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OKOCHI

(54) **DUST BOX AND BELT SANDER**

(71) Applicant: **MAKITA CORPORATION**, Anjo-shi (JP)

(72) Inventor: **Katsumi OKOCHI**, Anjo-shi (JP)

(73) Assignee: **MAKITA CORPORATION**, Anjo-shi (JP)

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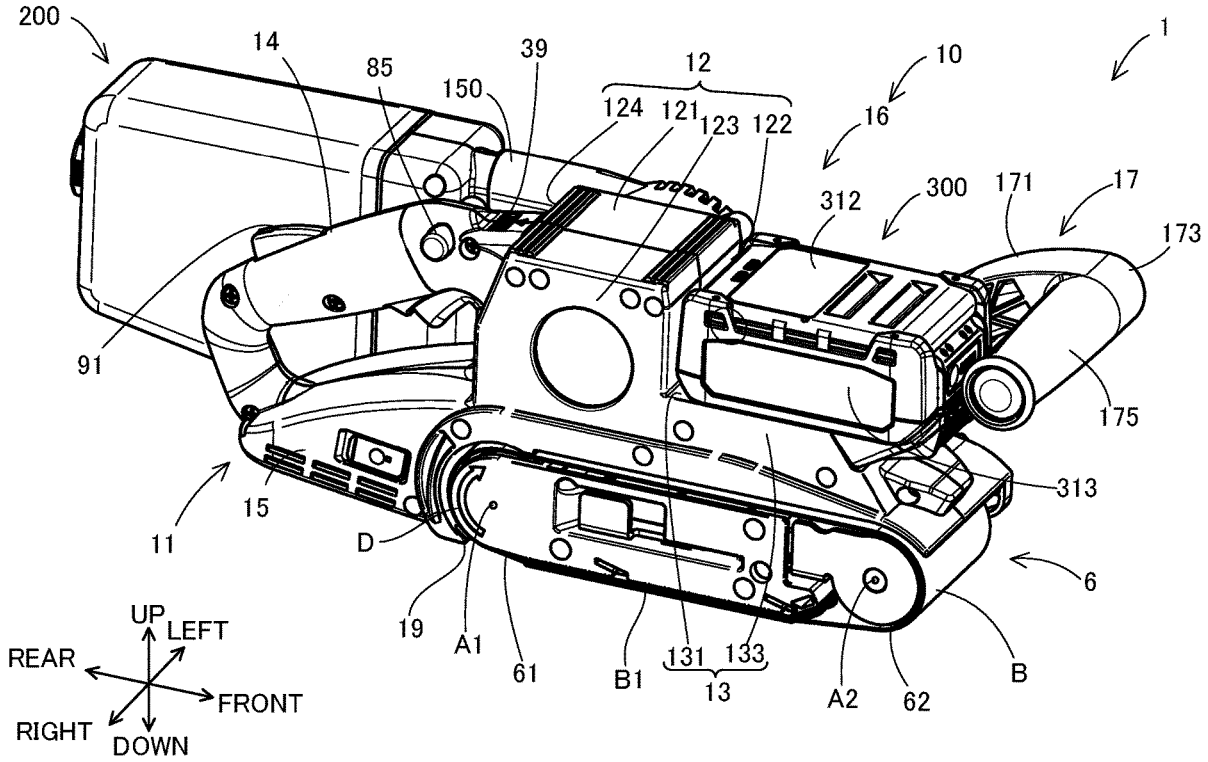
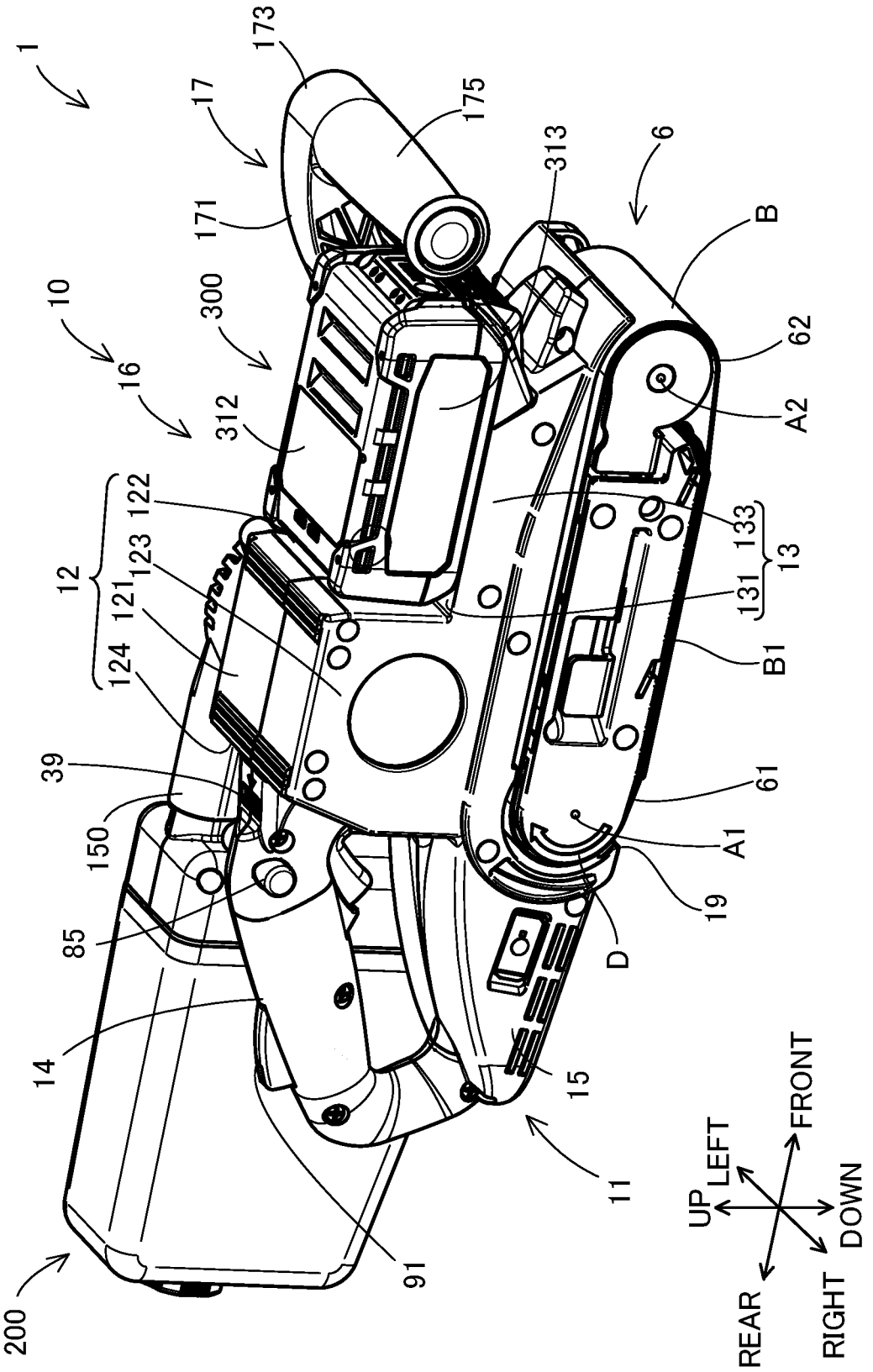
(57) **ABSTRACT**

A dust box is provided that is configured to be removably mounted to a belt sander having a housing, and a discharge nozzle and a suction nozzle that are connected to the housing. The dust box has a first nozzle configured to be connected to the discharge nozzle, a second nozzle configured to be connected to the suction nozzle, a container part formed of synthetic resin and connected to the first and second nozzles, and a filter. The filter is configured to separate dust from air. The filter is provided within the container part to partition an inside space of the container part into a first space that communicates with the first nozzle and a second space that communicates with the second nozzle.

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173
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124
B1
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A1
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FIG. 1

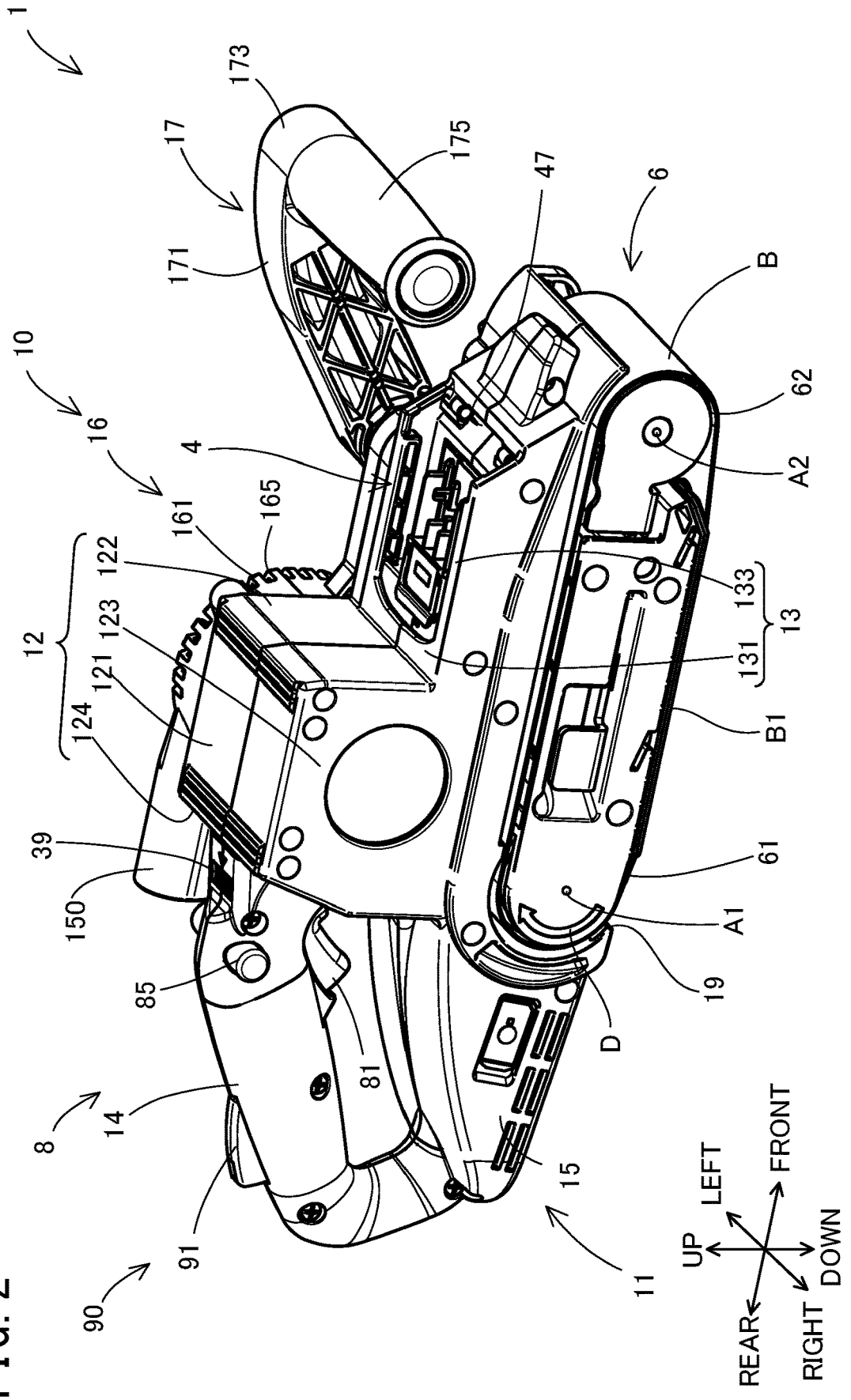
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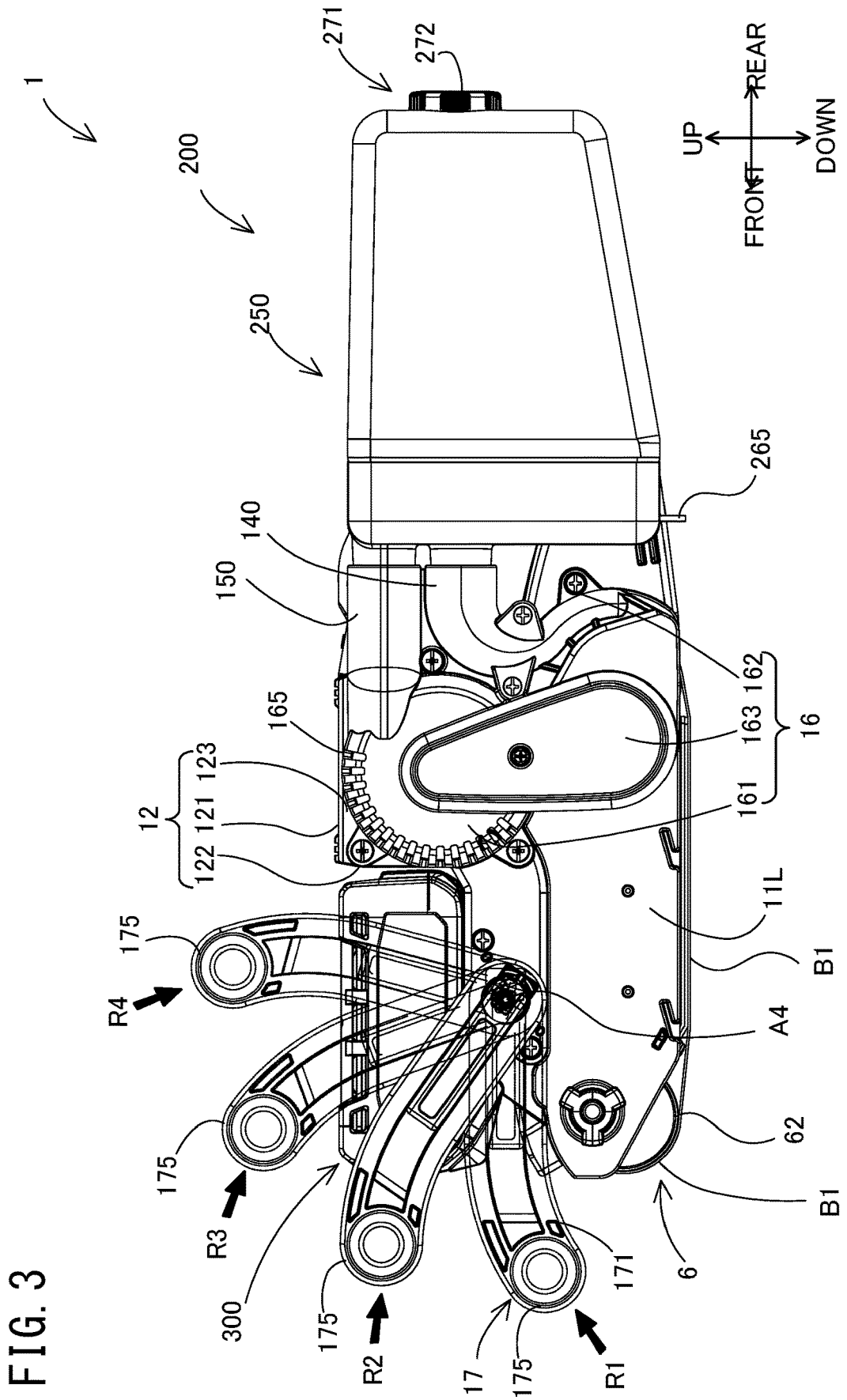
FIG. 2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200
250
271
272
UP
REAR
DOWN
FRONT
265
140
150
162
163
16
165
123
121
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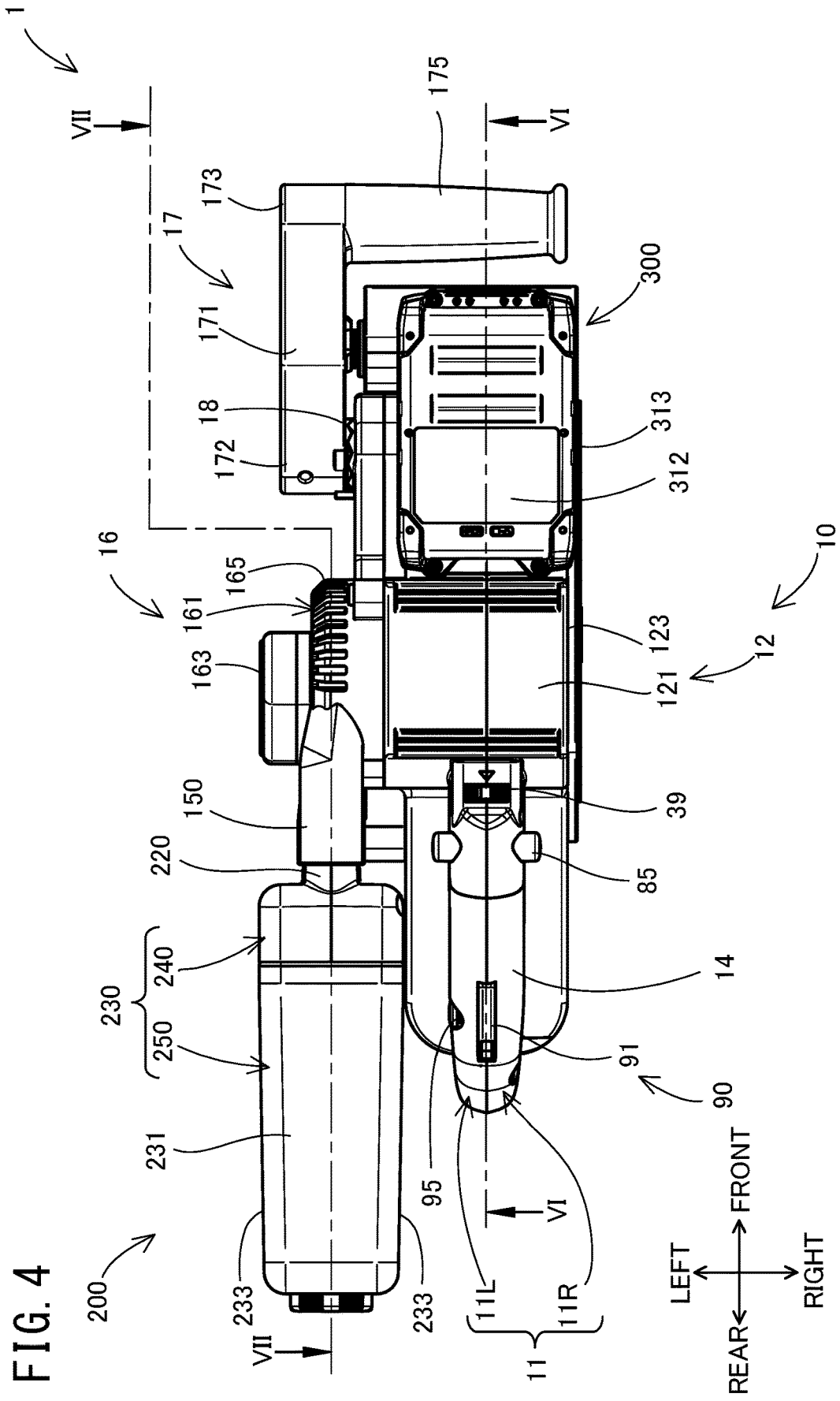
12
161
11L
B1
175
R4
A4
62
175
R3
B1
300
175
R2
171
6
17
175
R1

