from the lower cover 33 in the predetermined direction and is pivotally movable relative to the lower cover 33 between the first position where the dust proof cover 34 covers the sheet supporting surface 32C, 32F and the second position where the sheet supporting surface 32C, 32F is exposed to an outside. The dust proof cover 34 and the lower cover 33 are configured such that, as a result of pressure application from the second housing 4 to the dust proof cover 34 by the pivotal movement of the second housing 4 from the covering position to the exposing position in a state where the second engagement portion 34E is disengaged from the first engagement portion 33B so that the dust proof cover 34 is at the third position where the dust proof cover 34 is positioned on the lower cover 33, (i) as a result of the pressure application, the second housing 4 is in abutment with the dust proof cover 34 at the first abutment position C1 and the extension portion 34J is in abutment with the lower cover 33 at the second abutment position C2; and (ii) the pressure application to the dust proof cover 34 generates the force F4 directing from the first abutment position C1 to the second abutment position C2, the force F4 being directed upward relative to the normal line N perpendicular to the abutment surface of the lower cover 33 and passing through the second abutment position C2.

[0163] Even if the second housing 4 is opened when the dust proof cover 34 has been dropped and caught between the second housing 4 and the lower cover 33, the dust proof cover 34 is lifted upward along the abutment surface of the lower cover 33. Therefore, the dust proof cover 34 is not crushed between the second housing 4 and the lower cover 33, and thus damage to the dust proof cover 34 can be avoided.

[0164] According to the multifunction peripheral 1 described above, the extension portion 34J has a lower portion having a curved shape recessed in the direction away from the second engagement portion 34E.

[0165] When the dust proof cover 34 is at the third position, the dust proof cover 34 is moved upward in conjunction with the pivotal movement of the second housing 4 from

the covering position toward the exposing position. As a result, the extension portions 34J with the curved-shaped recess are brought into engagement with the upper end portion 33G of the lower cover 33. Through the engagement between the extension portions 34J and the upper end portion 33G, the dust proof cover 34 is supported at a position close to the first position. Accordingly, the dust proof cover 34 does not move when the second housing 4 is pivotally moved from the covering position toward the exposing position after the dust proof cover 34 has been supported on the lower cover 33 as a result of the engagement between the extension portion 34J and the upper end portion 33G. Therefore, resistance acting on the second housing 4 when the user opens the second housing 4 can be reduced.

[0166] According to the multifunction peripheral 1 described above, the second engagement portion 34E is configured to be movable to the height capable of being engaged with the first engagement portion 33B by pivotal movement of the second housing 4 from the covering position to the exposing position while the dust proof cover 34 is at the third position.

[0167] When the dust proof cover 34 is at the third position, the dust proof cover 34 is lifted upward as a result of pivotal movement of the second housing 4 from the covering position toward the exposing position, and the second engagement portions 34E move up to the height engageable with the first engagement portions 33B. The second engagement portions 34E are therefore likely to become engaged with the first engagement portions 33B.

[0168] According to the multifunction peripheral 1 described above, the abutment surface of the lower cover 33 is sloped downward toward the first housing 2.

[0169] Since the abutment surface of the lower cover 33 is sloped, resistance acting on the dust proof cover 34 at the second abutment position C2 can be reduced, thereby reducing resistance acting on the dust proof cover 34 when the dust proof cover 34 moves upward.

[0170] According to the multifunction peripheral 1 described above, the first engagement portion 33B is the recess opening upward and extending in the widthwise direction parallel to the sheet supporting surface 32C, 32F and orthogonal to the conveying direction of the sheet 18, the recess having a shape capable of receiving the protrusion. The second engagement portion 34E is the protrusion positioned at the lower end portion of the dust proof cover 34, the protrusion having a columnar shape and extending in the widthwise direction. The abutment surface of the lower cover 33 has a lower end positioned below the diametrical center of the columnar shape.

[0171] With this configuration, in a state where the dust proof cover 34 is at the third position, the second engagement portions 34E can be reliably brought into abutment with the abutment surface of the lower cover 33.

[0172] While the description has been made in detail with reference to the embodiments thereof, it would be apparent to those skilled in the art that many modifications and variations may be made therein without departing from the scope of the disclosure.

Reference Signs List

[0173] 1: multifunction peripheral 2: first housing 3: rear sheet supply tray 4: second housing 18: sheet 20: image forming portion 32: sheet supporting portion 32A: first sheet supporting portion 32B: second sheet supporting portion 32C: first sheet supporting surface 32F: second sheet supporting surface 32H: free end 33: lower cover (first cover) 33B, 63B: first engagement portion 33C: front portion 34, 74: dust proof cover (second cover) 34A: main cover 34B: side cover 34E: second engagement portion 34G: positioning portion 34H: notched region 34J: extension portion 35: side guide 54A: sheet introduction portion C1: first abutment position C2: second abutment position C4: fourth abutment position F1: force F2: a first component of force F4: force N: normal line R1: first pivot axis R2: second pivot axis R3: third pivot axis T: imaginary triangle TA: point of contact TY: locus Z: inflection point

Claims

[Claim 1] A sheet supply tray comprising:
a sheet supporting portion positioned at one side surface of a housing of an image forming apparatus, the sheet supporting portion having a sheet supporting surface on which a sheet to be conveyed into the housing is supported, the sheet supporting surface having a portion;
a first cover having one surface facing the portion of the sheet supporting surface and an opposite surface opposite to the one surface, the opposite surface having a first engagement portion; and
a second cover including a second engagement portion engageable with the first engagement portion, the second cover being positioned between the sheet supporting surface and the one side surface and configured to cover at least a part of the sheet supporting surface,
wherein one of the first engagement portion and the second engagement portion is a protrusion, and remaining one of the first engagement portion and the second engagement portion is a recess, the recess being attachable to and detachable from the protrusion and pivotally movably engaged with the protrusion so that the second cover is attachable to and detachable from the first cover in a predetermined direction and is pivotally movable relative to the first cover between a first position where the second cover covers the sheet supporting surface and a second position where the sheet supporting surface is exposed to an outside.

[Claim 2] The sheet supply tray according to claim 1, wherein the first engagement portion is the recess opening upward and extending in a widthwise direction parallel to the sheet supporting surface and orthogonal to a conveying direction of the sheet, the recess having a shape capable of receiving the protrusion, and
wherein the second engagement portion is positioned at a lower end portion of the second cover, and is the protrusion having a columnar shape extending in the widthwise direction.

[Claim 3] The sheet supply tray according to claim 1 or 2, wherein the second cover comprises:
a main cover positioned facing the sheet supporting surface, the main cover having side portions in a widthwise direction parallel to the sheet supporting surface and orthogonal to a conveying direction of the sheet; and

a pair of side covers extending from each of the side portions of the main cover toward the sheet supporting surface.

[Claim 4] The sheet supply tray according to claim 3, further comprising a pair of side guides provided at the sheet supporting surface and movable toward and away from each other in the widthwise direction, the pair of side guides being configured to adjust a widthwise position of the sheet supported on the sheet supporting surface,
wherein the pair of side covers is positioned outside of the pair of side guides in the widthwise direction in a state where the pair of side guides provide a maximum distance therebetween in the widthwise direction.

[Claim 5] The sheet supply tray according to claim 3 or 4, wherein the sheet supporting surface has widthwise ends in the widthwise direction, the pair of side covers being positioned inside of the widthwise ends of the sheet supporting surface in the widthwise direction.

[Claim 6] The sheet supply tray according to any one of claims 1 to 5, further comprising a sheet introduction portion provided at an upper end portion of the second cover, the sheet introduction portion having an inclined surface facing the sheet supporting surface, the inclined surface has a lower end and an upper end positioned farther from the sheet supporting surface than the lower end is from the sheet supporting surface.

[Claim 7] The sheet supply tray according to any one of claims 3 to 5, further comprising a positioning portion provided at an upper end portion of each of the pair of side covers at a position facing the sheet supporting surface, the positioning portion being configured to abut on the sheet supporting surface in a state where the second cover is at the first position.

[Claim 8] The sheet supply tray according to claim 2, wherein the first engagement portion has a first portion, a bottom portion, and a second portion in combination to provide the recess, the first portion being positioned closer to the one side surface of the housing than the second portion is to the housing, and
wherein the first portion has a height from the bottom portion capable of avoiding interference with a locus of the second engagement portion during pivotal movement of the second cover about a point of contact with the first cover as a fulcrum in a case where an external force is applied to the second cover at the first position in a direction away from

the second position.

[Claim 9] The sheet supply tray according to claim 8, wherein the first portion is a sloped surface sloping downward toward the bottom portion.

[Claim 10] The sheet supply tray according to claim 2, wherein the first engagement portion has a first portion, a bottom portion, and a second portion in combination to provide the recess, the first portion being positioned closer to the one side surface of the housing than the second portion is to the housing, and
wherein the first portion has a height from the bottom portion greater than a radius of the second engagement portion.

[Claim 11] An image forming apparatus comprising:
a housing;
an image forming portion accommodated in the housing and configured to form an image on a sheet; and
the sheet supply tray according to any one of claims 1 to 10.

[Claim 12] The image forming apparatus according to claim 11, further comprising:
a second housing positioned above the housing and pivotally movable about a first pivot axis between a covering position covering an upper portion of the housing and an exposing position exposing the upper portion to an outside,
wherein the sheet supply tray is positioned at side surfaces of the housing and the second housing at which the first pivot axis is positioned,
wherein the sheet supporting portion comprises:
a first sheet supporting portion having a first sheet supporting surface configured to support the sheet to be conveyed into the housing; and
a second sheet supporting portion connected to an upper end portion of the first sheet supporting portion and having a second sheet supporting surface configured to support the sheet to be conveyed into the housing, the second sheet supporting portion being pivotally movable about a second pivot axis parallel to the first pivot axis between a use position and a storage position, at the use position the second sheet supporting surface being capable of supporting the sheet in cooperation with the first sheet supporting surface, at the storage position a free end of the second sheet supporting portion being positioned closest to the second housing,
wherein the first cover is positioned facing the first sheet supporting

surface,

wherein the second cover has a lower end portion engageable with a portion of the first cover, the portion of the first cover being positioned on the opposite surface, the second cover being pivotally movable about a third pivot axis parallel to the first pivot axis between the first position where the second cover covers the first sheet supporting surface and the second sheet supporting surface and the second position where the first sheet supporting surface and the second sheet supporting surface are exposed to the outside, and

wherein the second cover and the second sheet supporting portion are configured such that, as a result of pressure application from the second housing to the second cover by the pivotal movement of the second housing from the covering position to the exposing position in a state where the second cover is at the second position and where the second sheet supporting portion is positioned between the use position and the storage position and where the free end of the second sheet supporting portion is in abutment with the second cover,

(i) the second cover is in abutment with the free end of the second sheet supporting portion at an abutment position as a result of the pressure application;

(ii) pressure application from the second cover to the second sheet supporting portion generates, at the abutment position, a force directed in a tangential direction in an imaginary circle whose center is at the third pivot axis as viewed in a direction of the first pivot axis; and

(iii) the force has, at the abutment position, a component of force directed in a tangential direction in an imaginary circle whose center is at the second pivot axis, the component of force being directed away from the second cover as viewed in a direction of the first pivot axis.

[Claim 13] The image forming apparatus according to claim 11, further comprising:

a second housing positioned above the housing and pivotally movable about a first pivot axis between a covering position covering an upper portion of the housing and an exposing position exposing the upper portion to an outside,

wherein the sheet supply tray is positioned at side surfaces of the housing and the second housing at which the first pivot axis is positioned,

wherein the sheet supporting portion comprises:

a first sheet supporting portion having a first sheet supporting surface configured to support the sheet to be conveyed into the housing; and
a second sheet supporting portion connected to an upper end portion of the first sheet supporting portion and having a second sheet supporting surface configured to support the sheet to be conveyed into the housing, the second sheet supporting portion being pivotally movable about a second pivot axis parallel to the first pivot axis between a use position and a storage position, at the use position the second sheet supporting surface being capable of supporting the sheet in cooperation with the first sheet supporting surface, at the storage position a free end of the second sheet supporting portion being positioned closest to the second housing,
wherein the first cover is positioned facing the first sheet supporting surface,
wherein the second cover has a lower end portion engageable with a portion of the first cover, the portion of the first cover being positioned on the opposite surface, the second cover being pivotally movable about a third pivot axis parallel to the first pivot axis between the first position where the second cover covers the first sheet supporting surface and the second sheet supporting surface and the second position where the first sheet supporting surface and the second sheet supporting surface are exposed to the outside, and
wherein the second cover and the second sheet supporting portion are configured such that, as a result of pressure application from the second housing to the second cover by the pivotal movement of the second housing from the covering position to the exposing position in a state where the second cover is at the second position and where the second sheet supporting portion is positioned between the use position and the storage position and where the free end of the second sheet supporting portion is in abutment with the second cover,
(i) the second cover is in abutment with the free end of the second sheet supporting portion at an abutment position as a result of the pressure application;
(ii) pressure application from the second cover to the second sheet supporting portion generates, at the abutment position, a force directed in a tangential direction in an imaginary circle whose center is at the third pivot axis as viewed in a direction of the first pivot axis; and
(iii) the second pivot axis, the third pivot axis, and the abutment

position in combination provide an imaginary triangle, the force being directed in a direction away from the imaginary triangle as viewed in a direction of the first pivot axis.

[Claim 14] The image forming apparatus according to claims 12 or 13, wherein the second cover has a notched region, and
wherein the free end of the second sheet supporting portion is in abutment with the notched region in the state where the second cover is at the second position and where the second sheet supporting portion is positioned between the use position and the storage position and where the free end of the second sheet supporting portion is in abutment with the second cover.

[Claim 15] The image forming apparatus according to claims 14, wherein, as viewed in a direction of the first pivot axis, the second cover has an inflection point positioned in an upper portion of the notched region and protruding toward the second sheet supporting surface.

[Claim 16] The image forming apparatus according to claim 11, further comprising:
a second housing positioned above the housing and pivotally movable about a first pivot axis between a covering position covering an upper portion of the housing and an exposing position exposing the upper portion to an outside,
wherein the sheet supply tray is positioned at side surfaces of the housing and the second housing at which the first pivot axis is positioned,
wherein the sheet supporting surface of the sheet supporting portion is sloped,
wherein the second cover is positioned between the sheet supporting surface and the side surfaces of the housing and the second housing, the second cover further including an extension portion extending toward the sheet supporting surface, and
wherein the second cover and the first cover are configured such that, as a result of pressure application from the second housing to the second cover by the pivotal movement of the second housing from the covering position to the exposing position in a state where the second engagement portion is disengaged from the first engagement portion so that the second cover is at a third position where the second cover is positioned on the first cover,
(i) as a result of the pressure application, the second housing is in

abutment with the second cover at a first abutment position and the extension portion is in abutment with the first cover at a second abutment position; and

(ii) the pressure application to the second cover generates a force directing from the first abutment position to the second abutment position, the force being directed upward relative to a normal line perpendicular to an abutment surface of the first cover and passing through the second abutment position.

[Claim 17] The image forming apparatus according to claim 16, wherein the extension portion has a lower portion having a curved shape recessed in a direction away from the second engagement portion.

[Claim 18] The image forming apparatus according to claim 16 or 17, wherein the second engagement portion is configured to be movable to a height capable of being engaged with the first engagement portion by pivotal movement of the second housing from the covering position to the exposing position while the second cover is at the third position.

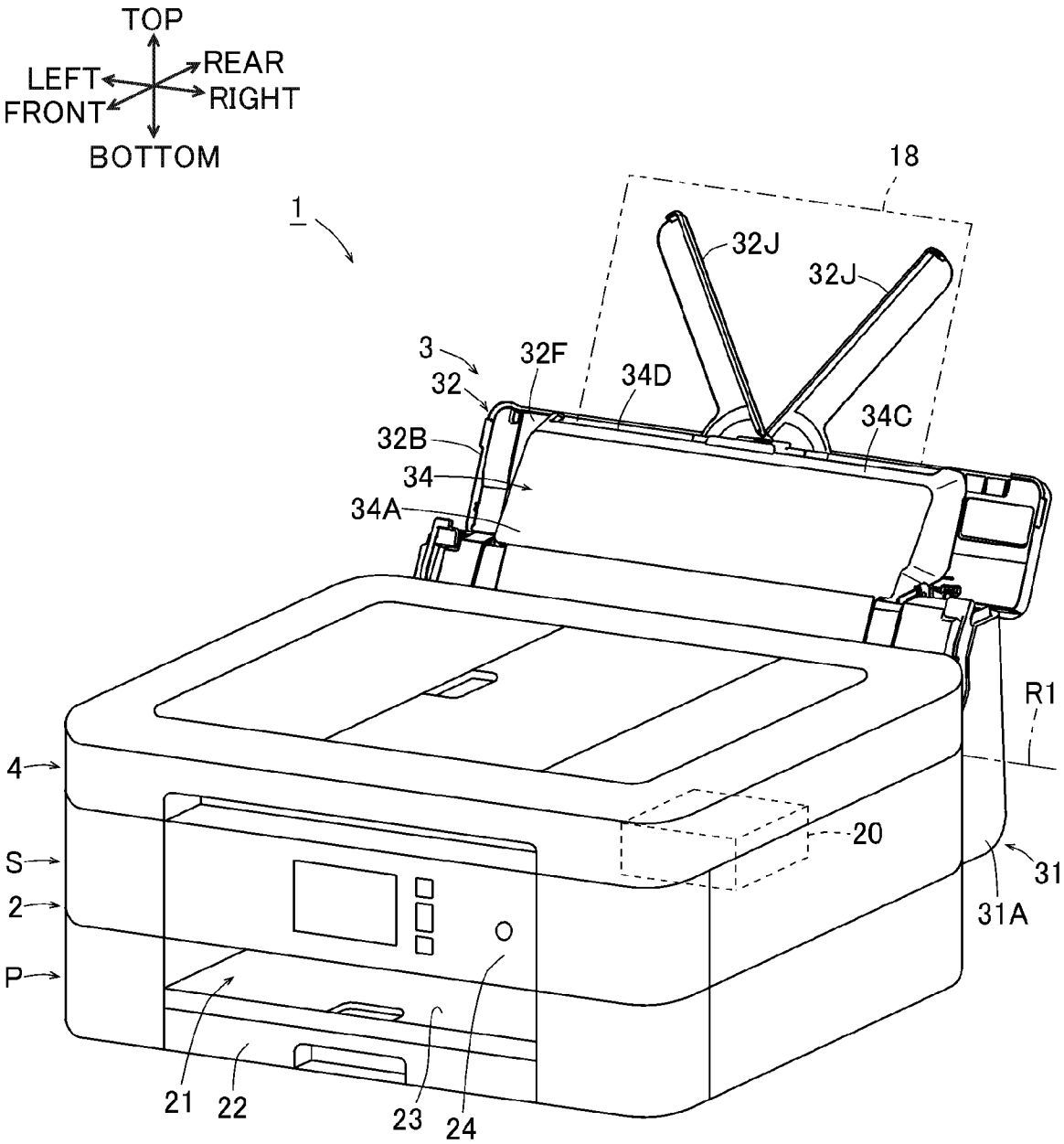
[Claim 19] The image forming apparatus according to any one of claims 16 to 18, wherein the abutment surface of the first cover is sloped downward toward the housing.

[Claim 20] The image forming apparatus according to claim 19, wherein the first engagement portion is the recess opening upward and extending in a widthwise direction parallel to the sheet supporting surface and orthogonal to a conveying direction of the sheet, the recess having a shape capable of receiving the protrusion,