FIG. 3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173
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16
165
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150
39
220
85
230
240
14
250
91
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231
95
VI
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233
233
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11R
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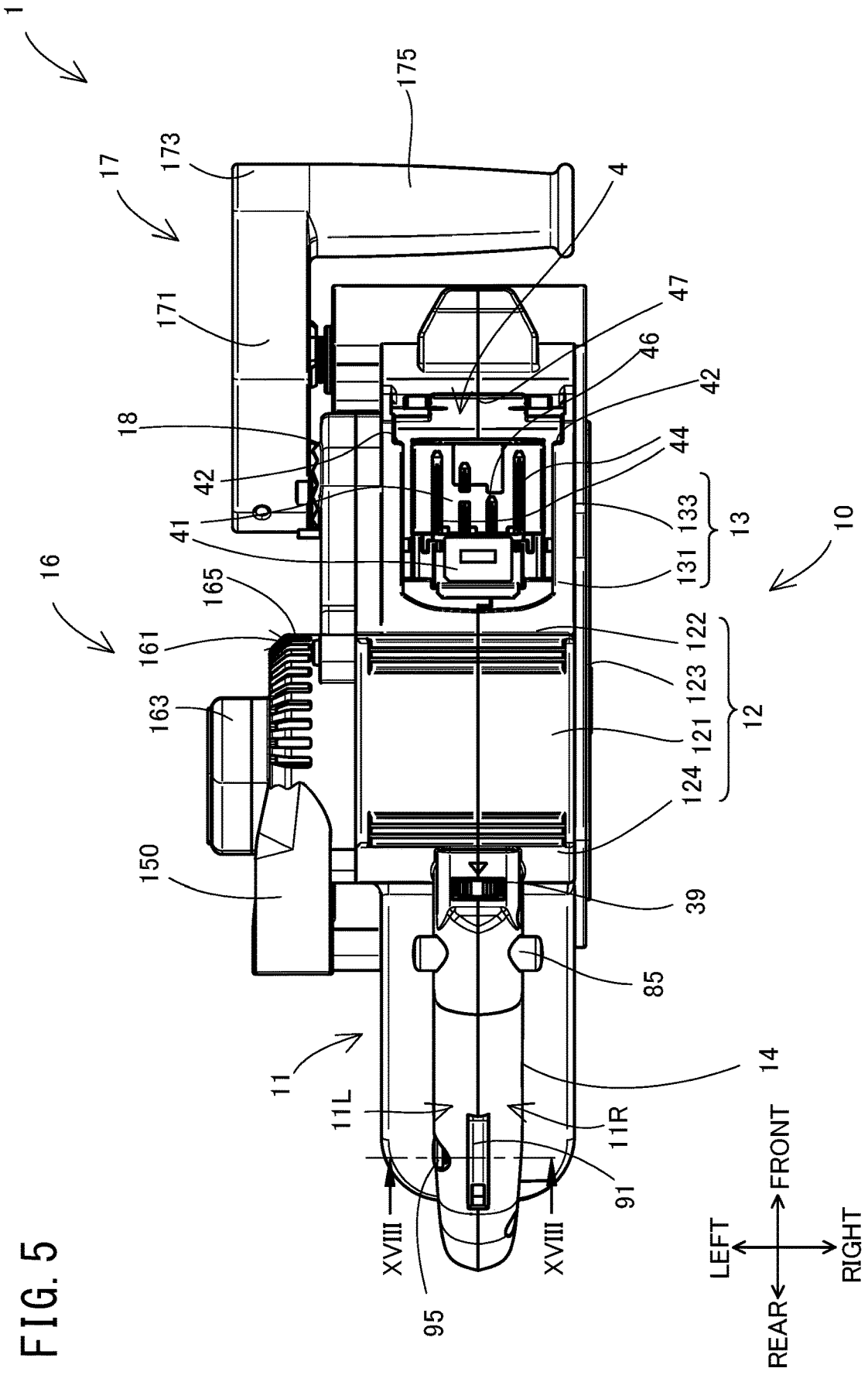
VII
LEFT
FRONT
RIGHT
REAR

FIG. 4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123
163
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12
124
150
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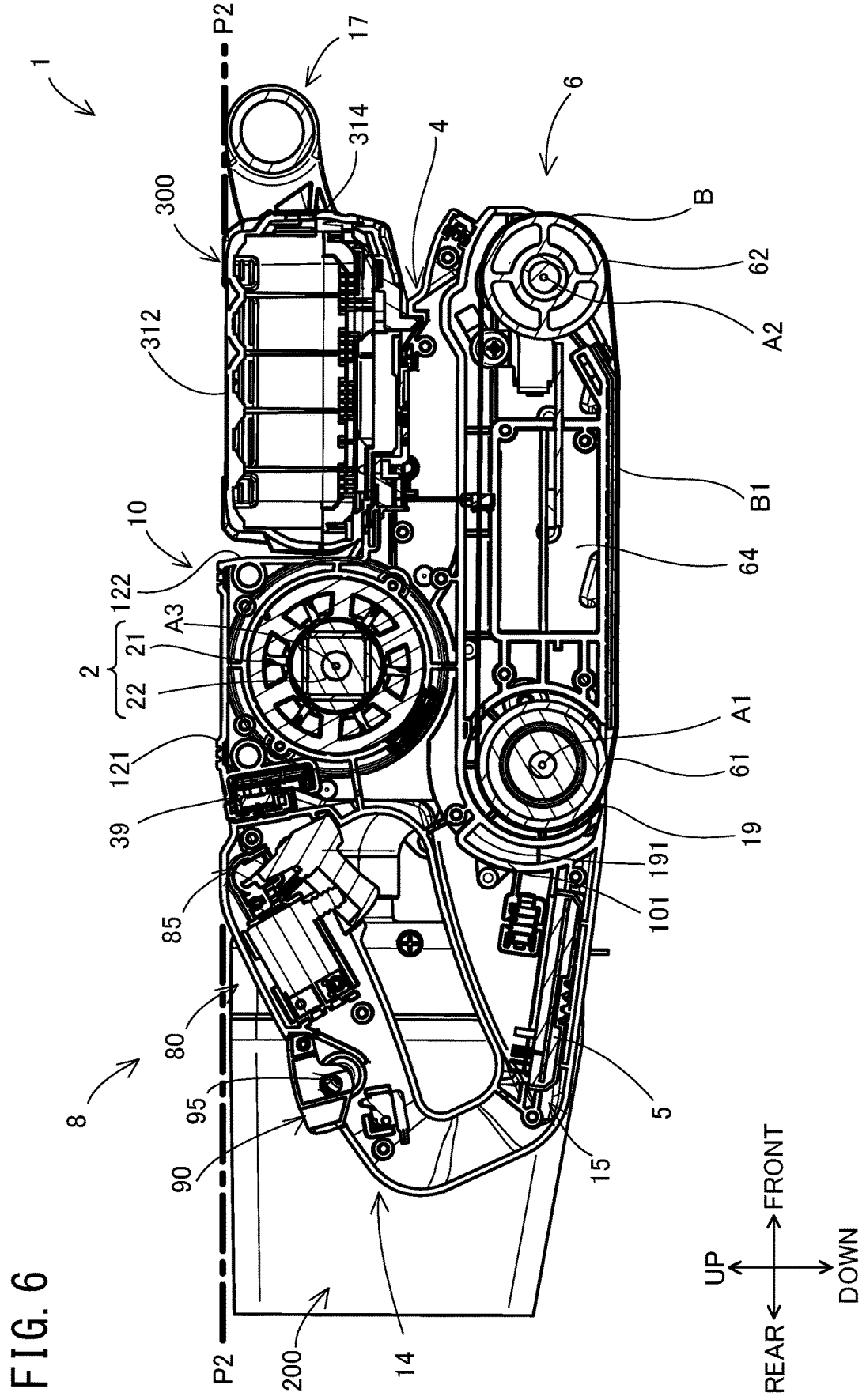
85
11
14
11L
11R
91
XVIII
XVIII
95
FRONT
LEFT
RIGHT
REAR

FIG. 5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B1
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122
A3
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2
22
121
A1
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191
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80
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90
15
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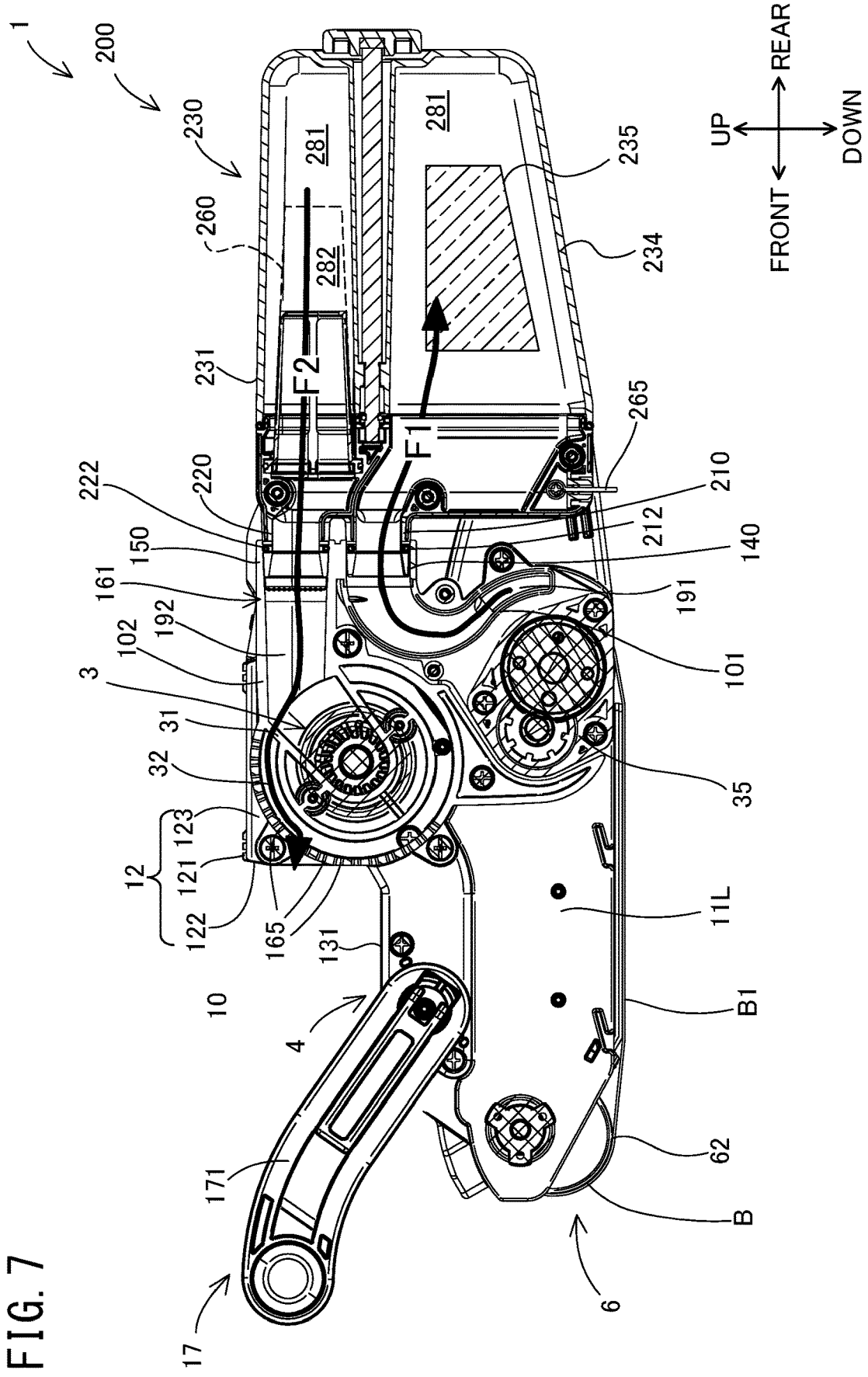
UP
FRONT
REAR
DOWN