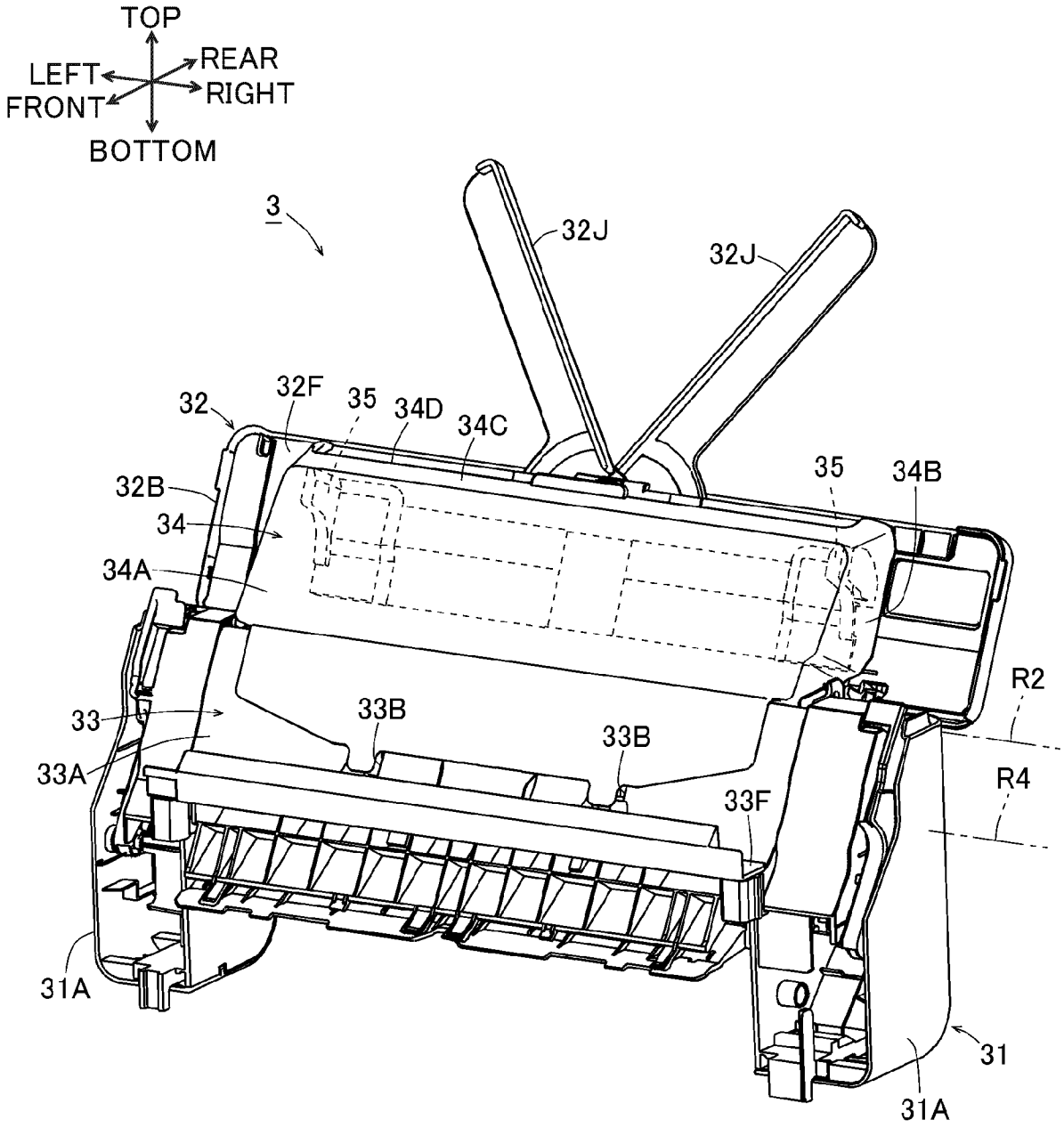
wherein the second engagement portion is positioned at a lower end portion of the second cover, and is the protrusion having a columnar shape and extending in the widthwise direction, and

wherein the abutment surface of the first cover has a lower end positioned below a diametrical center of the columnar shape in a state where the second cover is at the third position.

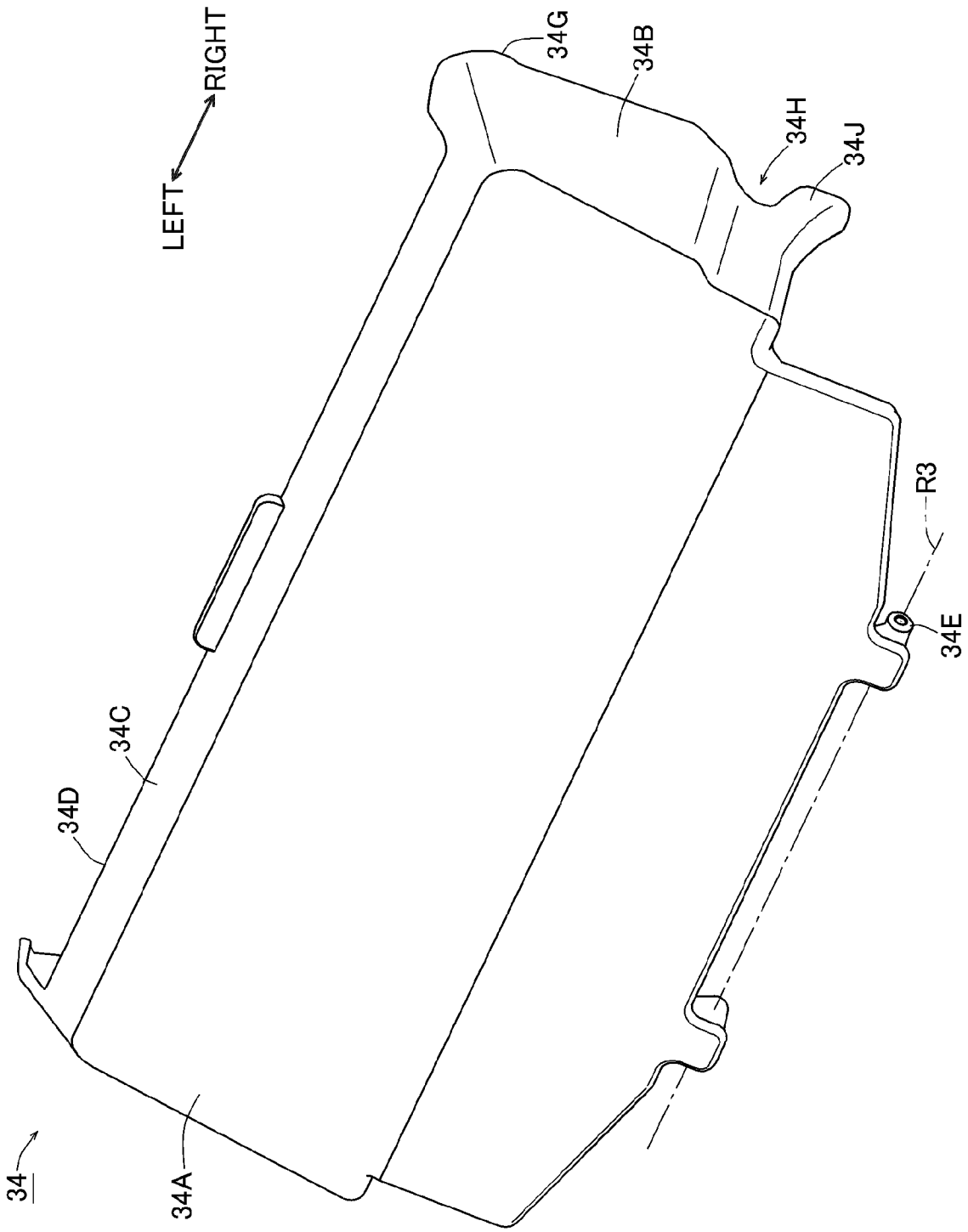
[Fig. 1]


TOP
LEFT
REAR
RIGHT
FRONT
BOTTOM
1
18
32J
32J
3
32F
34D
32
34C
32B
34
34A
R1
4
20
S
31
2
31A
P
21
22
23
24

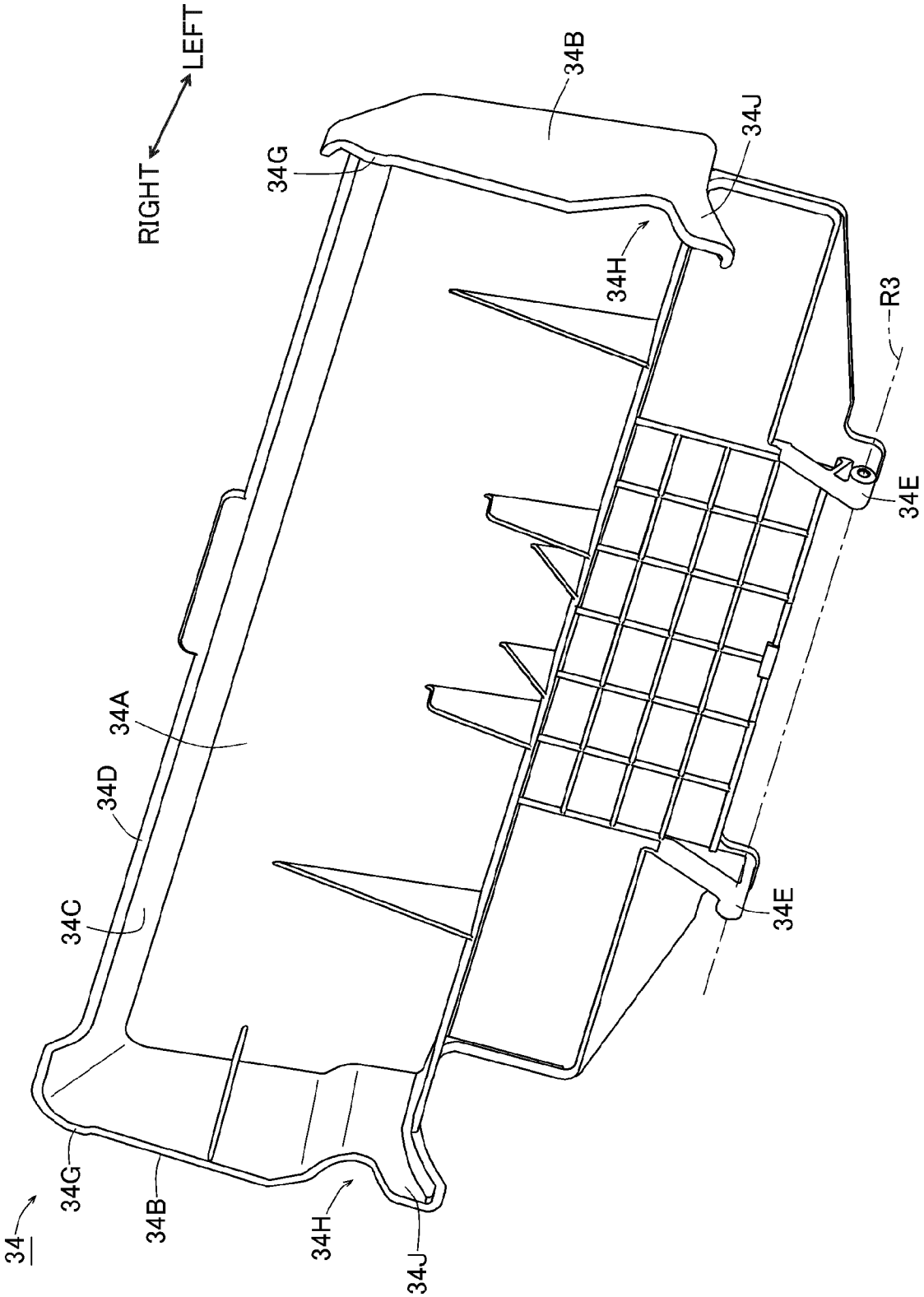
[Fig. 2]


TOP
LEFT
REAR
FRONT
RIGHT
BOTTOM
3
32J
32J
32
32F
35
34D
34C
35
34B
32B
34
34A
R2
33
33B
33B
R4
33A
33F
31A
31
31A

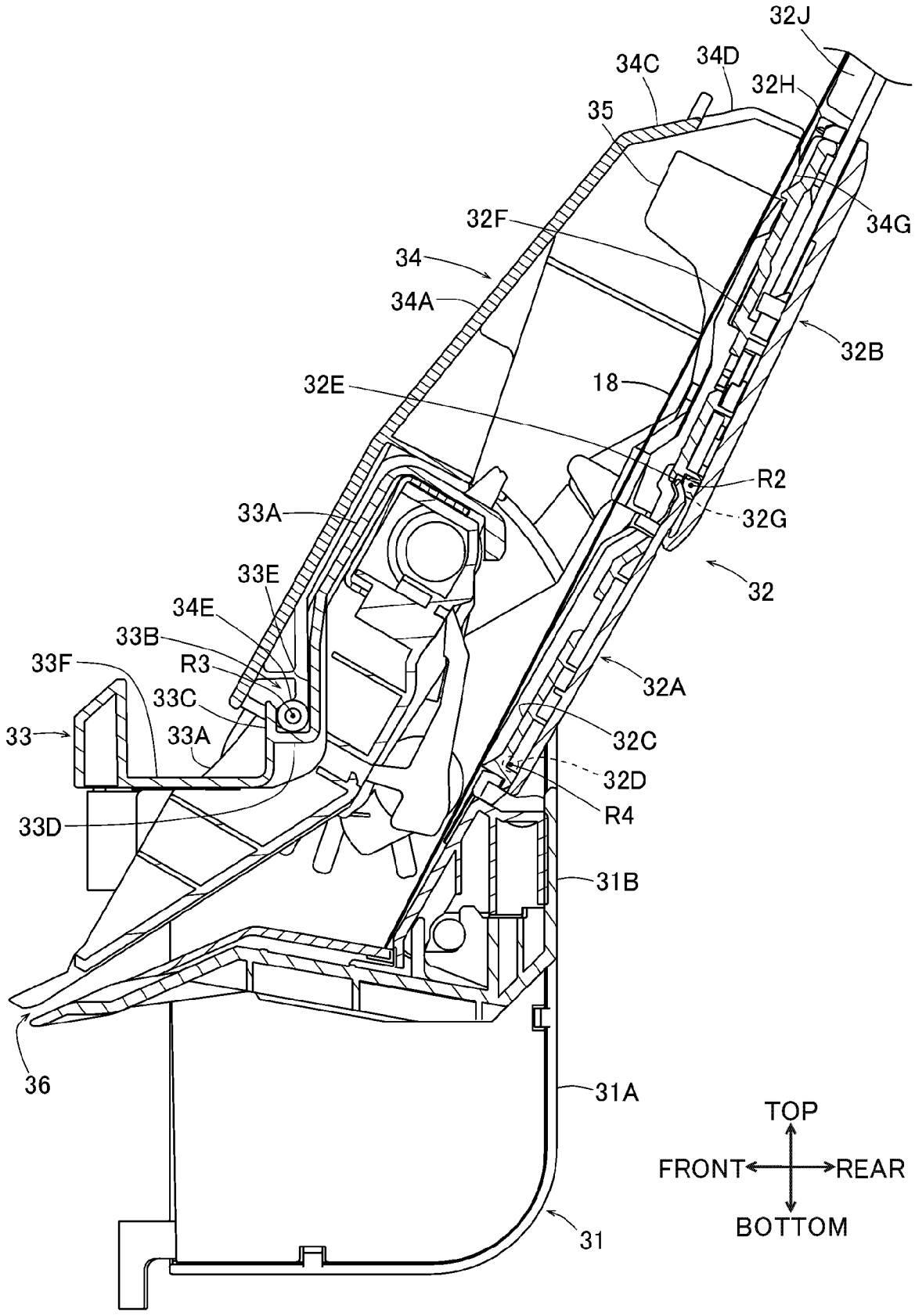
[Fig. 3]



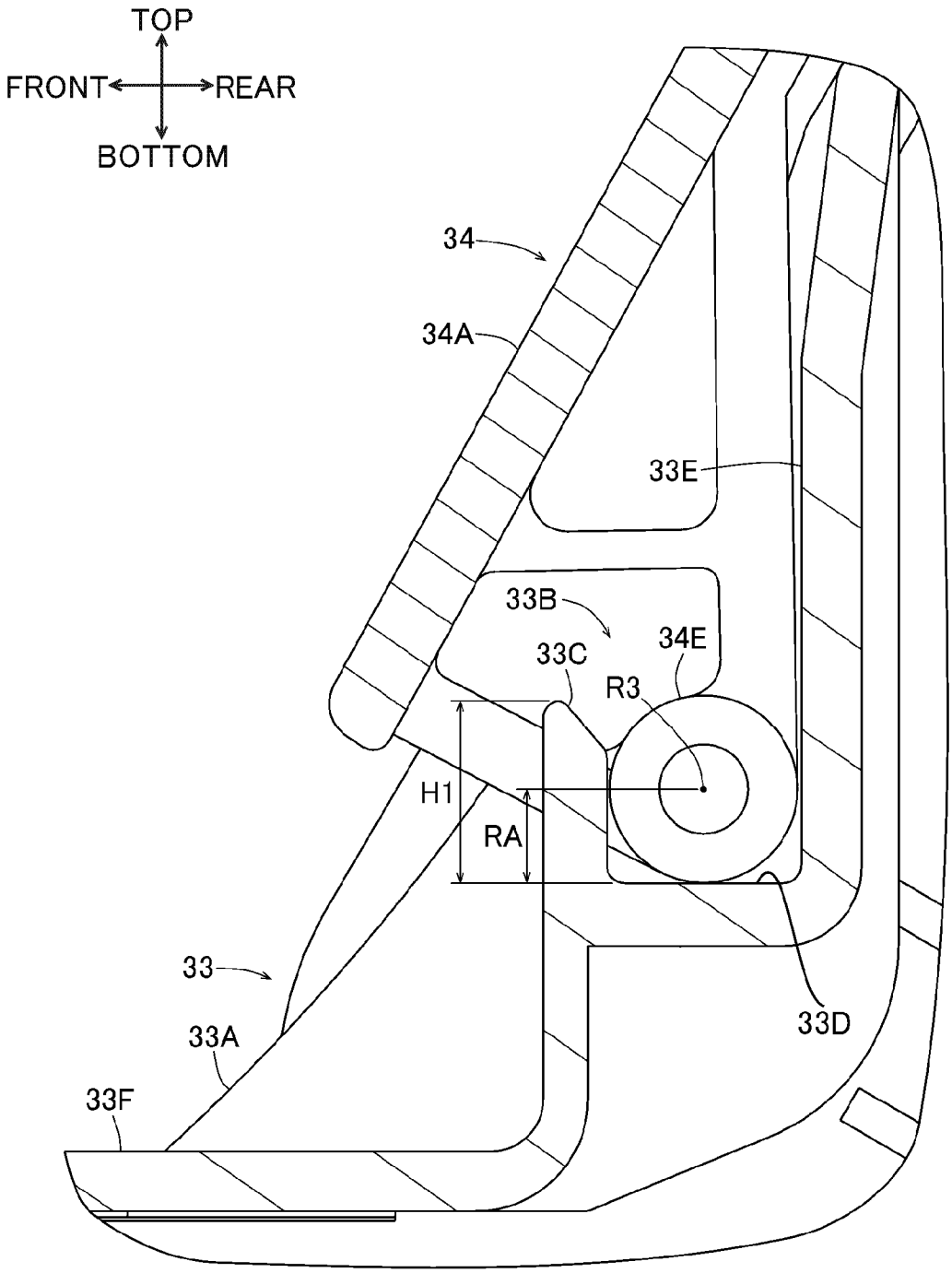
[Fig. 4]


LEFT
RIGHT
34B
34J
34G
34H
R3
34E
34A
34D
34C
34E
34G
34B
34H
34J
34

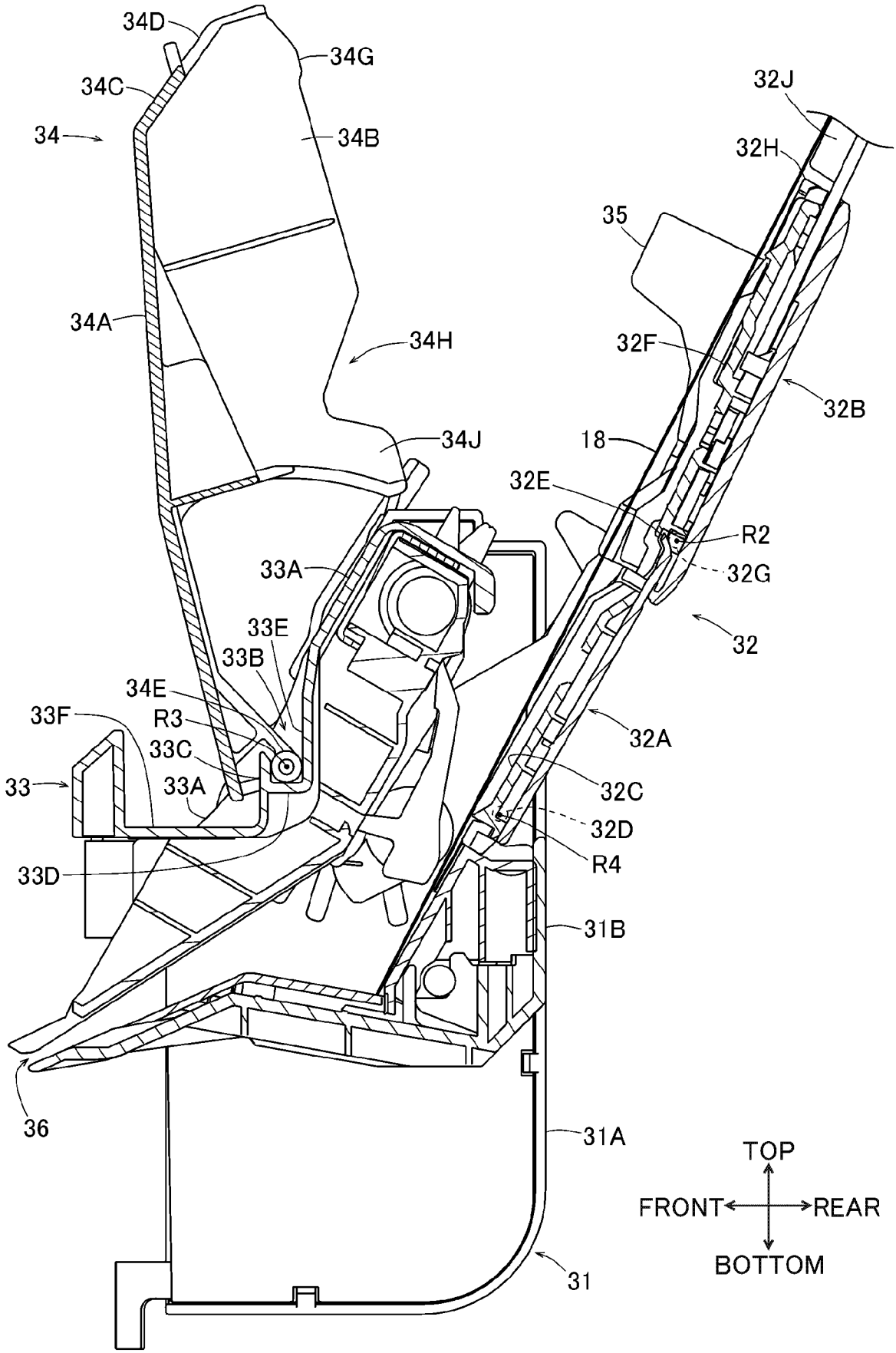
[Fig. 5]