FIG. 6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F2
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192
102
101
3
31
32
35
123
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171
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UP
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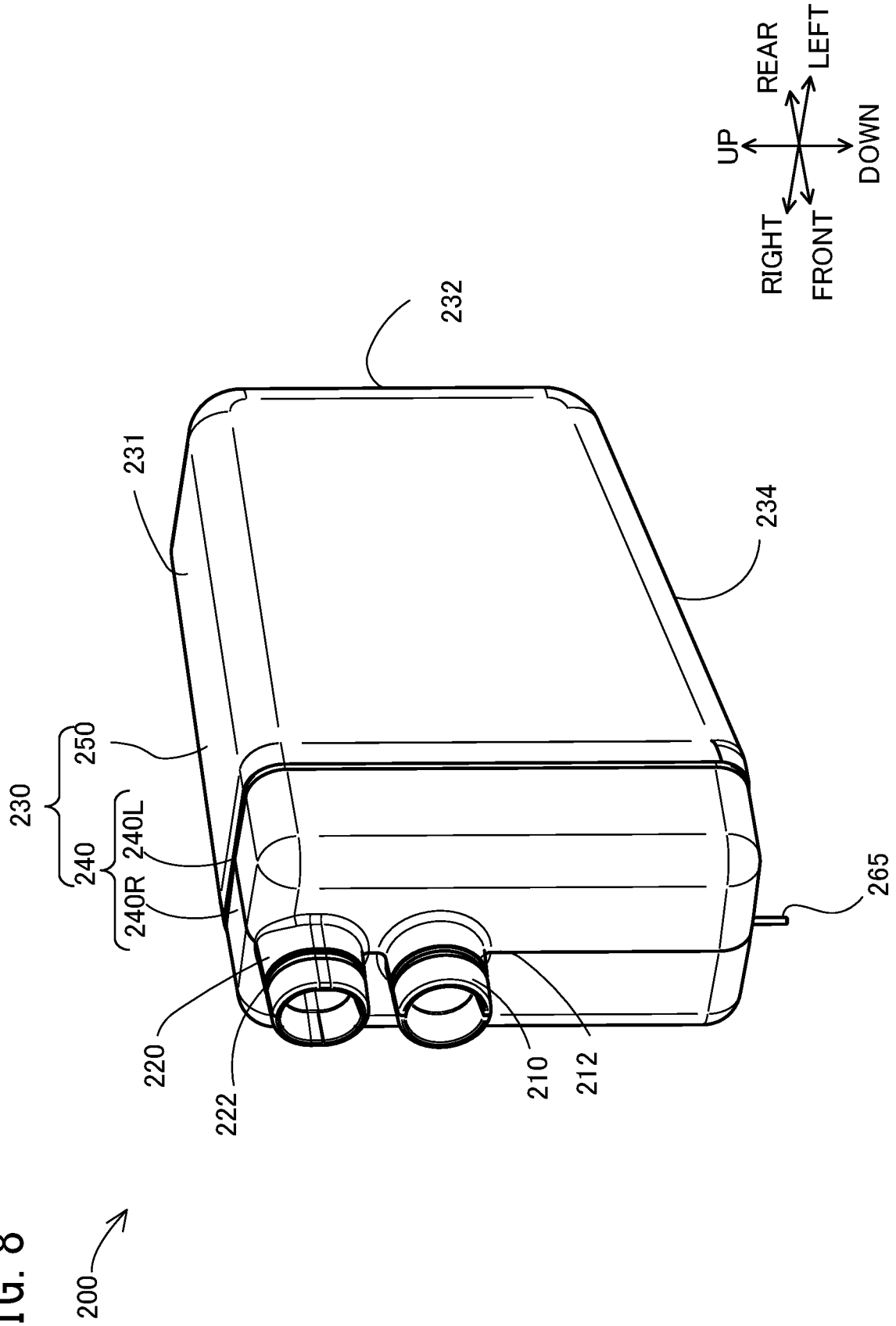
FIG. 7


UP
REAR
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232
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234
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240L
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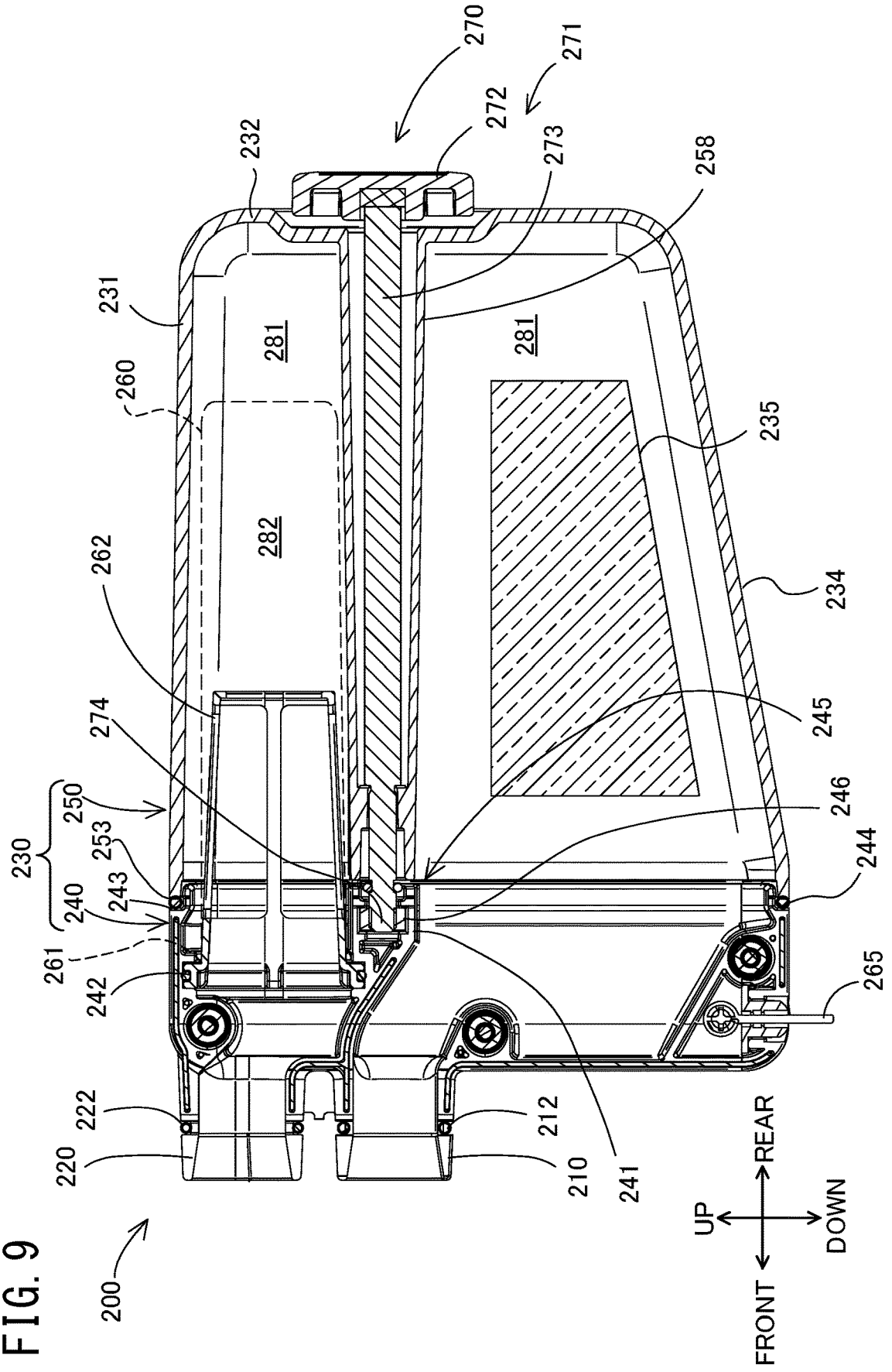
212
200

FIG. 8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UP
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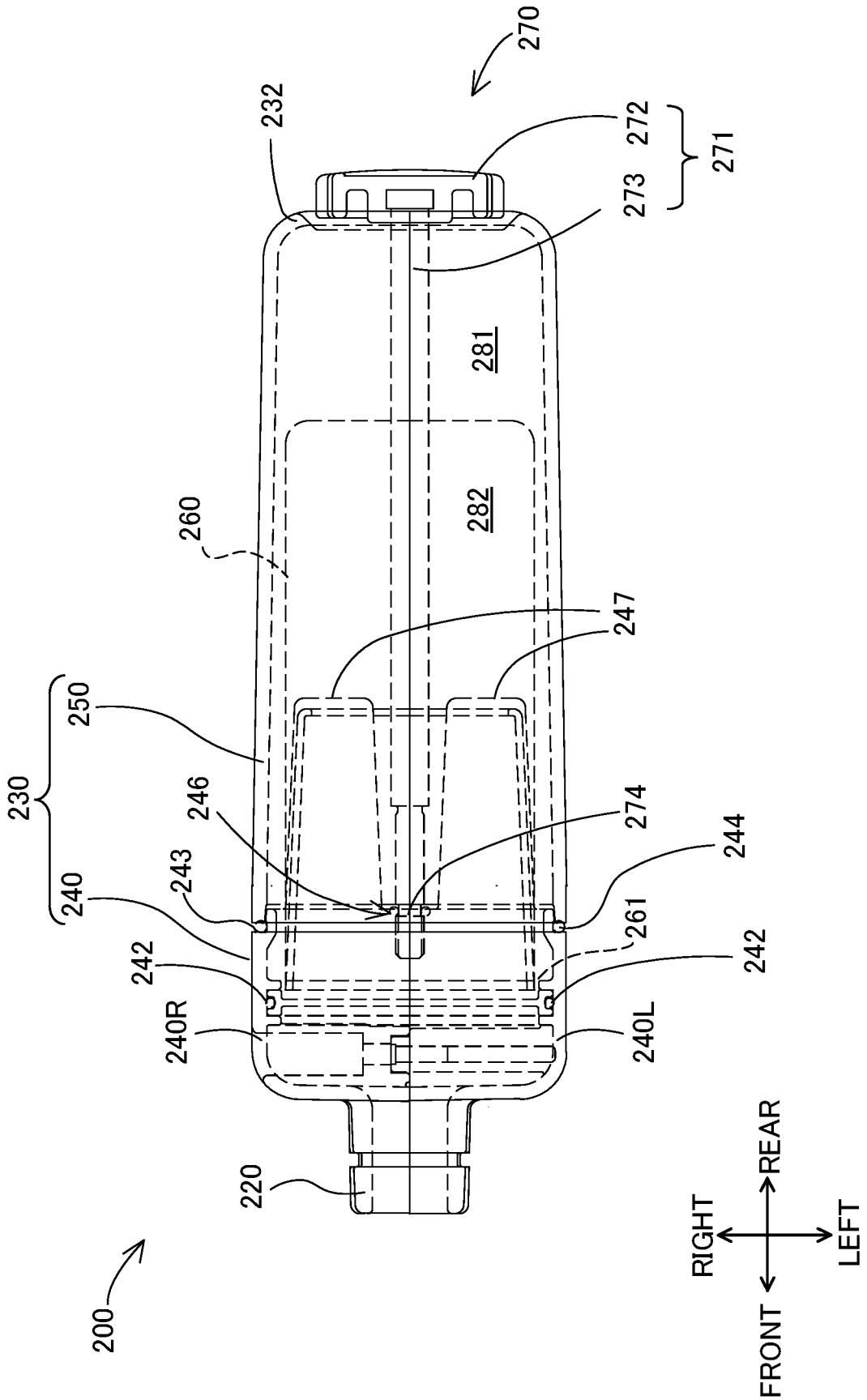
FIG. 9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240R
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LEFT
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FIG. 10

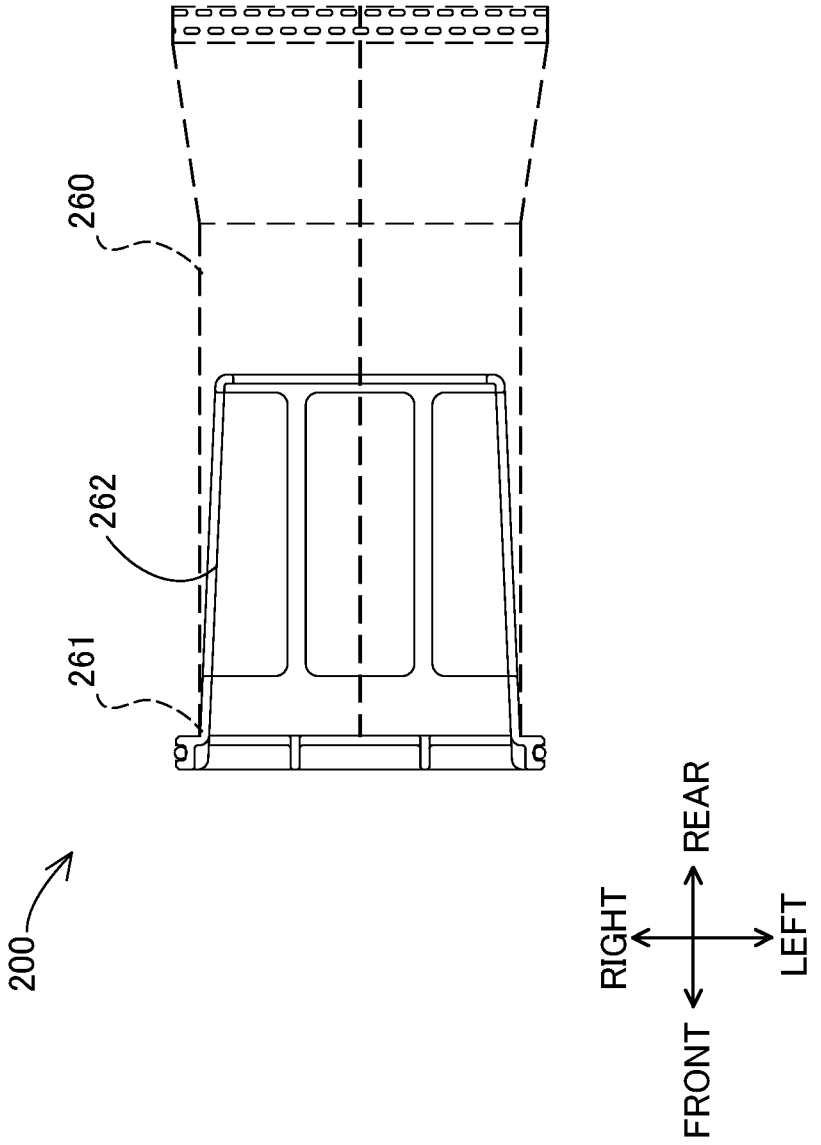
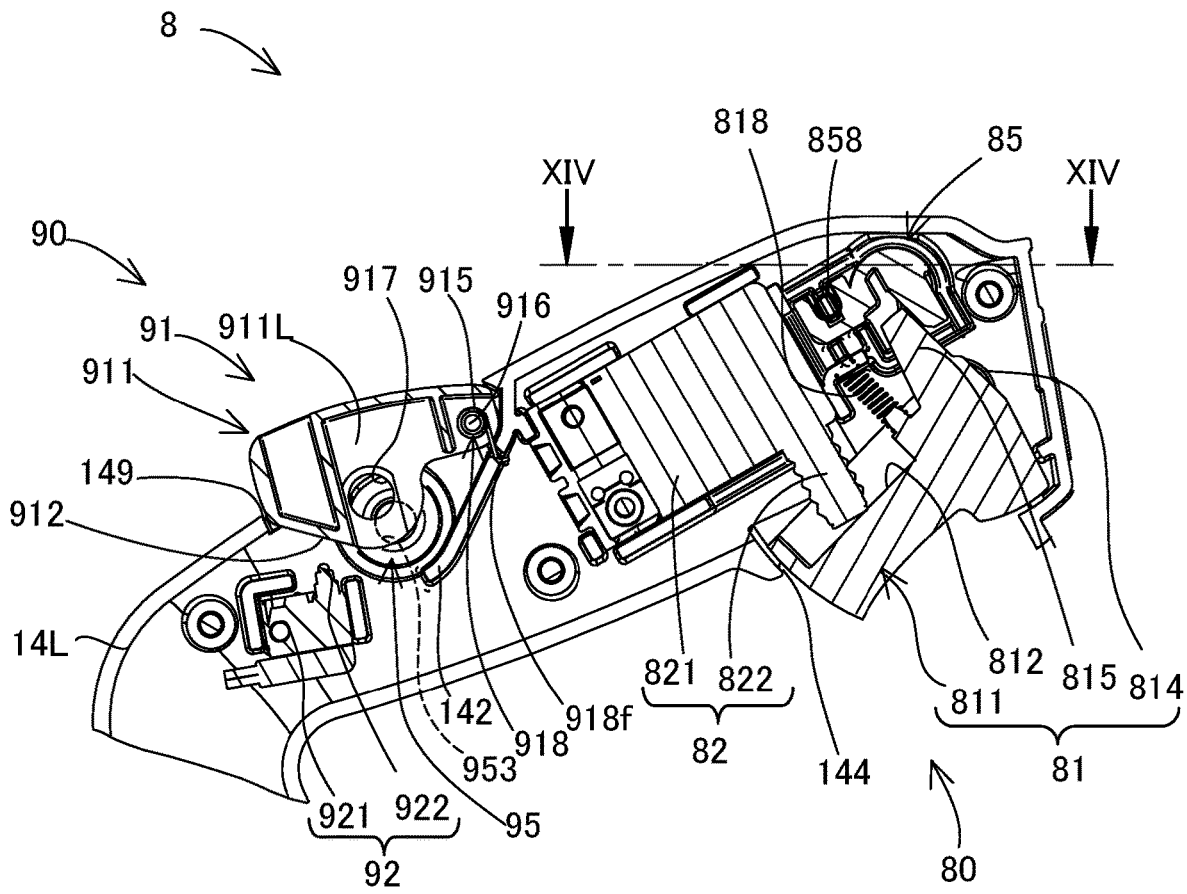