32J
34C
34D
32H
35
34G
32F
34
34A
32B
18
32E
R2
32G
33A
32
33E
34E
33B
33F
R3
32A
33C
33
33A
32C
32D
R4
33D
31B
36
31A
31
TOP
FRONT
REAR
BOTTOM

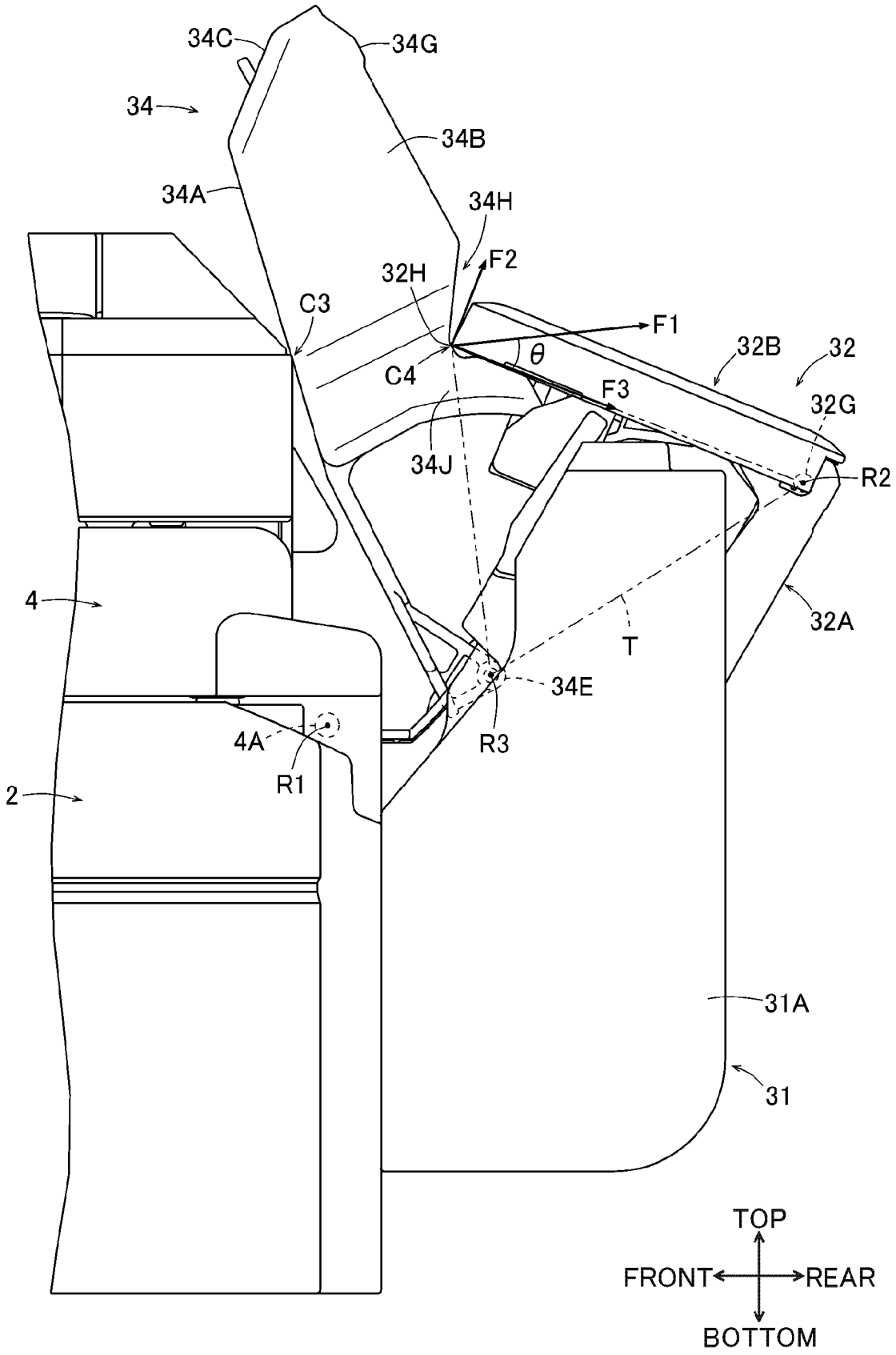
[Fig. 6]


TOP
FRONT
REAR
BOTTOM
34
34A
33E
33B
33C
34E
R3
H1
RA
33
33A
33F
33D

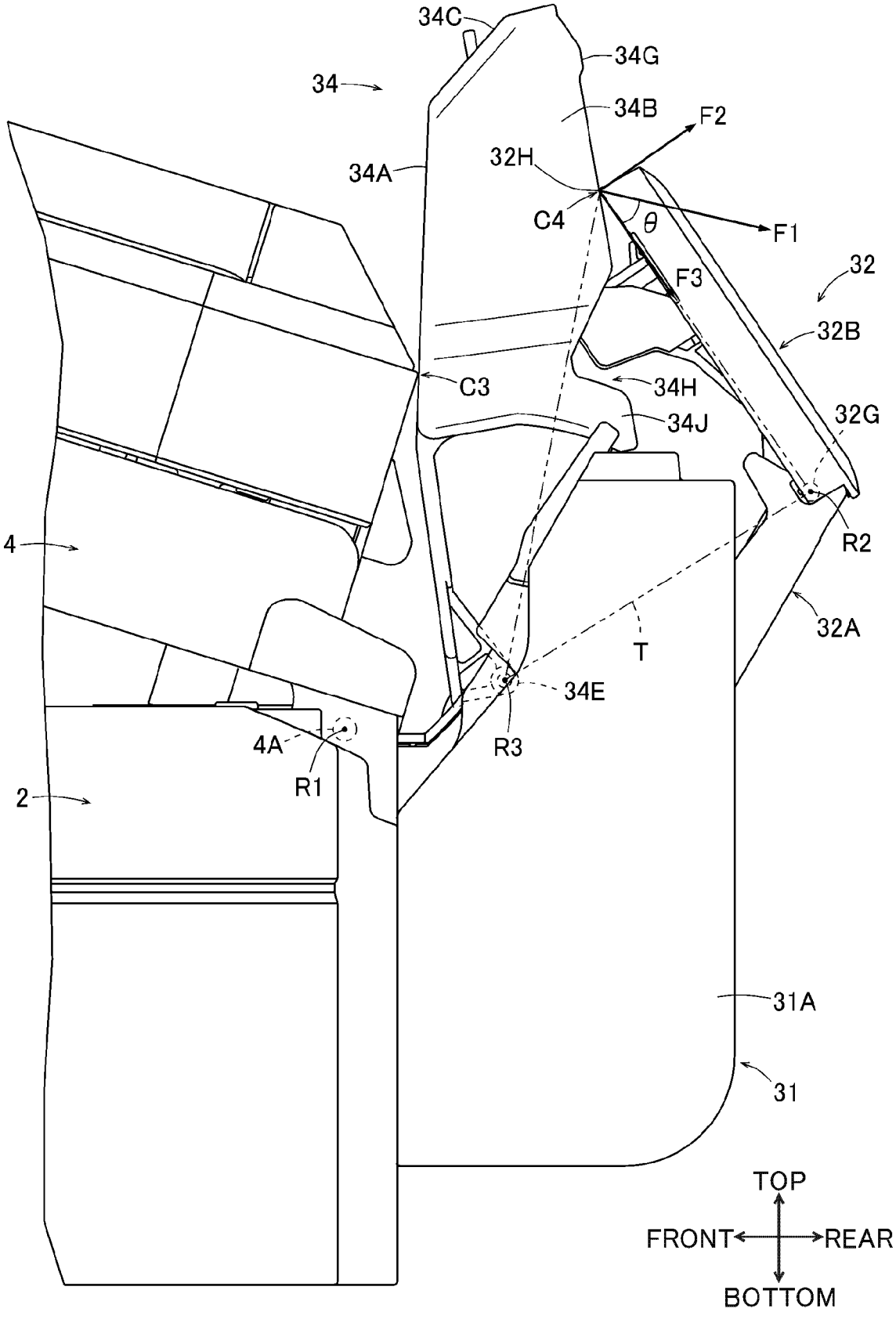
[Fig. 7]


34D
34G
34C
34
34B
34A
34H
34J
32J
32H
35
32F
32B
18
32E
R2
32G
32
33A
33E
33B
34E
33F
R3
33C
33
33A
33D
32A
32C
32D
R4
31B
36
31A
31
TOP
FRONT
REAR
BOTTOM