FIG. 11

FIG. 12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818
858
85
XIV
XIV
90
917
915
916
91
911L
911
149
912
14L
821
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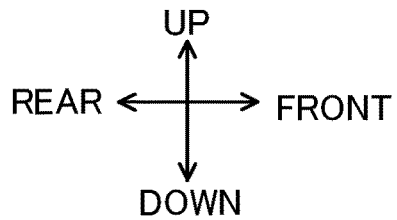
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FIG. 13

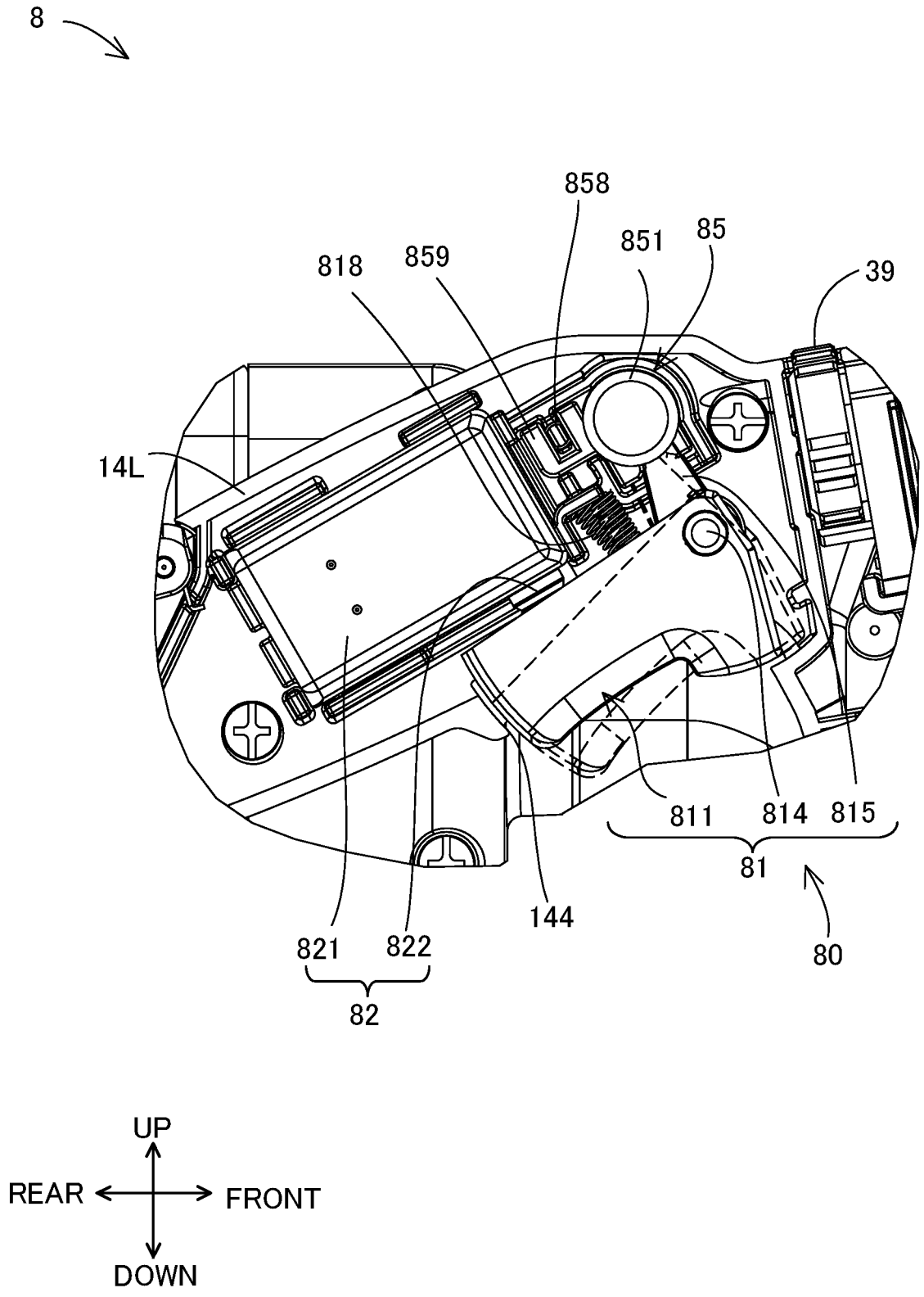
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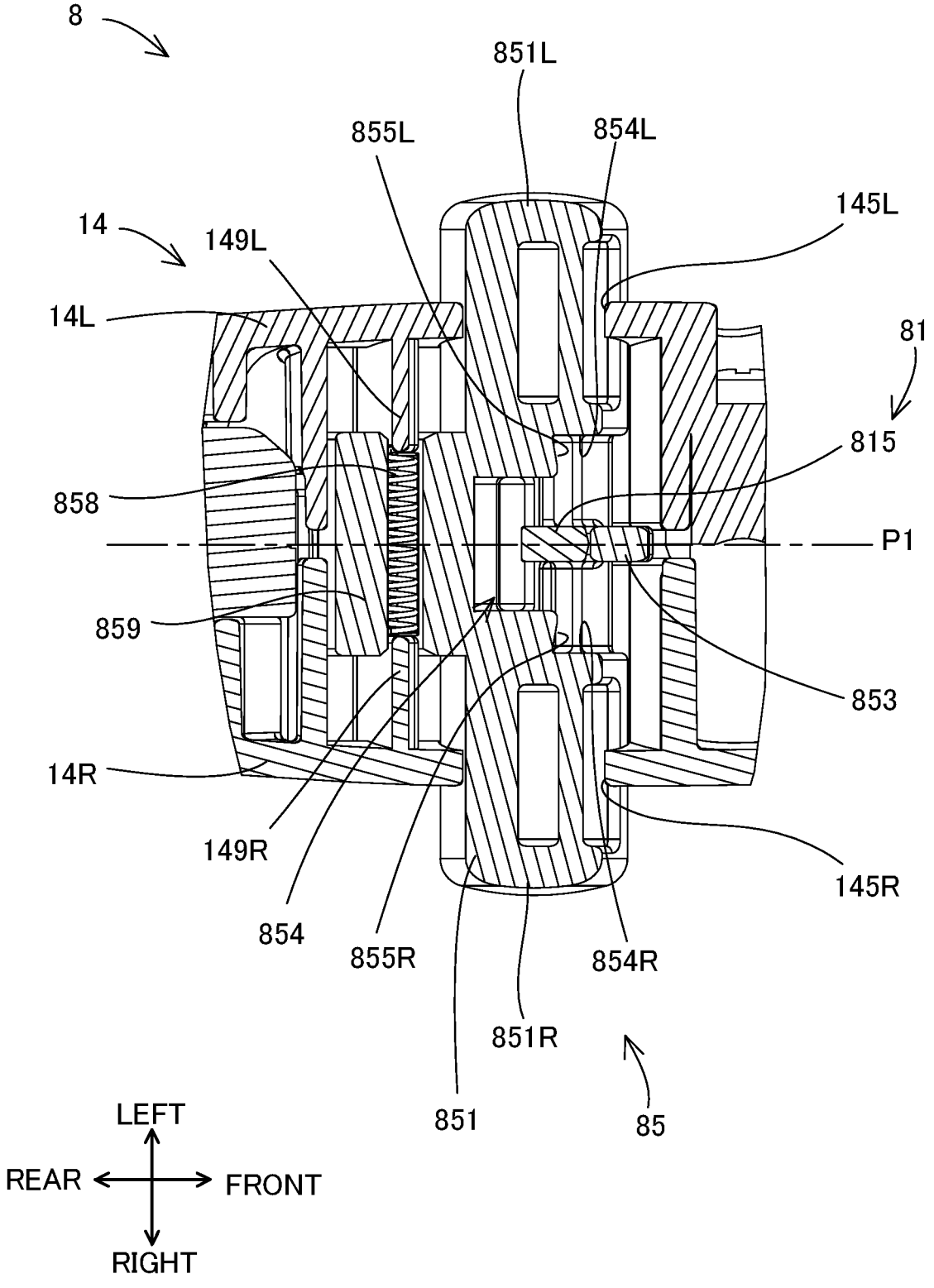
FIG. 14


8
851L
855L
854L
145L
14
149L
14L
81
815
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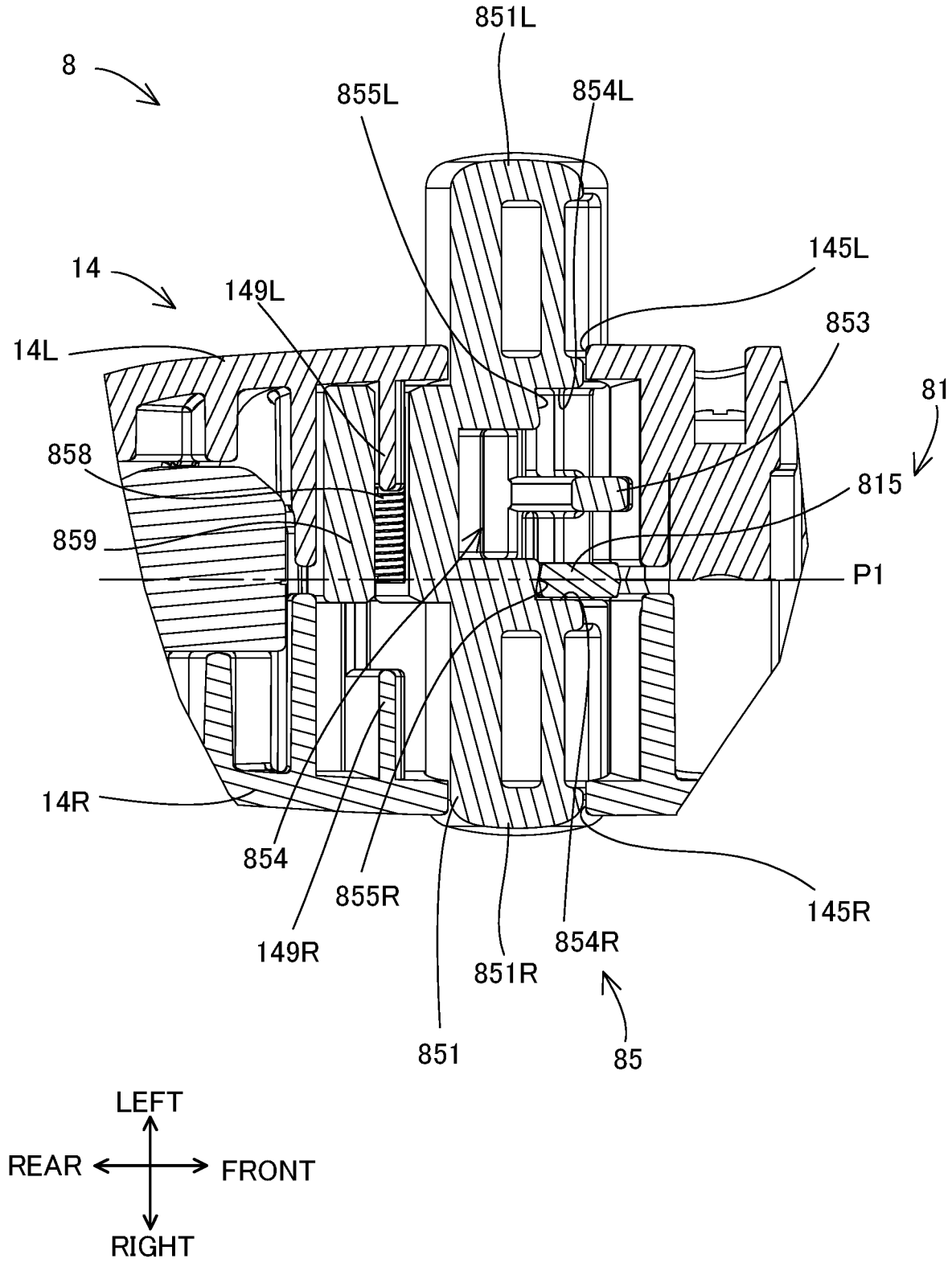
14R
149R
145R
854
855R
854R
851R
851
85
LEFT
REAR
FRONT
RIGHT

FIG. 15


8
851L
855L
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14
145L
149L
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14L
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LEFT
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FIG. 16

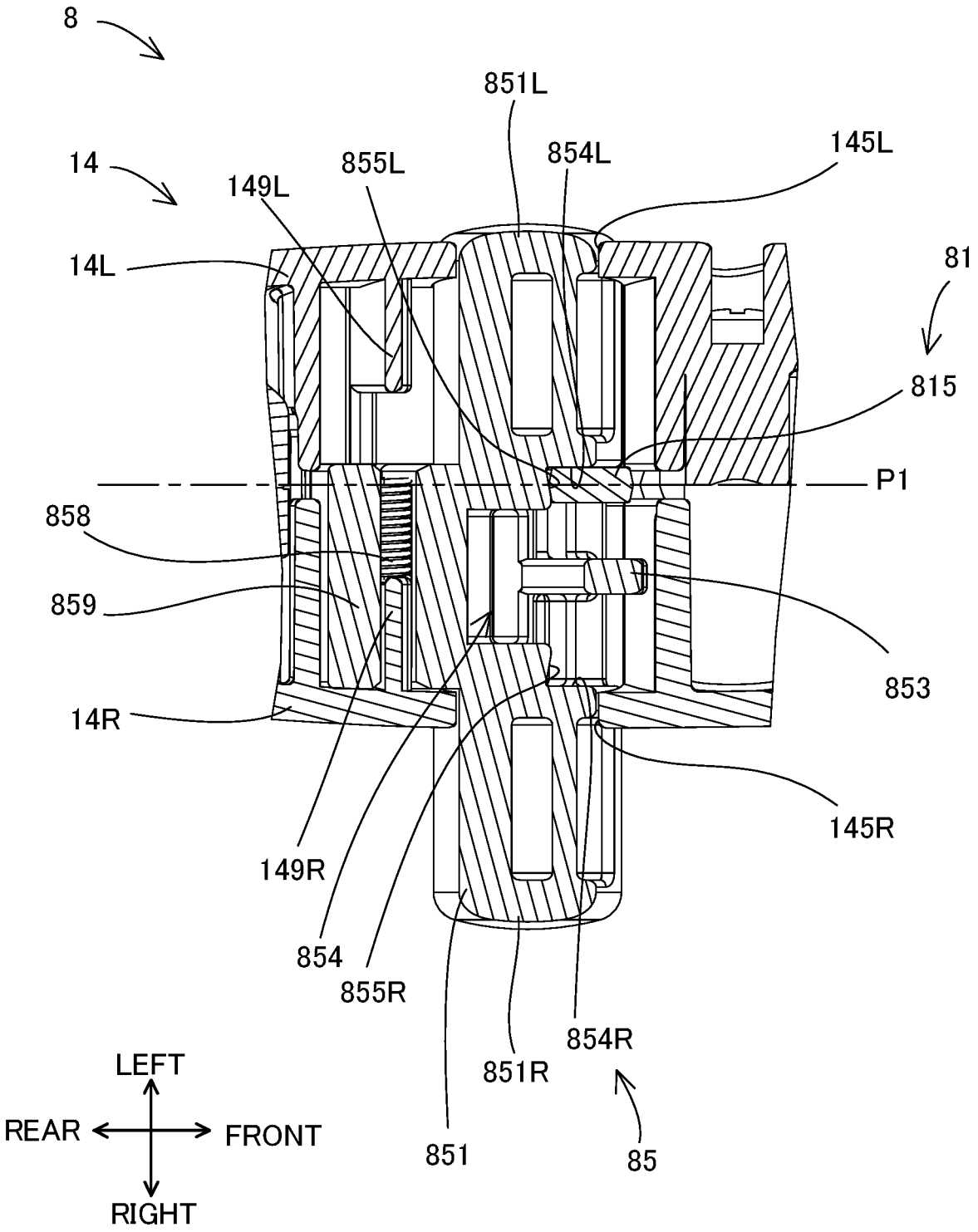
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FIG. 17

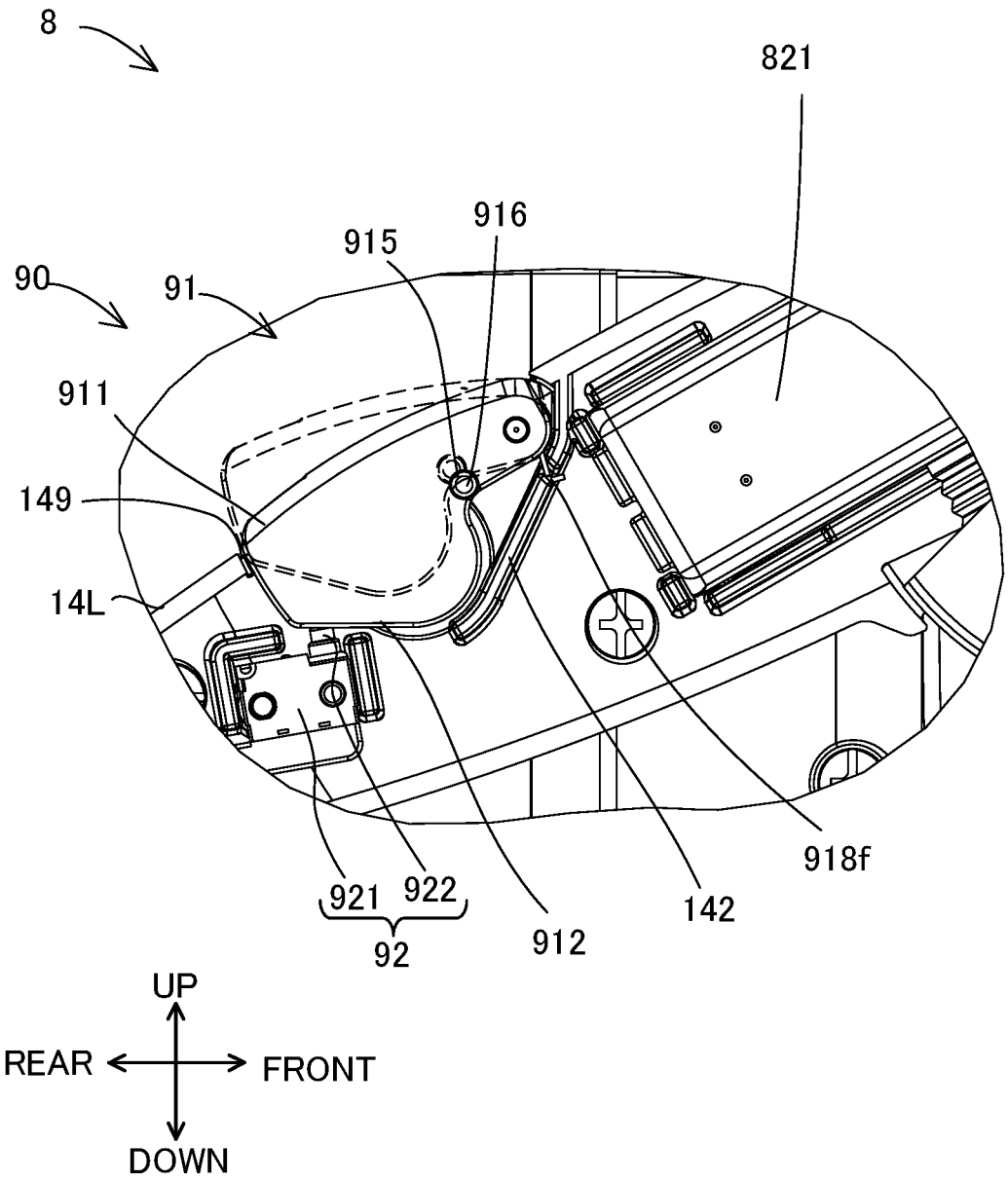
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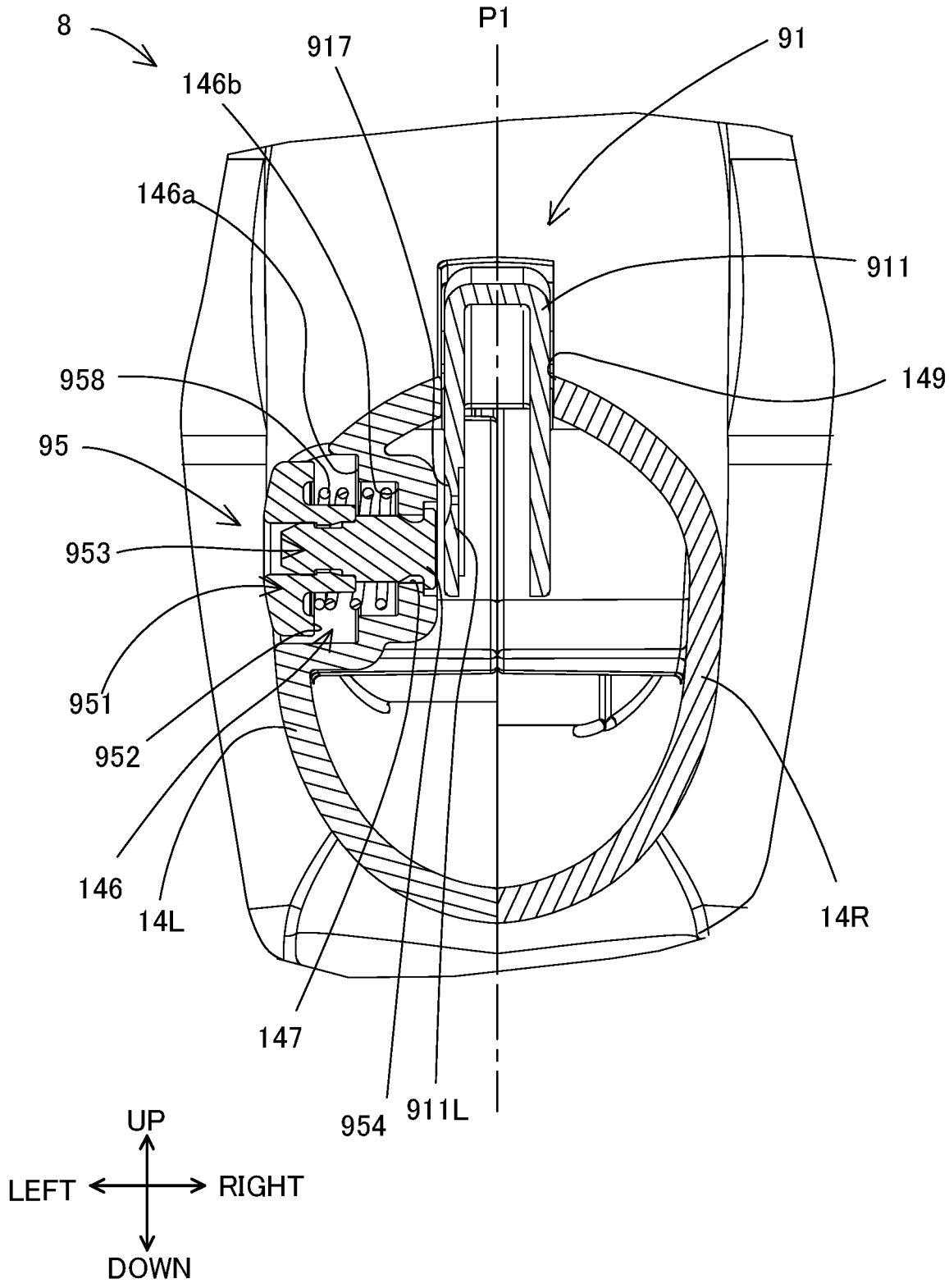
FIG. 18


8
P1
917
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146b
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954
911L
UP
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FIG. 19

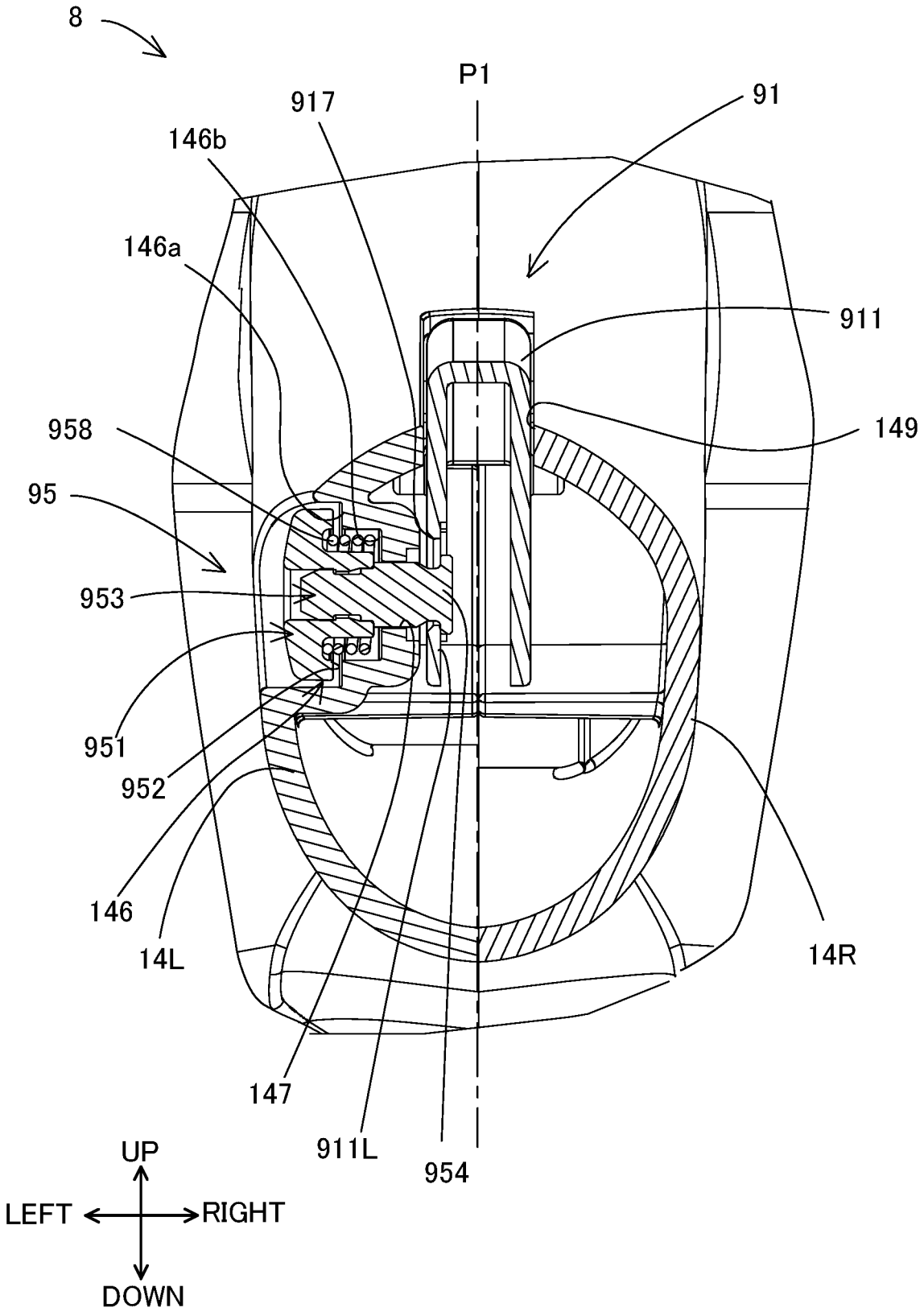
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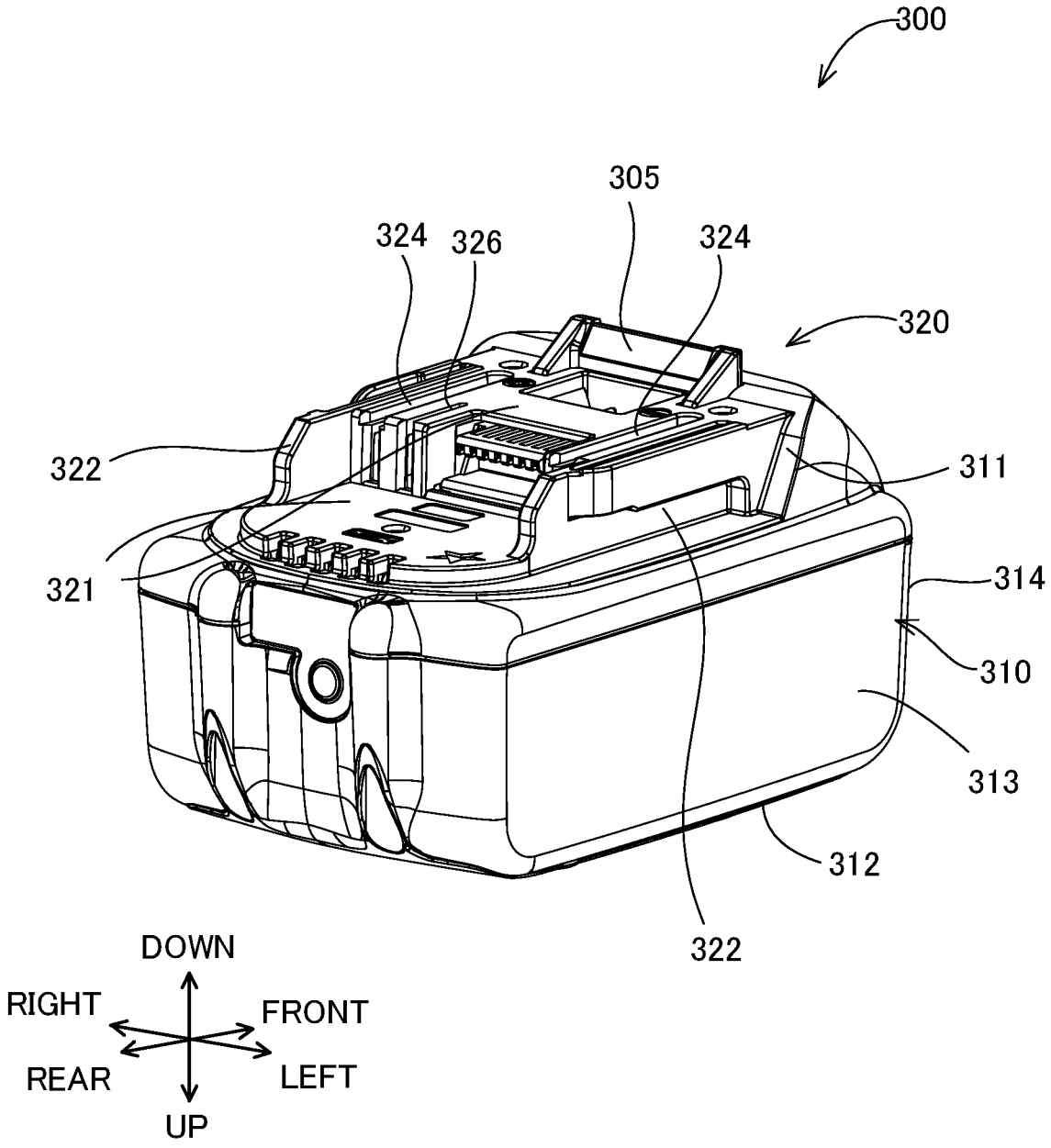
FIG. 20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DUST BOX AND BELT SANDER

CROSS REFERENCE TO RELATED ART

[0001] The present application claims priority to Japanese Patent Application No. 2022-46450 filed on Mar. 23, 2022, the disclosure of which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to a dust box configured to be removably mounted to a belt sander, and a belt sander having the dust box.