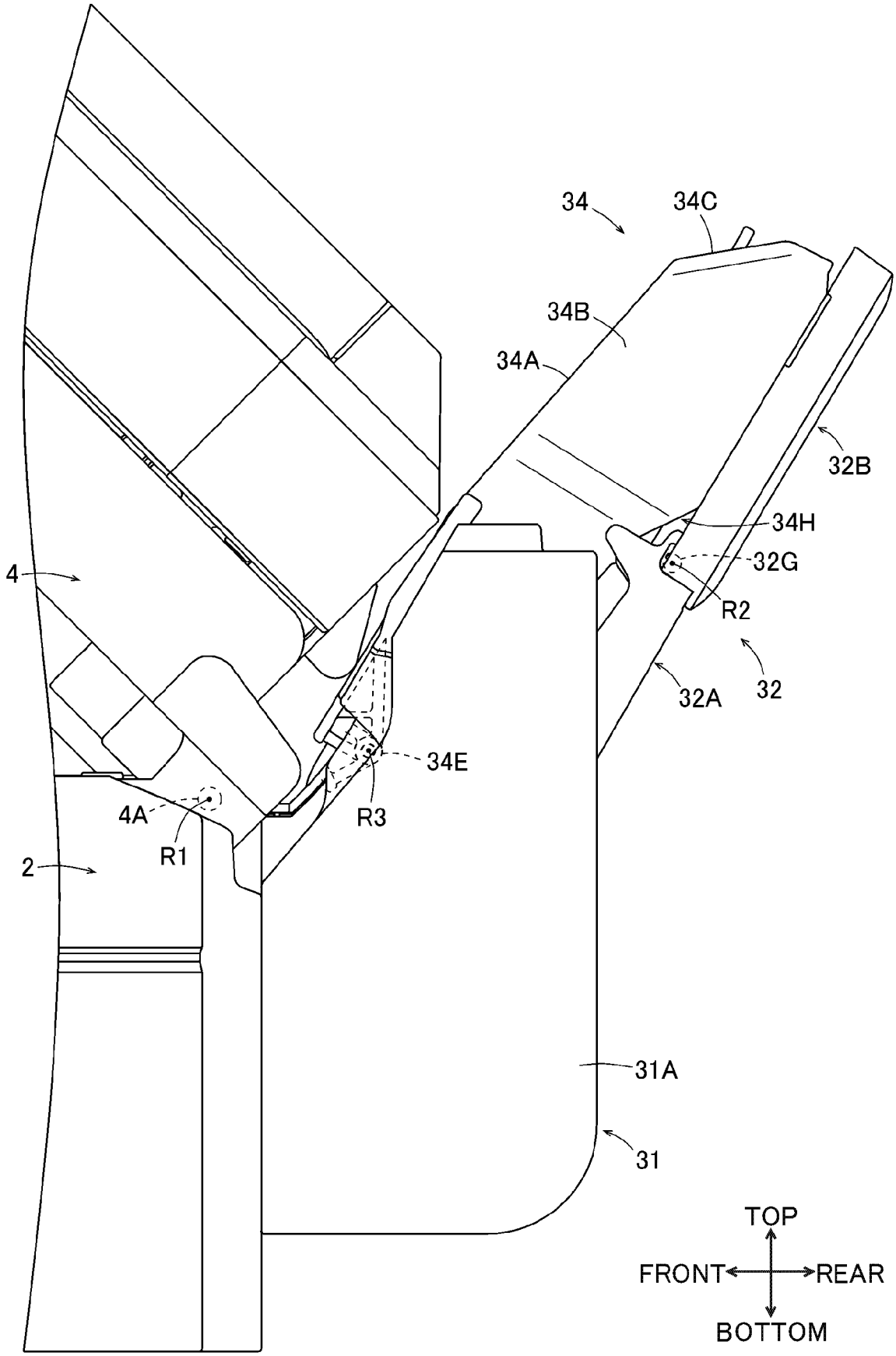
[Fig. 8]


34C
34G
34
34B
34A
34H
F2
32H
C3
F1
θ
32B
32
C4
F3
32G
34J
R2
4
32A
T
34E
4A
R3
R1
2
31A
31
TOP
FRONT
REAR
BOTTOM

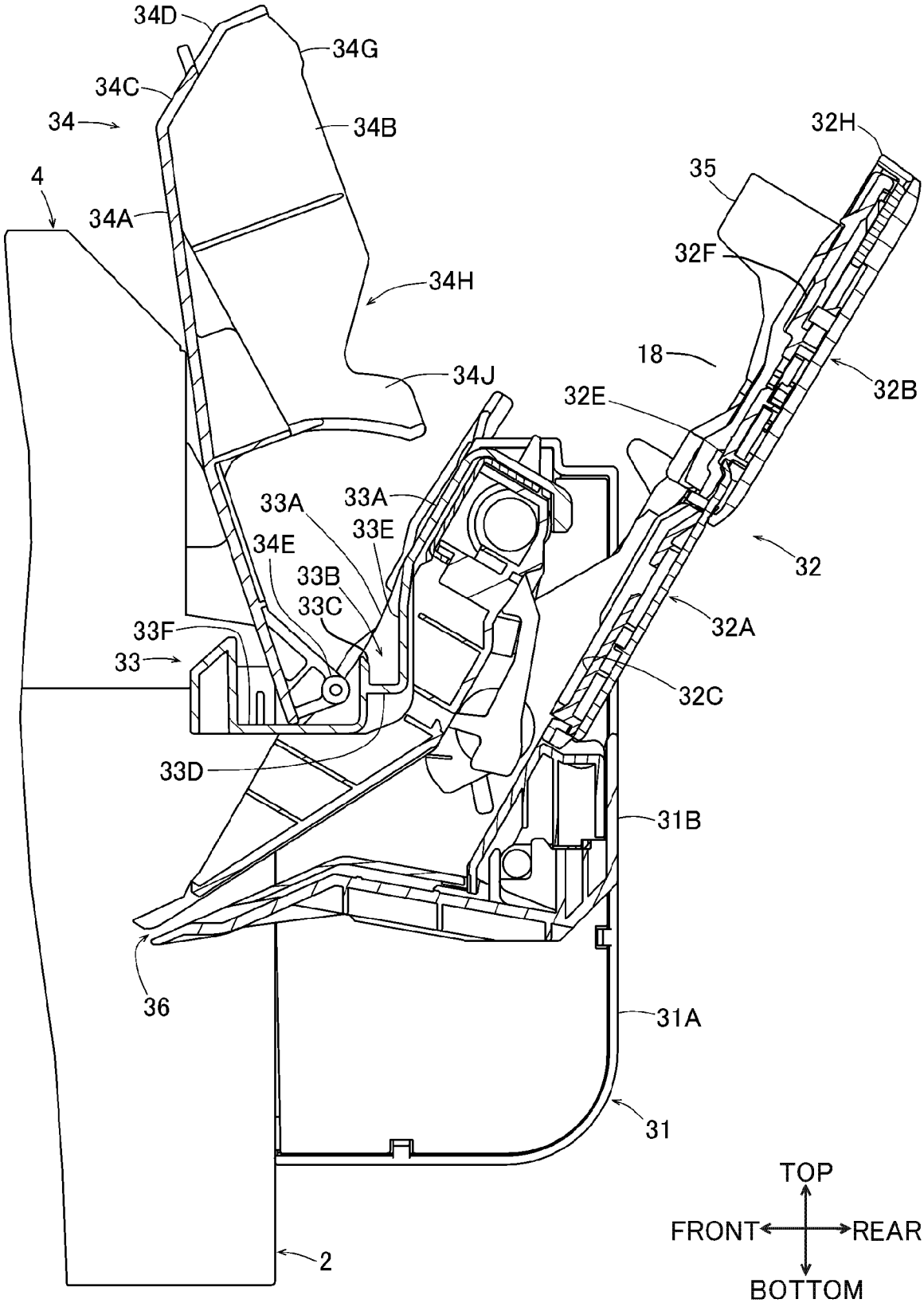
[Fig. 9]


34C
34G
34
34B
F2
34A
32H
C4
θ
F1
F3
32
32B
C3
34H
34J
32G
4
R2
32A
T
34E
4A
R3
R1
2
31A
31
TOP
FRONT
REAR
BOTTOM

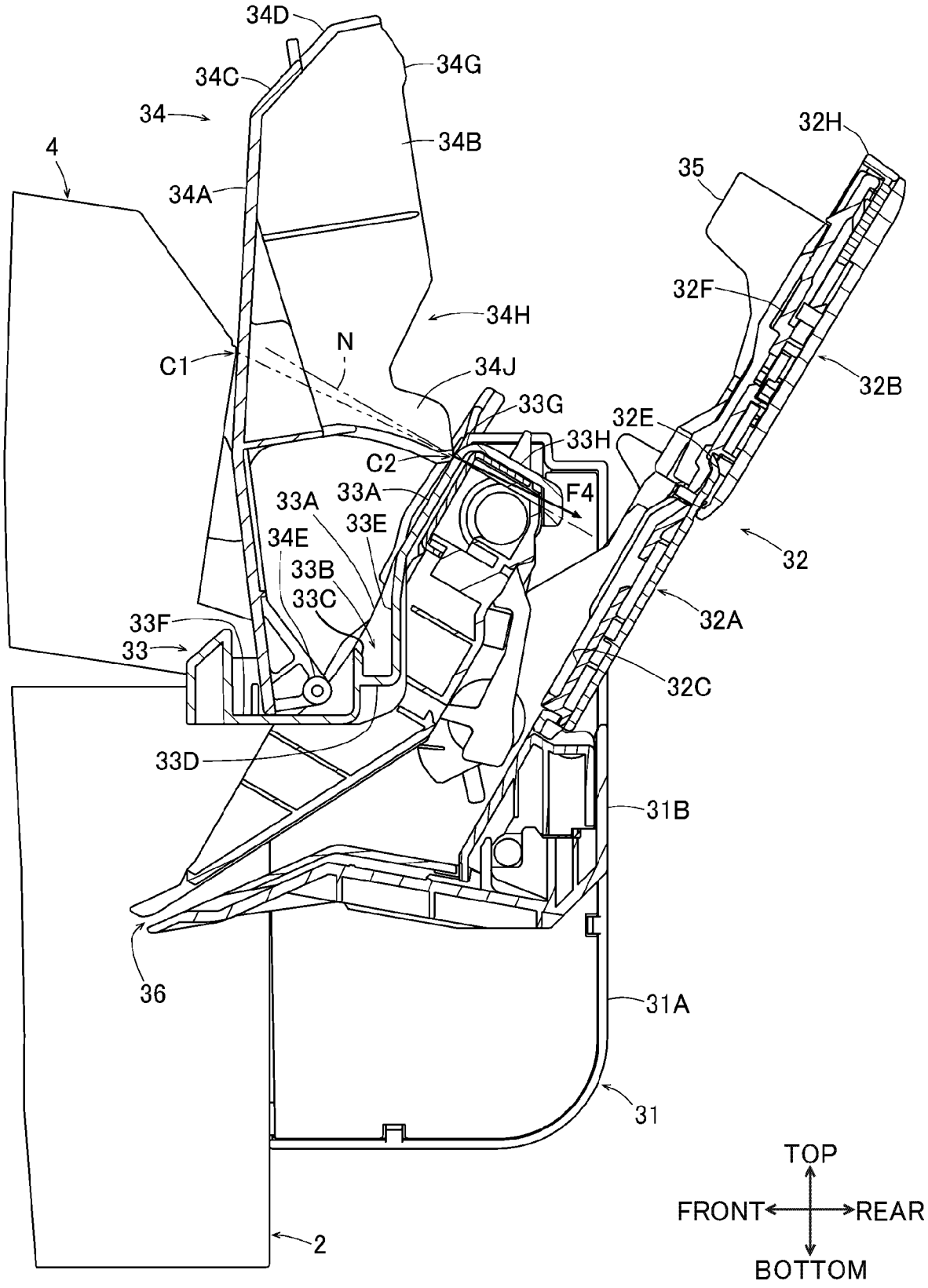
[Fig. 10]