BACKGROUND

[0003] Japanese Unexamined Patent Application Publication No. H11-291170 discloses a belt sander in which dust generated by working operation can be collected in a dust collecting bag. This belt sander has a dust collection port that is provided behind a drive roller in a lower part of a housing, a dust collection passage that is provided within the housing and communicates with the dust collection port, a discharging tube that communicates with the dust collection passage, and a dust bag that is mounted to the discharging tube via a cuff. The dust collection passage is formed in the dust collection passage so as to surround the motor shaft and a dust collecting fan. Dust is sucked from the dust collection port by rotation of the dust collecting fan and stored in the dust bag through the dust collection passage, the discharging tube and the cuff. The belt sander further has an earth plate that is configured to be electrically connected to an inside body simultaneously with mounting of the cuff, thereby suppressing electrostatic charging of the dust during dust collection.

SUMMARY

[0004] It is however desired to improve the dust collecting efficiency in a dust box configured to be removably mounted to a belt sander.

[0005] According to a first aspect of the present disclosure, a dust box is provided that is configured to be removably mounted to a belt sander, the belt sander having a belt driving part configured to rotate an endless sanding belt, and a housing that has a discharge nozzle and a suction nozzle and houses an electric motor for driving the belt driving part and a dust collecting fan. The dust box has a first nozzle configured to be removably connected to the discharge nozzle, a second nozzle configured to be removably connected to the suction nozzle, a container part formed of synthetic resin and connected to the first and second nozzles, and a filter that is configured to separate dust from air. The filter is arranged within the container part to partition an inside space of the container part into a first space that communicates with the first nozzle and a second space that communicates with the second nozzle.

[0006] According to this aspect, the first and second nozzles of the dust box are respectively connected to the discharge nozzle and the suction nozzle of the belt sander, and air within the dust box is sucked into the suction nozzle via the second nozzle when the dust collecting fan rotates. Further, dust generated by working operation is discharged from the discharge nozzle of the belt sander into the dust box via the first nozzle. At this time, the pressure inside the dust box becomes negative by air suction, so that the dust box according to the first aspect provides improved dust collecting efficiency. Further, by provision of the filter that partitions the inside space of the container part into the first space that communicates with the first nozzle and the second space that communicates with the second nozzle, dust is stored within the dust box and restrained from entering the housing from the second nozzle.

[0007] According to a second aspect of the present disclosure, a belt sander having the dust box removably mounted thereto is provided.

[0008] According to this aspect, the belt sander having the dust box removably mounted thereto provides improved dust collecting efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. **1** is a perspective view of a belt sander, with a battery and a dust box mounted thereto.

[0010] FIG. **2** is a perspective view of the belt sander.

[0011] FIG. **3** is a left side view of the belt sander, with the battery and the dust box mounted thereto, showing a turning range of a front handle.

[0012] FIG. **4** is a top view of the belt sander, with the battery and the dust box mounted thereto.

[0013] FIG. **5** is a top view of the belt sander.

[0014] FIG. **6** is a sectional view taken along line VI-VI in FIG. **4**.

[0015] FIG. **7** is a sectional view taken along line VII-VII in FIG. **4**.

[0016] FIG. **8** is an external, perspective view of the dust box.

[0017] FIG. **9** is a sectional view of the dust box, taken along line VII-VII in FIG. **4**.

[0018] FIG. **10** is a top view of the dust box, showing the inside by broken lines.

[0019] FIG. **11** shows a filter and a frame.

[0020] FIG. **12** is a partial, enlarged view of FIG. **6**, showing a switching mechanism.

[0021] FIG. **13** is a right side view, with a right body housing removed, showing a first switch and a first lock switch in enlarged view.

[0022] FIG. **14** is a sectional view taken along line XIV-XIV in FIG. **12**, showing a first lock switch and a first switch operation part in a lock-off state.

[0023] FIG. **15** is a sectional view corresponding to FIG. **14**, with the first lock switch placed in a first lock-on position.

[0024] FIG. **16** is a sectional view corresponding to FIG. **14**, with the first lock switch placed in a second lock-on position.

[0025] FIG. **17** is a right side view, with the right body housing removed, showing a second switch and a second lock switch in enlarged view.

[0026] FIG. **18** is a sectional view taken along line XVIII-XVIII in FIG. **5**, showing the second switch and the second lock switch.

[0027] FIG. **19** is a sectional view corresponding to FIG. **18**, with the second lock switch placed in a lock-on position.

[0028] FIG. **20** shows an example of a battery that can be removably mounted to the belt sander.

DETAILED DESCRIPTION OF THE EMBODIMENT

[0029] In one non-limiting embodiment according to the present disclosure, the filter may be arranged closer to the second nozzle than to the first nozzle within the container part.

[0030] According to this embodiment, the first space in which dust is stored can be secured large relative to the second space that communicates with the second nozzle, while dust is restrained from entering the housing from the second nozzle.

[0031] In addition or in the alternative to the preceding embodiment, the belt driving part may include a drive roller that is rotated by the motor, and a driven roller. Where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, a polishing surface may be defined by a lower surface of the sanding belt. The dust box may be configured such that when the dust box is mounted to the belt sander, the first nozzle is located below the second nozzle, and the first space may be a lower space within the container part.

[0032] According to this embodiment, the first nozzle is arranged below the second nozzle and the first space is provided in a lower part within the container part, so that a dust collecting path from the lower surface (polishing surface) of the sanding belt into the container part can be shorter. Thus, the dust collecting efficiency is improved.

[0033] In addition or in the alternative to the preceding embodiments, the first and second nozzles may be open in the same direction.

[0034] According to this embodiment, compared with a structure in which the first and second nozzles are open in different directions, air flow within the container part can be smoother, so that the dust collecting efficiency is more improved.

[0035] In addition or in the alternative to the preceding embodiments, the filter may be a bag-like air filter having an open end.

[0036] According to this embodiment, dust can be efficiently separated from air by the filter.

[0037] In addition or in the alternative to the preceding embodiments, the container part may have a nozzle connection part that is connected to the first and second nozzles, and a body part that is removably fitted to the nozzle connection part. The filter may be provided on the nozzle connection part.

[0038] According to this embodiment, dust stored in the container part can be removed by detaching the body part from the nozzle connection part.

[0039] In addition or in the alternative to the preceding embodiments, the dust box may further have an attaching/detaching part configured to attach and detach the body part to and from the nozzle connection part.

[0040] According to this embodiment, the user need not separately prepare a tool for attaching and detaching the body part to and from the nozzle connection part, so that the convenience in use of the dust box is improved.

[0041] In addition or in the alternative to the preceding embodiments, at least part of the dust box may be formed of conductive synthetic resin.

[0042] According to this embodiment, the dust collecting efficiency is improved in the dust box at least part of which is formed of conductive synthetic resin.

[0043] In addition or in the alternative to the preceding embodiments, where an up-down direction is defined with the side of the belt sander on which the belt driving part is arranged being defined as a lower side and the opposite side defined as an upper side, at least part of the container part that is located below a central position of the container part in the up-down direction when the dust box is mounted to the belt sander may be formed of the conductive synthetic resin.

[0044] According to this embodiment, the dust collecting efficiency is improved in the dust box at least part of which is formed of conductive synthetic resin.

[0045] In addition or in the alternative to the preceding embodiments, the dust box may further have an earth member (a ground member). The earth member may be provided on the dust box such that its one end part is connected to the part formed of the conductive synthetic resin, and the other end part is exposed outside the dust box.

[0046] According to this embodiment, electric charge charged (accumulated) in the dust box is discharged by the earth member. This suppresses adhesion of dust to a certain place of the dust box, so that the dust collecting efficiency is improved.

[0047] In addition or in the alternative to the preceding embodiment, a belt sander to which the dust box is removably mounted is provided. The belt sander may include an electric motor, a dust collecting fan, a housing that houses the motor and the dust collecting fan, and a belt driving part. The belt driving part may include a drive roller configured to be rotated by the motor, and a driven roller, and may be configured to drive an endless sanding belt looped over the drive roller and the driven roller. Where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, the belt driving part may be arranged below the housing. The housing may have a discharge nozzle and a suction nozzle. The discharge nozzle may be configured to discharge dust generated by the working operation from the housing. The suction nozzle may be configured to suck air from the dust box into the housing. The housing may further have a dust collection port, an air outlet, a first passage that connects the dust collection port and the discharge nozzle, and a second passage that connects the suction nozzle and the air outlet. The dust collection port may be provided behind the belt driving part. The air outlet may be provided in the housing to communicate with a space where the dust collecting fan is housed. The first passage may be separated from spaces where the motor and the dust collecting fan are housed within the housing, and the second passage. The second passage may communicate with the space where the dust collecting fan is housed. The dust collecting fan may be configured to rotate to generate an air flow from the dust collection port toward the discharge nozzle through the first

passage, and an air flow from the suction nozzle toward the air outlet through the second passage.

[0048] According to this embodiment, when the dust collecting fan rotates, dust generated by working operation is led together with air from the dust collection port to the first passage, the discharge nozzle, the first nozzle and the container part in this order. The filter is provided within the container part of the dust box, so that the possibility of dust passing through the filter and stored in the first space of the container part can be reduced. After separated from dust by the filter, air within the container part is led to the second nozzle, the suction nozzle and the second passage and discharged from the air outlet of the belt sander. Further, the first passage is separated from the spaces where the motor and the dust collecting fan are housed and the second passage, so that adhesion of dust to the motor and the dust collecting fan is suppressed. Therefore, the dust collecting efficiency is improved, and the life of the belt sander is elongated.

[0049] In addition or in the alternative to the preceding embodiments, the suction nozzle and the discharge nozzle may be open to the rear. The discharge nozzle may be arranged below the suction nozzle.

[0050] According to this embodiment, with the configuration in which the dust collection port is provided behind the belt driving part and the discharge nozzle is provided below the suction nozzle, the first passage from the dust collection port to the discharge nozzle can be relatively short, so that the dust collecting efficiency is further improved.

[0051] <The Overall Structure of the Belt Sander>

[0052] A belt sander **1** is now described as a representative embodiment according to the present disclosure. The belt sander **1** is capable of performing a working operation by driving a belt driving part **6**, which holds an endless sanding belt B, by a motor **2**, with the sanding belt B placed in contact (pressing contact) with a workpiece. In this embodiment, the belt sander **1** has a handle **14**. A user can perform a working operation on a desired part of the workpiece by holding the handle **14** and moving the belt sander **1** while placing the sanding belt B in contact with the workpiece. The belt sander **1** described in this embodiment is also called as an "up-handle belt sander". The up-handle belt sander is a belt sander of a type that has the handle **14** and the motor **2** on a side opposite to a polishing (sanding) surface of the sanding belt B.

[0053] The overall structure of the belt sander **1** is now described with reference to FIGS. **1** to **7**. The belt sander **1** mainly includes a housing **10**, an electric motor **2**, a fan **3**, a power transmitting part **35**, a belt driving part **6**, a battery mounting part **4** and a switching mechanism **8**.

[0054] The belt driving part **6** includes a drive roller **61**, a driven roller **62** arranged on a side opposite to the drive roller **61**, and a support frame **64** (see FIG. **6**) that supports the rollers **61**, **62** so as to be rotatable around their respective axes (rotational axes A**1** and A**2**). The drive roller **61** and the driven roller **62** are arranged in parallel, and the endless sanding belt B is looped over the drive roller **61** and the driven roller **62**. A plate for pressing the sanding belt B against a workpiece is arranged on a prescribed face of the support frame **64**. The drive roller **61** is rotated in a direction of arrow D (see FIG. **1**) by the motor **2**.

[0055] In the following description, for convenience sake, the direction in which the drive roller **61** and the driven roller **62** are arranged in parallel is defined as a front-rear direction of the belt sander **1**. In the front-rear direction, the side of the belt driving part **6** on which the drive roller **61** is arranged is defined as a rear side and the side on which the driven roller **62** is arranged is defined as a front side. A direction that crosses the front-rear direction and in which rotational axes A**1**, A**2** of the drive roller **61** and the driven roller **62** extend is defined as a left-right direction of the belt sander **1**. Further, a direction orthogonal to the front-rear direction and the left-right direction is defined as an up-down direction of the belt sander **1**. In the up-down direction, the side of the belt sander **1** on which the belt driving part **6** is arranged is defined as a lower side, and the opposite side is defined as an upper side. A part of the sanding belt B that is exposed from the housing **10** functions as a polishing surface (sanding surface B**1**) for polishing a workpiece.

[0056] The housing **10** includes a body housing **11** and a side housing **16**.

[0057] The body housing **11** holds the belt driving part **6** with a lower end part of the belt driving part **6** exposed. The body housing **11** covers an upper part of the belt driving part **6** and an area behind a rear end part of the belt driving part **6** and substantially extends in the front-rear direction as a whole. In this embodiment, as shown in FIG. **4**, the body housing **11** is formed by two halves, or a left body housing **11**L and a right body housing **11**R, fixed together with screws.

[0058] As shown in FIG. **2**, the body housing **11** includes a first part **12** and a second part **13** in front of the first part **12**, directly above the belt driving part **6**.

[0059] The first part **12** is formed directly above the belt driving part **6** and on the rear side substantially from the central position of the belt driving part **6** in the front-rear direction. The first part **12** mainly houses the motor **2**. The first part **12** is also referred to as a "motor housing part". The first part **12** has a generally box-like shape including an upper wall **121**, a front wall **122**, side walls **123** and a rear wall **124**. The upper wall **121** is substantially orthogonal to the up-down direction and substantially parallel to the sanding surface B**1**. The front wall **122** and the rear wall **124** are substantially orthogonal to the front-rear direction. The upper wall **121** may just be configured to, when the belt sander **1** is used in a second use mode, be placed on a desk or the like which may have a slightly uneven surface.