34
34C
34B
34A
32B
34H
32G
R2
32
32A
4
34E
R3
4A
R1
2
31A
31
TOP
FRONT
REAR
BOTTOM

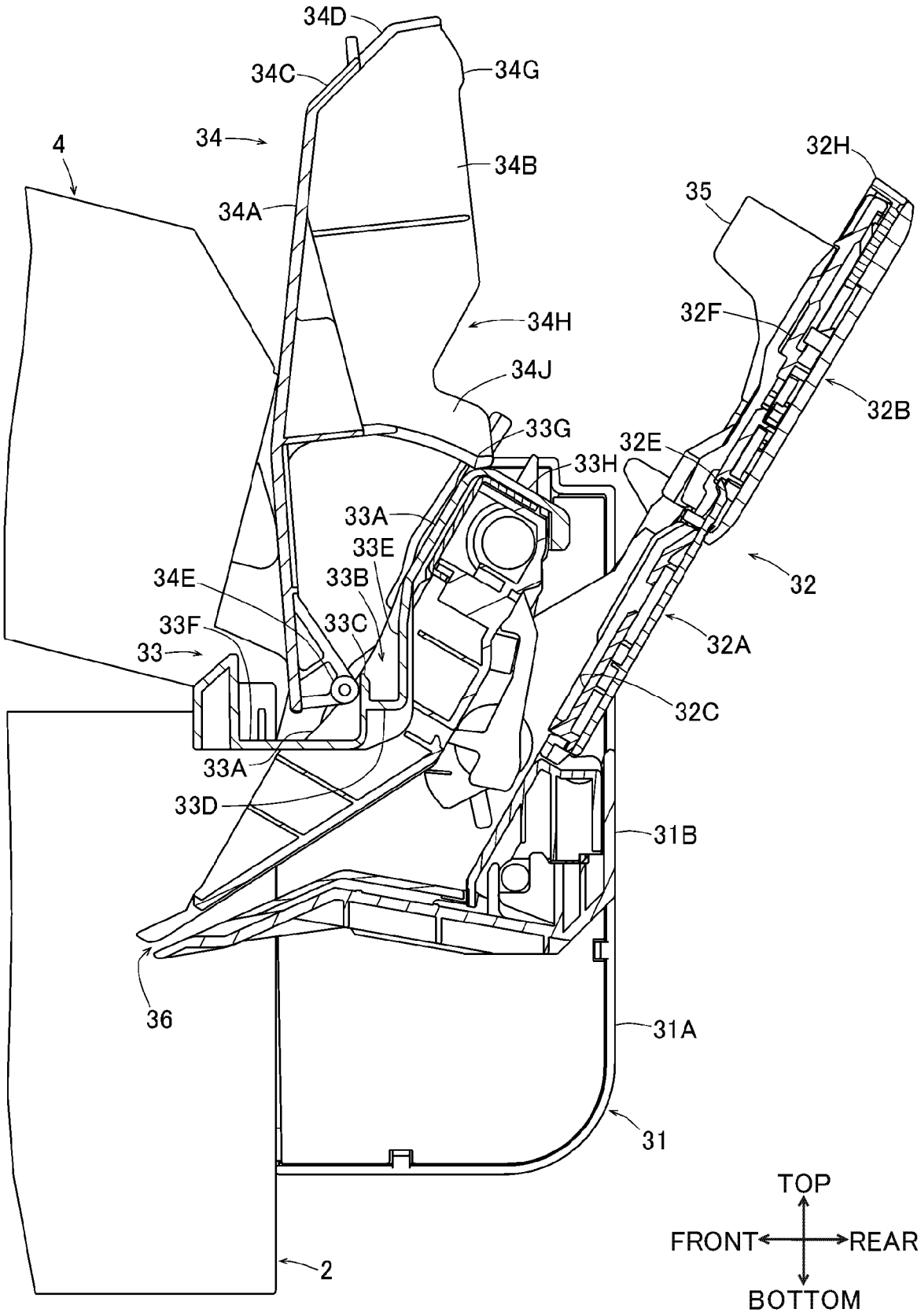
[Fig. 11]


34D
34G
34C
34
34B
4
34A
34H
34J
32H
35
32F
18
32B
32E
33A
33A
33E
34E
33B
33C
32
32A
33F
33
32C
33D
31B
36
31A
31
2
TOP
FRONT
REAR
BOTTOM

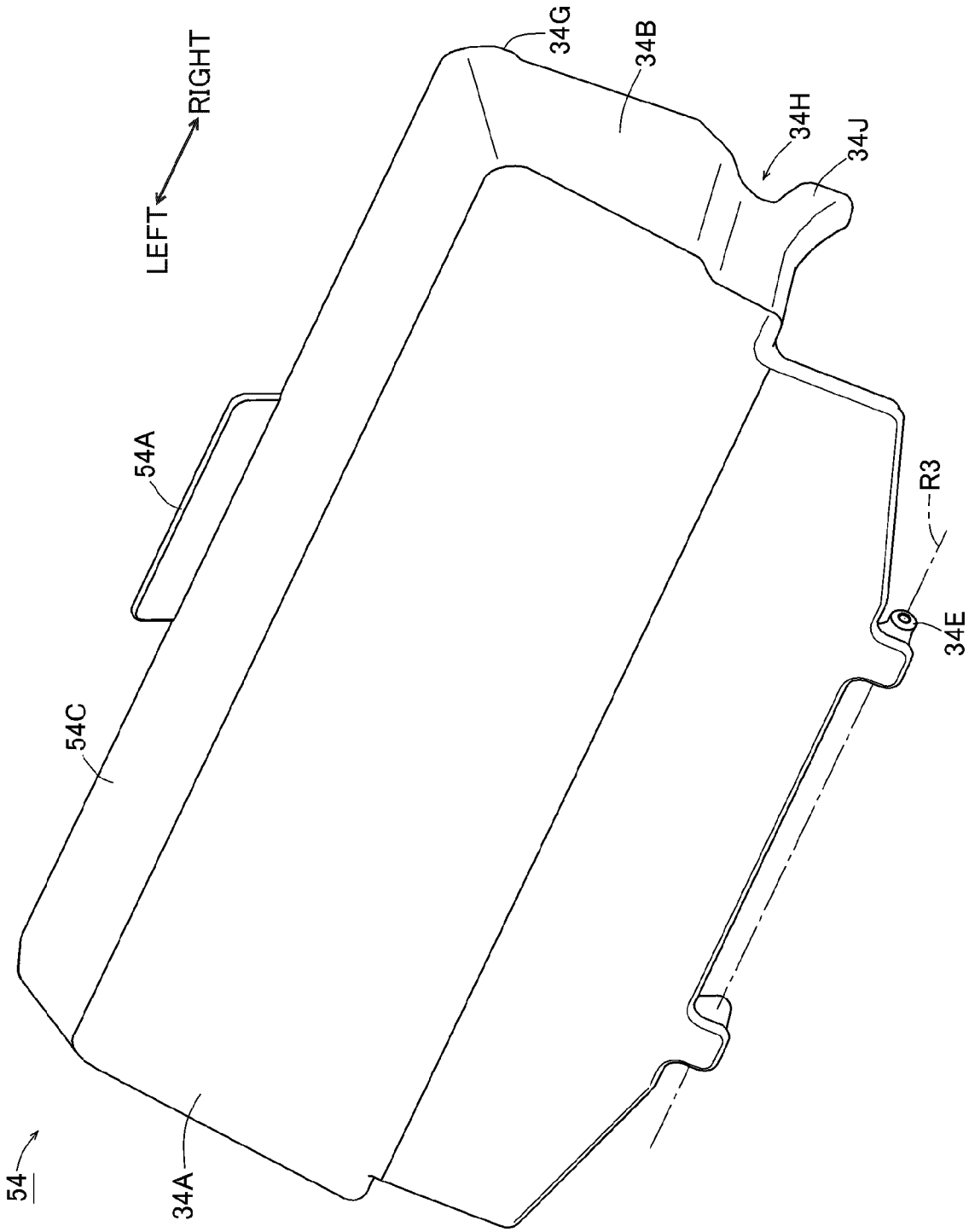
[Fig. 12]


34D
34C
34
34G
34B
4
34A
32H
35
32F
34H
N
C1
34J
32B
33G
32E
33H
C2
33A
33A
F4
33E
34E
33B
33C
32
33F
33
32A
32C
33D
31B
36
31A
31
2
TOP
FRONT
REAR
BOTTOM

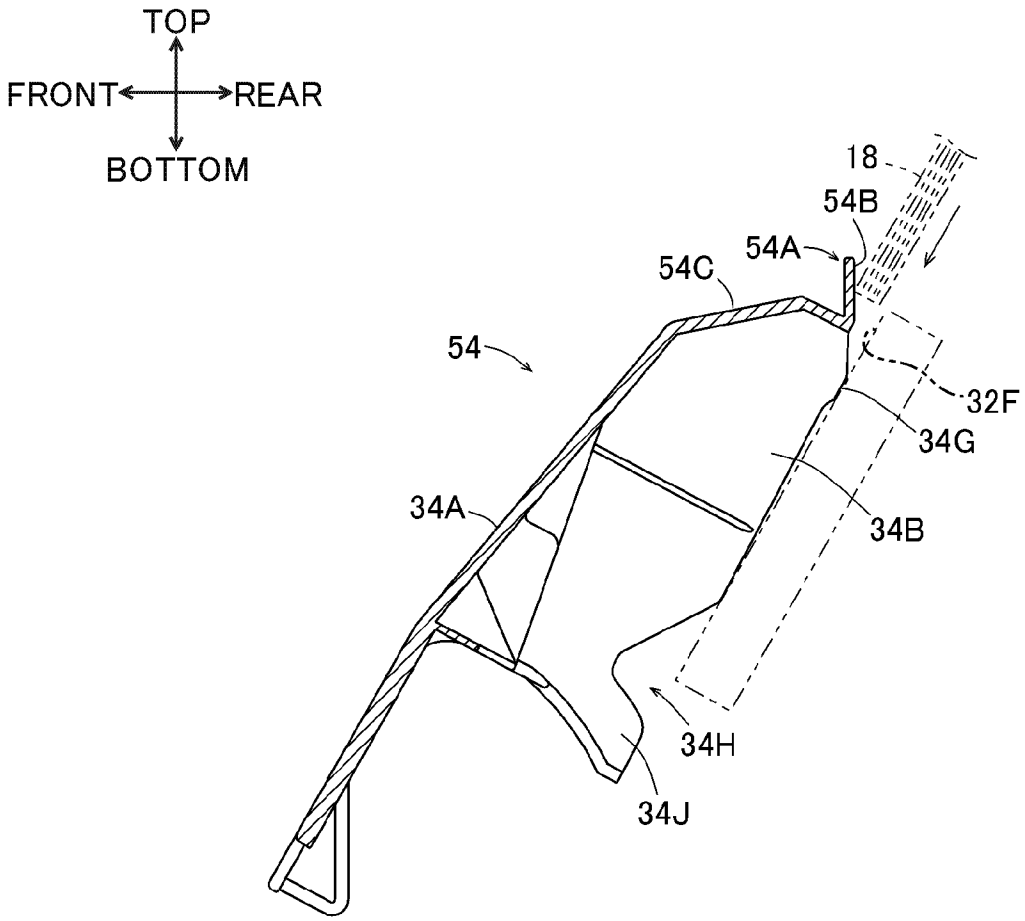
[Fig. 13]