[0060] The second part **13** is formed directly above the belt driving part **6** and on the front side substantially from the central position of the belt driving part **6** in the front-rear direction. The second part **13** has side walls **133** formed continuously to the side walls **123** of the first part **12**. The upper wall **131** of the second part **13** is located below the upper wall **121** of the first part **12**. Thus, a part of the body housing **11** that is located above the belt driving part **6** has a stepped shape. The battery mounting part **4** is provided on the second part **13**.

[0061] A part of the body housing **11** that extends rearward from the first part **12** forms the handle **14** extending in the front-rear direction. The handle **14** is connected to the first part **12** and extends in the front-rear direction. In this embodiment, the handle **14** is connected to an upper part of the rear wall **124** of the first part **12** and extends rearward and downward from the first part **12**. An upper end of the handle **14** dose not protrude upward from the upper wall **121** of the first part **12**. In this embodiment, the upper end of the handle **14** is located substantially in the same position as the

upper wall **121** in the up-down direction. The handle **14** is also referred to as a "first handle".

[0062] A rear end part of the handle **14** is bent downward. The bent part is connected to a rear lower part of the first part **12**. Thus, a rear part of the body housing **11** behind the belt driving part **6** has an annular shape.

[0063] A lower part of the handle **14** of the body housing **11**, via which the rear end part of the handle **14** is connected to a part of the body housing **11** behind the belt driving part **6**, forms a controller housing part **15**. A front end part (directly behind the belt driving part **6**) of the controller housing part **15** is curved along an outer edge of the drive roller **61**. The body housing **11** is open in the left-right direction directly behind the belt driving part **6**. This opening functions as a dust collection port **19** through which dust generated by working operation is introduced to a dust passage (a first passage **191**) provided within the housing **10**.

[0064] As shown in FIG. **6**, the switching mechanism **8** is provided behind the motor **2** within the body housing **11**. The switching mechanism **8** includes a first switch **80**, a second switch **90**, a first lock switch **85** and a second lock switch **95** (see FIG. **4**), which can be manually operated by a user. The switching mechanism **8** will be described in detail below.

[0065] A dial **39** for adjusting the speed of the motor **2** is provided on an upper part of the body housing **11** behind the motor **2**. An upper end of the dial **39** is exposed from the upper wall **121** of the body housing **11**. The dial **39** is configured such that the attitude (rotational position) of the dial **39** can be changed by manual operation of a user. The dial **39** is connected to a controller **5** via wiring. The controller **5** is configured to set the speed of the motor **2** according to the rotational position of the dial **39**.

[0066] As shown in FIG. **6**, the controller **5** is mounted on a main board arranged within a case of the controller housing part **15**. In this embodiment, the controller **5** is configured as a microcomputer including a CPU and a memory. The controller **5** is configured to control various operations of the belt sander **1**, including drive control of the motor **2**. The controller **5** is connected to the battery mounting part **4**, the motor **2** and the first and second switches **80**, **90** of the switching mechanism **8** via wiring (not shown). The controller **5** is configured to supply power of a battery **300** mounted to the battery mounting part **4**, to the motor **2** when the first and second switches **80**, **90** are in an ON state. Then, the motor **2** is rotated and the belt driving part **6** is driven via the power transmitting part **35**. Thus, the sanding belt B is rotated in the direction of arrow D. Further, the controller **5** is configured not to supply power to the motor **2** when at least one of the first and second switches **80**, **90** is in an OFF state.

[0067] Part of the left side wall **123** of the first part **12** is open and covered by the side housing **16**. As shown in FIGS. **3** and **4**, the side housing **16** includes a fan housing **161** for covering the left side of the fan **3**, a gear cover **162** for covering part of the power transmitting part **35**, and a belt cover **163** for covering an endless synchronous belt that is part of the power transmitting part **35**. The side housing **16** is fixed to the left body housing **11**L with screws.

[0068] The motor **2** is driven by power supplied from the battery **300** mounted to the battery mounting part **4**. In this embodiment, a brushless DC motor is used as the motor **2**. As shown in FIG. **6**, the motor **2** has a motor body **21** having a stator and a rotor, and a shaft **22** that extends from the rotor and rotates integrally with the rotor. The shaft **22** (a rotational axis A**3** of the shaft **22**) extends in the left-right direction. The shaft **22** is supported by the body housing **11** via a bearing.

[0069] As shown in FIG. **7**, the power transmitting part **35** is held by the side housing **16** and configured to transmit rotation of the shaft **22** to the drive roller **61**. The power transmitting part **35** includes a pulley part including a pulley integrally formed with a left end part of the shaft **22**, an endless synchronous belt and a gear mechanism for reducing the rotation speed of the shaft **22**.

[0070] The fan **3** is configured to have a function of cooling the motor **2** and a function as a dust collecting fan. The fan **3** generates an air flow for cooling the motor **2** and an air flow for sucking dust generated by working operation into the housing **10** and discharging the dust into a dust box **200**.

[0071] In this embodiment, the fan **3** is housed on the left side of the motor body **21** mostly in the first part **12** of the body housing **11**. The fan **3** is fixed between the motor body **21** and a bearing onto the shaft **22** and rotates integrally with the shaft **22**. Part of the left wall **123** of the first part **12** is open as described above, and a back side of the fan **3** is covered by the side housing **16** (a fan housing **161**). A front part of the fan housing **161** is curved along an outer edge of the fan **3**. A plurality of small openings (air outlets **165**) are formed in the curved part of the fan housing **161** (see FIGS. **4** and **7**, for example).

[0072] The fan **3** of this embodiment is configured as a centrifugal fan. The fan **3** sucks air from the back side of the fan **3** (the left side of the belt sander **1**) and discharges the air radially in a direction crossing the rotational axis A**3** of the shaft **22**. The discharged air is led to the motor **2** by a plurality of small blades formed on a front side of the fan **3** (on the right side of the belt sander **1**) and a baffle plate **32** provided on the front side of the fan **3**. Further, a guide plate **31** is provided on the back side of the fan **3** and connected to a suction nozzle **150** (described below). When the fan **3** is rotated, the fan **3** sucks air from the back side and radially discharges the air and then sends the discharged air to the motor **2**, as well as sending air within the housing **10** to the air outlets **165**.

[0073] <The Structures of the Dust Box and the Belt Sander for Collecting Dust in the Dust Box>

[0074] The belt sander **1** of this embodiment is configured such that the dust box **200** is removably mounted thereto. The structure of the belt sander **1** for collecting dust in the dust box **200** and the structure of the dust box **200** are now described.

[0075] As shown in FIGS. **3** and **7**, the housing **10** of the belt sander **1** has two tubular parts (a discharge nozzle **140** and a suction nozzle **150**). The discharge nozzle **140** and the suction nozzle **150** are formed on a rear upper part of the side housing **16** and extend in the front-rear direction. The discharge nozzle **140** and the suction nozzle **150** are arranged side by side in the up-down direction, and the discharge nozzle **140** is arranged below the suction nozzle **150**. The discharge nozzle **140** and the suction nozzle **150** are open to the rear.

[0076] As described above, the body housing **11** has the dust collection port **19** that is open in the left-right direction directly behind the belt driving part **6**. The first passage **191** for communication between the dust collection port **19** and the discharge nozzle **140** is formed within the housing **10**. In

this embodiment, the first passage **191** is defined by a partition **101** provided within the housing **10** and a tubular wall of the discharge nozzle **140**. The partition **101** is provided continuously within a rear lower part of the body housing **11**, a rear part of the gear cover **162** and a rear part of the fan housing **161**. The first passage **191** is separated from spaces where parts including the motor **2**, the fan **3** and the power transmitting part **35** are housed, by the partition **101** and the tubular wall of the discharge nozzle **140**. Therefore, the possibility of air and dust flowing through the first passage **191** entering the housing parts (spaces) for the motor **2**, the fan **3** and the power transmitting part **35** is reduced.

[0077] As shown in FIG. **7**, a second passage **192** for communication between the suction nozzle **150** and the air outlets **165** is formed within the housing **10**. The second passage **192** communicates with the space where the fan **3** is housed within the housing **10**. The second passage **192** is mainly defined by a tubular wall of the suction nozzle **150**, the guide plate **31**, and a wall part **102** forming the fan housing **161**.

[0078] The structure of the dust box **200** is now described with reference to FIGS. **7** to **11**. The dust box **200** is formed to extend in a prescribed direction as a whole. The dust box **200** has a first nozzle **210** and a second nozzle **220** that extend in this prescribed direction, a container part **230** connected to the first and second nozzles **210**, **220**, and a filter **260** provided within the container part **230**. The first and second nozzles **210**, **220** and the container part **230** are formed of an air impermeable (airtight) material. In this embodiment, the first and second nozzles **210**, **220** and the container part **230** are formed of conductive synthetic resin.

[0079] In FIG. **8**, the up-down direction, the front-rear direction and the left-right direction are shown for the dust box **200** attached to the belt sander **1**. The dust box **200** attached to the belt sander **1** extends in the front-rear direction as a whole. The first and second nozzles **210**, **220** extend in the front-rear direction and are open to the front. The first and second nozzles **210**, **220** are arranged side by side in the up-down direction, and the first nozzle **210** is arranged below the second nozzle **220**. The dust box **200** is attached to the belt sander **1** by inserting the first and second nozzles **210**, **220** respectively into the discharge nozzle **140** and the suction nozzle **150** of the belt sander **1**. The first passage **191** of the belt sander **1** communicates with the inside of the first nozzle **210** (the inside of the dust box **200**) by insertion of the first nozzle **210** into the discharge nozzle **140**. The second passage **192** of the belt sander **1** communicates with the inside of the second nozzle **220** (the inside of the dust box **200**) by insertion of the second nozzle **220** into the suction nozzle **150**. Further, O-rings **212**, **222** are fitted onto outer peripheral walls of the first and second nozzles **210**, **220**, respectively, so that the connection parts of these nozzles are kept airtight.

[0080] The container part **230** has a generally box-like shape extending in the front-rear direction. The length of the container part **230** in the left-right direction is shorter than the lengths of the container part **230** in the up-down direction and in the front-rear direction. An upper wall (an upper surface **231**) of the container part **230** is substantially orthogonal to the up-down direction. A lower wall (a lower surface **234**) of the container part **230** is inclined rearward and upward. As shown in FIG. **4**, the container part **230** is located on the left side of the handle **14** and the controller housing part **15** with the dust box **200** attached to the belt sander **1**.

[0081] The dust box **200** is configured to be fitted within the widths (lengths) of the housing **10** in the up-down direction and the left-right direction when attached to the belt sander **1**. Further, the dust box **200** is configured such that the lower surface **234** is located above the sanding surface B**1** in the up-down direction when attached to the belt sander **1**. In this embodiment, as shown in FIG. **4**, a left side surface **233** of the container part **230** is located substantially in the same position in the left-right direction as a left surface of the housing **10** (a left surface of the fan housing **161**). Further, as shown in FIG. **7**, the upper surface **231** of the container part **230** is located substantially in the same position in the up-down direction as an upper end (the upper wall **121**) of the belt sander **1**.

[0082] The container part **230** is configured to be divided into a nozzle connection part **240** and a body part **250**. The nozzle connection part **240** is a front part of the container part **230** and is connected to the first and second nozzles **210**, **220**. In this embodiment, the nozzle connection part **240** is integrally formed with the first and second nozzles **210**, **220**. As shown in FIG. **10**, the first and second nozzles **210**, **220** and the nozzle connection part **240** are formed by two halves, or a left nozzle part **240**L and a right nozzle part **240**R, fixed together with screws. An O-ring **244** is fitted onto an outer periphery of a rear end part **243** of the nozzle connection part **240**.

[0083] The body part **250** is a rear part of the container part **230**. The body part **250** has a generally box-like shape having an open front end. In this embodiment, the container part **230** is formed of carbon resin. As shown in FIG. **9**, the container part **230** has a window part **235** formed of light transmitting resin. A user can visually check the amount of dust within the container part **230** via the window part **235**.

[0084] As shown in FIG. **9**, the dust box **200** further has an attaching/detaching part **270** configured to attach and detach the body part **250** to and from the nozzle connection part **240**. In this embodiment, the attaching/detaching part **270** includes a mounting screw **271** provided on the body part **250**, and an engagement part **245** provided on the nozzle connection part **240**. The mounting screw **271** has a knob **272** and a shaft **273**. The engagement part **245** is configured to be engaged with a front end part **274** of the mounting screw **271**.

[0085] A tubular part **258** is provided inside the body part **250** and extends forward from a rear wall **232** of the container part **230**. The tubular part **258** has a rear end opening formed in the rear wall **232**. The knob **272** is arranged on the rear side of the rear wall **232** and covers this opening. The shaft **273** is connected to the knob **272** and arranged within the tubular part **258**. The nozzle connection part **240** has a partition **241** provided between the first nozzle **210** and the second nozzle **220** in the up-down direction, and the engagement part **245** is formed by an opening formed in the partition **241** and engagement members including a nut **246** arranged in the opening. The partition **241** partitions the inside of the nozzle connection part **240** into a space that communicates with the first nozzle **210** and a space that communicates with the second nozzle **220**.

[0086] A method of fitting the body part **250** to the nozzle connection part **240** is now described. A user positions and aligns the body part **250** having the mounting screw **271**

mounted thereto and the nozzle connection part **240** with each other such that an external contour (for example, the side surface **233**) formed by connecting the body part **250** and the nozzle connection part **240** is continuous. The user then inserts the front end part **274** of the shaft **273** into the opening of the engagement part **245** while fitting a front end part **253** of the body part **250** into the rear end part **243** of the nozzle connection part **240**. When the user manually operates (turns) the knob **272**, the front end part **274** of the shaft **273** is inserted into the opening of the engagement part **245** and engaged (fitted) with the engagement part **245**. In this manner, the body part **250** is fitted to the nozzle connection part **240**.

[0087] The filter **260** is arranged within the container part **230** so as to partition the space inside the container part **230** into a first space **281** that communicates with the first nozzle **210** and a second space **282** that communicates with the second nozzle **220**. The filter **260** is arranged closer to the second nozzle **220** than to the first nozzle **210**. The filter **260** is configured to allow air to pass therethrough but not to allow dust generated by working operation to pass therethrough. In this embodiment, a bag-like air filter having an opening **261** is used as the filter **260**. The air filter is, for example, a filter for coarse dust.

[0088] In this embodiment, a frame **262** is arranged inside the filter **260**. The frame **262** is configured to expand the filter **260** so as to keep the bag-like shape. As shown in FIG. **9**, a groove **242** is formed behind the second nozzle **220** above the partition **241** in an inner wall of the nozzle connection part **240** and configured such that the frame **262** is removably fixed thereto. The filter **260** is fixed to the groove **242** via the frame **262** such that the opening **261** faces the second nozzle **220** side (forward). It can also be said that the filter **260** is mounted to a part (second nozzle connection part) of the nozzle connection part **240** that is connected to the second nozzle **220**. As shown in FIG. **10**, a plate **247** extending rearward from the partition **241** supports a lower end part of the filter **260**.

[0089] The dust box **200** further has a string-like earth (ground) member **265**. The earth member **265** is provided to keep the potential of the dust box **200** equal to that of the ground. One end part of the earth member **265** is arranged in contact with the container part **230** and the other end part is exposed from the container part **230**. The length of exposure of the earth member **265** is set such that the other end part of the earth member **265** can come into contact with a workpiece or an object on the same plane as the workpiece when the sanding surface B**1** is placed on the workpiece. In this embodiment, the earth member **265** is arranged in a lower end part of the nozzle connection part **240** so as to be apart from the space (the first space **281**) of the container part **230**. The earth member **265** discharges electric charge accumulated in the dust box **200**.

[0090] Effects of the dust box **200** and the belt sander **1** having the dust box **200** attached thereto according to this embodiment are now described as well as the manner in which dust is stored (collected) in the dust box **200**.