34D
34C
34G
34
4
34B
32H
35
34A
32F
34H
34J
32B
33G
32E
33H
33A
33E
33B
34E
32
33F
33C
32A
33
32C
33A
33D
31B
36
31A
31
2
TOP
FRONT
REAR
BOTTOM

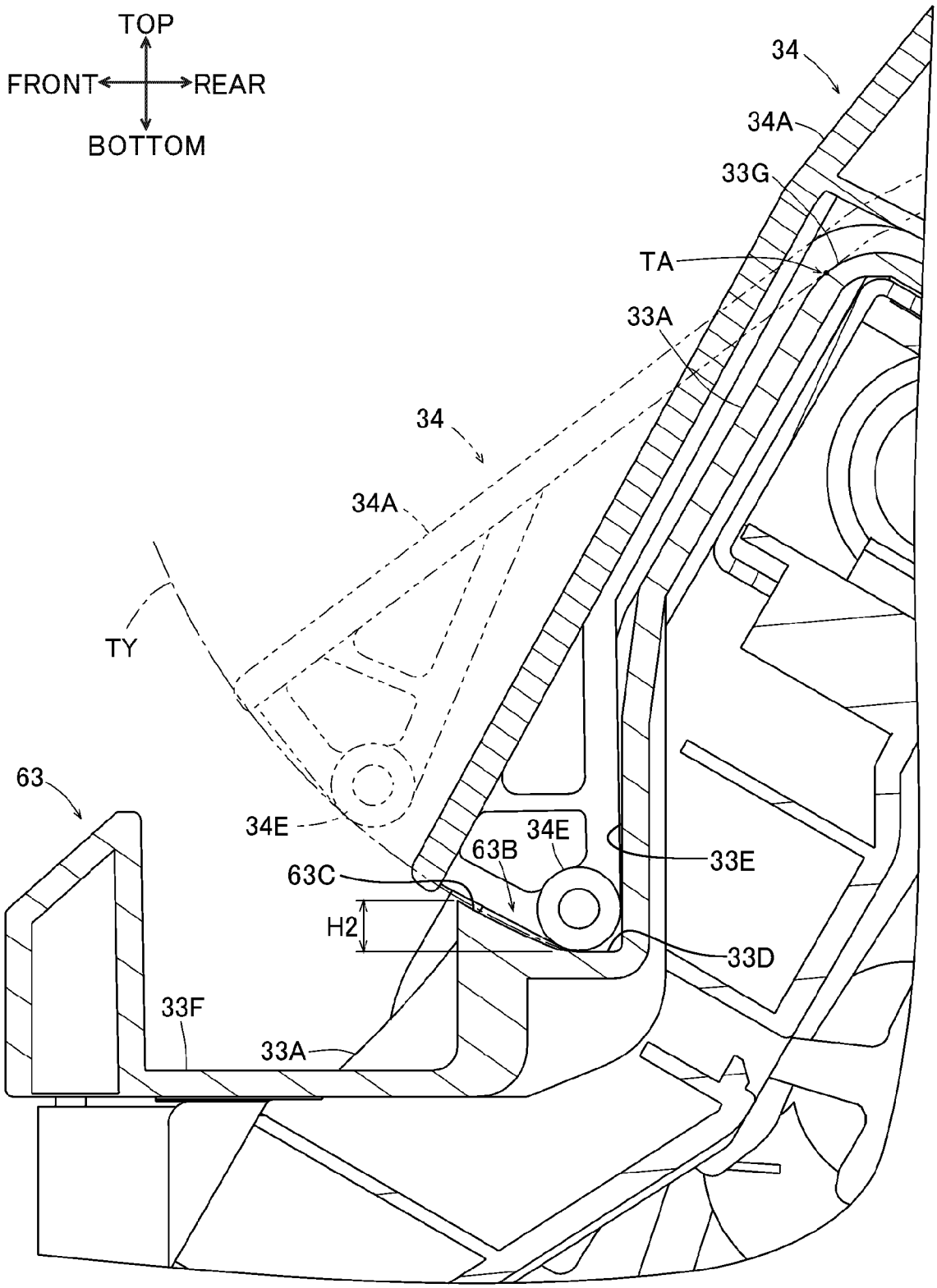
[Fig. 14]



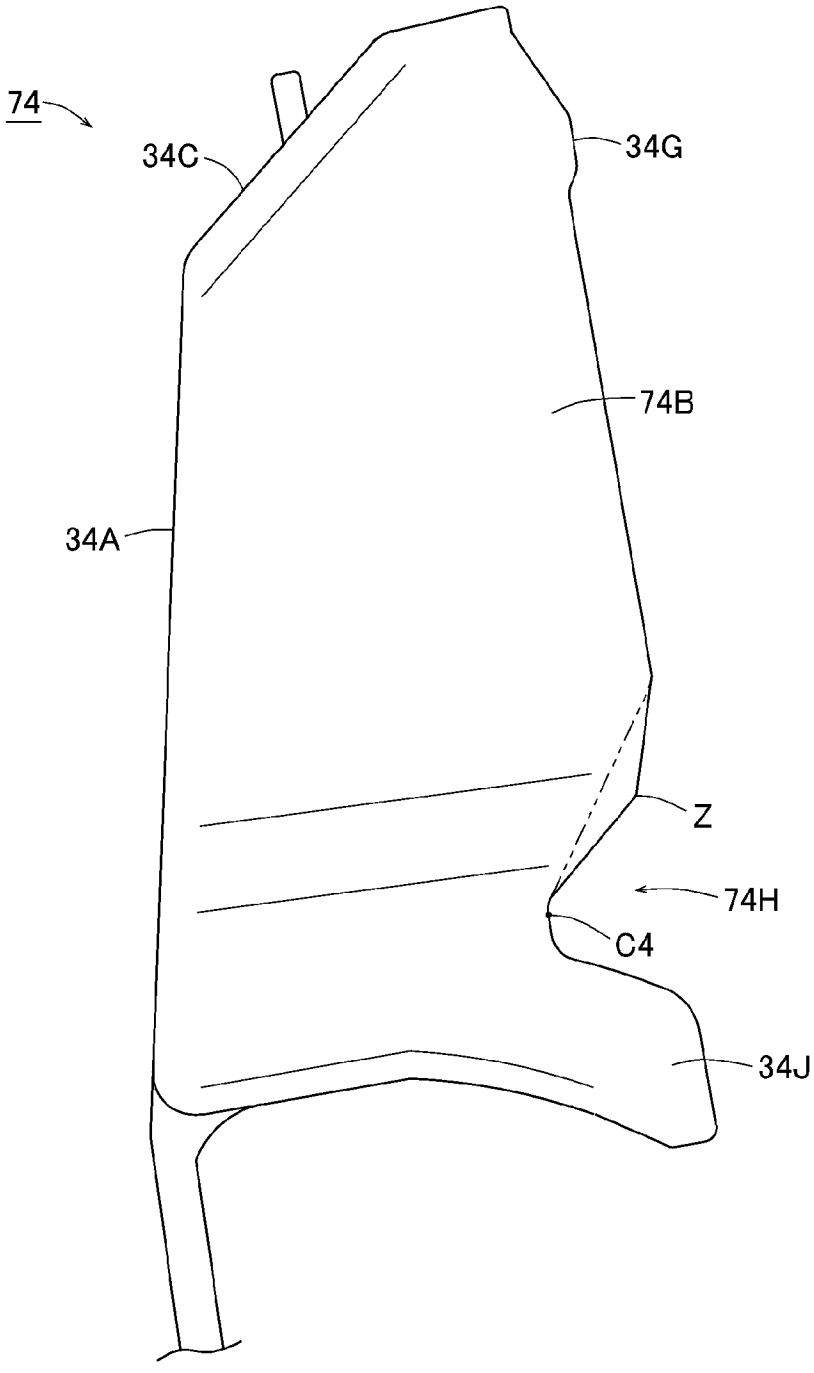
[Fig. 15]



[Fig. 16]


TOP
FRONT
REAR
BOTTOM
34
34A
33G
TA
33A
34
34A
TY
63
34E
34E
63B
33E
63C
H2
33D
33F
33A

[Fig. 17]



INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2018/012900

A. CLASSIFICATION OF SUBJECT MATTER
INV. G03G15/00 B41J29/13
ADD. G03G21/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G03G B41J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	EP 1 707 390 A2 (FUNAI ELECTRIC CO [JP]) 4 October 2006 (2006-10-04) paragraph [0024] - paragraph [0047]; figures 1-13D	1-11 12-20
X	US 2006/263127 A1 (KIM YOUNG-MIN [KR] ET AL) 23 November 2006 (2006-11-23) paragraph [0023] - paragraph [0034]; figures 3-5	1-11
X	US 2005/140083 A1 (KOGA YUJI [JP] ET AL) 30 June 2005 (2005-06-30) paragraph [0028] - paragraph [0058]; figures 1-5	1,11
X	JP 2001 096726 A (SEIKO EPSON CORP) 10 April 2001 (2001-04-10) abstract; figures 1-5	1,3-5,11

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
28 June 2018	10/07/2018

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INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2018/012900

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP H09 18642 A (CANON KK) 17 January 1997 (1997-01-17) abstract; figures 5, 8 -----	1-20

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/JP2018/012900

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