[0091] When the dust box **200** is attached to the belt sander **1** by connecting the first and second nozzles **210**, **220** of the dust box **200** respectively to the discharge nozzle **140** and the suction nozzle **150** of the belt sander **1**, the first passage **191** of the belt sander **1** communicates with the first space **281** of the dust box **200**, and the second passage **192** of the belt sander **1** communicates with the second space **282** of the dust box **200**. As described above, the first space **281** is separated from the second space **282** by the filter **260**, so that air within the dust box **200** is allowed to move between the first and second spaces **281**, **282**.

[0092] When the belt sander **1** is driven, the fan **3** rotates and sucks air from the back side. At this time, by air suction of the fan **3**, air around the fan **3** is led from the suction nozzle **150** toward the air outlets **165**. In other words, by rotation of the fan **3**, air flow F**2** is generated from the inside of the dust box **200** toward the air outlets **165** through the second passage **192** (see FIG. **7**). Further, the pressure inside the dust box **200** becomes negative by air suction of the fan **3**, so that air flow F**1** is generated from the dust collection port **19** (provided behind the belt driving part) toward the inside of the dust box **200** through the first passage **191**. Therefore, dust generated by working operation is led from the dust collection port **19** to the first passage **191**, the discharge nozzle **140**, the first nozzle **210**, and the first space **281** of the container part **230**, in this order. Dust flowing into the container part **230** is prevented from moving into the second space **282** by the filter **260** and thus stored in the first space **281**. In this manner, dust is stored in the first space **281**. Further, air within the dust box **200** passes through the filter **260** and flows from the first space **281** to the second space **282**, the second nozzle **220**, the suction nozzle **150**, the second passage **192** and the air outlets **165**, in this order, and then the air is discharged to the outside of the belt sander **1**.

[0093] Thus, according to this embodiment, when the first and second nozzles **210**, **220** of the dust box **200** are respectively connected to the discharge nozzle **140** and the suction nozzle **150** of the belt sander **1** and the fan **3** is rotated, air flow is generated from the dust collection port **19** of the belt sander **1** toward the air outlets **165** of the belt sander **1** through the inside of the dust box **200**. Further, the filter **260** partitions the space of the container part **230** into the first space **281** that communicates with the first nozzle **210** and the second space **282** that communicates with the second nozzle **220**, so that dust is stored in the dust box **200** and restrained from entering the housing **10** from the second nozzle **220**. Therefore, the dust box **200** and the belt sander **1** having the dust box **200** attached thereto according to this embodiment provide improved dust collecting efficiency.

[0094] As described above, the first passage **191** is separated from the spaces where parts including the motor **2**, the fan **3** and the power transmitting part **35** are housed, by the partition **101** and the tubular wall of the discharge nozzle **140**. Therefore, air and dust flowing through the first passage **191** does not enter the housing parts (spaces) for the motor **2**, the fan **3** and the power transmitting part **35**. Further, air flows from the dust box **200** into the second passage **192** after dust is removed from the air by the filter **260**. Therefore, adhesion of dust generated by working operation to the motor **2**, the fan **3** and the power transmitting part **35** within the housing **10** is suppressed, so that the life of the belt sander **1** is elongated.

[0095] In the dust box **200**, the first nozzle **210** through which dust enters is arranged below the second nozzle **220** through which air is sucked. Therefore, dust need not be transferred up to an upper part within the container part **230**, so that a path for storing dust within the container part **230** can be shorter. Thus, the dust collecting efficiency is improved.

[0096] The filter **260** is fixed to the groove **242** formed behind the second nozzle **220**, via the frame **262**. Thus, the filter **260** is arranged closer to the second nozzle **220** than to the first nozzle **210**. Therefore, the first space **281** in which dust is stored can be formed large relative to the second space **282** that communicates with the second nozzle **220**.

[0097] The first and second nozzles **210**, **220** are arranged side by side in the up-down direction and are open to the rear. This structure suppresses complication of air flow within the container part **230** that may be caused by a structure in which the first and second nozzles **210**, **220** are open in different directions. Therefore, air flow within the container part **230** can be smoother, so that the dust collecting efficiency is more improved.

[0098] Further, the container part **230** has the nozzle connection part **240** that is connected to the first and second nozzles **210**, **220**, and the body part **250** that is removably fitted to the nozzle connection part **240**, and the filter **260** is mounted to the nozzle connection part **240**. Therefore, dust stored within the container part **230** can be removed by detaching the body part **250** from the nozzle connection part **240**.

[0099] Dust, which is blocked by the filter **260** when air flows into the filter **260** (the second space **282**), may adhere to an outer surface of the filter **260**. In this embodiment, however, the filter **260** is mounted to the nozzle connection part **240**, so that a user can easily remove dust adhered to the outer surface of the filter **260** when detaching the body part **250** from the nozzle connection part **240**. Thus, the filter **260** can be avoided from being covered with dust, so that the dust collecting efficiency is more improved.

[0100] The dust box **200** has the attaching/detaching part **270** configured to attach and detach the body part **250** to and from the nozzle connection part **240**. Therefore, the user need not separately prepare a tool for attaching and detaching the body part **250** to and from the nozzle connection part **240**, so that the convenience in use of the dust box **200** is improved.

[0101] In the belt sander **1**, dust flows through the first passage **191** within the housing **10**, so that static electricity is easily generated by friction between the dust and the housing **10**. In this embodiment, however, the dust box **200** has the earth member **265** having one end part arranged in contact with the container part **230** formed of conductive synthetic resin, and the other end part exposed from the container part **230**. Therefore, the generated static electricity is discharged via the earth member **265**. Thus, dust is avoided from staying in a certain place of the dust box **200** by the static electricity, so that the dust collecting efficiency is further improved.

[0102] The dust box **200** is configured to be fitted within the widths (lengths) of the housing **10** in the up-down direction and the left-right direction when attached to the belt sander **1**. With this configuration, the possibility that the working range of the belt sander **1** is restricted by contact of the dust box **200** with a structure such as a wall located on the right or left of the belt sander **1** is reduced. Further, when the belt sander **1** is used in the second use mode, the possibility that the dust box **200** comes into contact with a desk or the like on which the belt sander **1** is placed is reduced.

[0103] <Other Embodiments of the Dust Box and the Belt Sander for Collecting Dust in the Dust Box>

[0104] The dust box **200** may only have the first nozzle **210** configured to be connected to the discharge nozzle **140**, the second nozzle **220** configured to be connected to the suction nozzle **150**, the container part **230** and the filter **260**. The shapes and materials of these parts may be different from those of the above-described embodiment. For example, the container part **230** may be formed of bag-shaped vinyl. The filter **260** may only be formed to allow air to pass therethrough but not to allow dust generated by working operation of the belt sander **1** to pass therethrough.

[0105] In the above-described embodiment, the opening **261** of the filter **260** is mounted to a part (the second nozzle connection part) of the nozzle connection part **240** that is connected to the second nozzle **220**, but the filter **260** may be mounted to the second nozzle **220**.

[0106] <The Structure of the Switching Mechanism>

[0107] The overall structure of the switching mechanism **8** is now described. The switching mechanism **8** is configured to be manually operated by a user to switch between driving and stopping of the motor **2** and thereby switch between driving and stopping of the belt sander **1**. As shown in FIG. **6**, the switching mechanism **8** includes the first switch **80**, the second switch **90**, the first lock switch **85** and the second lock switch **95**. In FIGS. **14** to **18**, a plane P**1** including a longitudinal axis of the handle **14** and orthogonal to the left-right direction is shown as an imaginary plane for the purpose of explaining the structure of the switching mechanism **8**. FIG. **12** is a sectional view of the switching mechanism **8** taken along the plane P**1** in the state (normal state) where the belt sander **1** is stopped.

[0108] As shown in FIG. **12**, part of the first switch **80** protrudes downward from an opening **144** formed in a front lower part of the handle **14**. The first switch **80** is configured to be depressed relative to the handle **14** by a user. The first switch **80** is also referred to as a depressing switch or a trigger switch. Part of the second switch **90** protrudes upward from an opening **149** formed in a rear upper part of the handle **14**. The second switch **90** is configured to be pushed relative to the handle **14** by a user. The first and second switches **80**, **90** are each configured as a momentary switch.

[0109] As shown in FIGS. **4** and **12**, the first lock switch **85** is provided in a front part of the handle **14** and configured to act on the first switch **80**. The first lock switch **85** is configured to have a function of restricting the first switch **80** from being turned on or placed in the ON state (a function of keeping the first switch **80** in the OFF state, a lock-off function). The first lock switch **85** is further configured to have a function of maintaining the ON state of the first switch **80** (a lock-on function). The first lock switch **85** is also referred to as a lock-on/lock-off switch. The second lock switch **95** is provided in a left rear part of the handle **14** and configured to act on the second switch **90**. The second lock switch **95** is configured to have a function of maintaining the ON state of the second switch **90** (a lock-on function). The second lock switch **95** is also referred to as a lock-on switch.

[0110] The controller **5** is configured to rotate the motor **2** when both of the first and second switches **80**, **90** are in the ON state. The controller **5** is configured to stop rotation of the motor **2** when at least one of the first and second switches **80**, **90** is in the OFF state.

[0111] As described above, a user can use the belt sander **1** of this embodiment in first and second use modes. The first

use mode is a normal use mode in which the sanding surface B1 is placed on a workpiece and a user performs a working operation while holding the handle **14**. In the second use mode, the belt sander **1** is set upside down, for example, on a stand or a desk, with the sanding surface B1 facing vertically upward, and a user performs a working operation by pressing a workpiece onto the sanding belt B while holding the workpiece. The second lock switch **95** is mainly used in the second use mode.

[0112] <The Structure of the First Switch>

[0113] First, the structure of the first switch **80** is described. As shown in FIGS. **12** and **13**, the first switch **80** has a first switch operation part **81** and a first main switch **82**.

[0114] The first main switch **82** is held within the handle **14** of the body housing **11**. The first main switch **82** has a body **821** that is electrically connected to the controller **5**, and a plunger **822** that is exposed from a lower part of the body **821** and configured to be movable substantially in the up-down direction. The first main switch **82** is turned on (placed in an ON state) when the length of the exposed part of the plunger **822** is a prescribed threshold or less, and turned off (placed in an OFF state) when the length of the exposed part of the plunger **822** exceeds the prescribed threshold. The body **821** outputs an ON signal to the controller **5** when the first main switch **82** is ON.

[0115] The first switch operation part **81** is configured to be manually operated by a user. The first switch operation part **81** can be moved to a first ON position and a first OFF position. In FIG. **13**, the first switch operation part **81** placed in the first ON position is shown by solid lines, and the first switch operation part **81** placed in the first OFF position is shown by broken lines. The first ON position is a position of the first switch operation part **81** where the first switch operation part **81** acts on the first main switch **82** to place the first main switch **82** in the ON state. The first OFF position is a position of the first switch operation part **81** to place the first main switch **82** in the OFF state. The first switch operation part **81** is normally in the first OFF position. Operations of moving the first switch operation part **81** to the first ON position and the first OFF position are also referred to as an ON operation and an OFF operation, respectively. In this embodiment, the ON operation of the first switch operation part **81** is depressing it, and the OFF operation of the first switch operation part **81** is releasing the depressing operation.

[0116] The structure of the first switch operation part **81** is now specifically described. The first switch operation part **81** has a base **811**, a boss **814** and a projection **815**. The base **811** extends from front of the first main switch **82** to below the plunger **822**. Part of the base **811** protrudes downward from the opening **144** formed in the front lower part of the handle **14**. This protruding part has an external shape that conforms to user's fingers. The base **811** has an abutment part **812** (see FIG. **12**) that abuts on a lower end of the plunger **822**. The projection **815** has a generally thick plate-like shape protruding upward from a front part of the base **811**. As shown in FIGS. **14** to **16**, the projection **815** is located substantially in the center of the handle **14** in the left-right direction, and the plane P1 passes through the projection **815** (through this center). The boss **814** extends in the left-right direction in a front part of the base **811** and is supported by the handle **14**. The boss **814** is rotatable relative to the handle **14**.

[0117] When the ON operation of the first switch operation part **81** is not restricted by the first lock switch **85**, the first switch operation part **81** is depressed into the opening **144** by user's depressing operation. At this time, the first switch operation part **81** is turned clockwise around the boss **814**. Thus, the first switch operation part **81** is moved from a position shown by the broken lines to a position shown by the solid lines in FIG. **13**, and the projection **815** is moved forward. Further, the abutment part **812** pushes in the plunger **822**. When the abutment part **812** pushes in the plunger **822**, the first main switch **82** (the first switch **80**) is placed in the ON state. The first ON position is also a position of the first switch operation part **81** where the length of the exposed part of the plunger **822** is the prescribed threshold or less.

[0118] When the depressing operation of the first switch operation part **81** is released, the first switch operation part **81** is turned counterclockwise around the boss **814** and returned to an initial position, and the projection **815** is moved rearward. Further, the abutment part **812** releases pushing of the plunger **822**. Thus, the first switch **80** is placed in the OFF state. The first OFF position is also a position of the first switch operation part **81** where the length of the exposed part of the plunger **822** exceeds the prescribed threshold.

[0119] The first switch **80** further has a biasing member **818** configured to bias the first switch operation part **81** to the first OFF position. In this embodiment, a compression coil spring is used as the biasing member **818**. As shown in FIG. **12**, one end of the biasing member **818** is supported behind the boss **814** and in front of the abutment part **812** by the base **811**. The other end of the biasing member **818** is supported by an inner wall of the handle **14**. When the first switch operation part **81** is depressed against the biasing force of the biasing member **818** and placed in the first ON position, the first switch **80** is placed in the ON state. When the depressing operation of the first switch operation part **81** is released, the first operation part **81** is returned to the first OFF position by the biasing force of the biasing member **818**, and thus the first switch **80** is placed in the OFF state.

[0120] <The Structure of the First Lock Switch>

[0121] The structure of the first lock switch **85** is now described. The first lock switch **85** is configured to be moved between a lock-off position for restricting the ON operation of the first operation part **81** and a lock-off release position for allowing the ON operation of the first operation part **81**, by user's manual operation. The lock-off release position includes a lock-on position for maintaining the ON operation of the first switch **80**. The first lock switch **85** is normally placed in the lock-off position. FIGS. **12** and **14** show the first lock switch **85** placed in the lock-off position (the lock-off state), and FIGS. **15** and **16** show the first lock switch **85** placed in the lock-on position (in the lock-on state).

[0122] As shown in FIG. **14**, the first lock switch **85** has an operation stem **851**, a lock-off locking part **853**, lock-on locking parts **855**L, **855**R and a biasing member **858**. The first lock switch **85** is configured as a push-in operation part to be pushed in relative to the handle **14** by a user.

[0123] The operation stem **851** extends substantially in the left-right direction. In the lock-off state, as shown in FIG. **14**, a substantially central part of the operation stem **851** in the left-right direction is located on the plane P1. Left and right end parts of the operation stem **851** normally protrude from

openings **145**L, **145**R formed in a left surface (a left wall **14**L) and a right surface (a right wall **14**R) of the handle **14**, respectively. The left and right end parts of the operation stem **851** serve as operation parts **851**L, **851**R, respectively. The first lock switch **85** is arranged within the reach of a hand of a user operating the first switch operation part **81**. Specifically, the operation part **851**R is arranged within the reach of the right thumb of a user holding the handle **14** with the right hand such that the user can depress the first switch operation part **81** with a right finger. Further, the operation part **851**L is arranged within the reach of the left thumb of a user holding the handle **14** with the left hand such that the user can depress the first switch operation part **81** with a left finger.

[0124] The lock-off locking part **853** is configured to abut on the projection **815** of the first switch operation part **81** and thus restrict a depressing operation of the first switch operation part **81**. In this embodiment, a recess **854** is formed in a central part of the operation stem **851** in the left-right direction and recessed rearward. The lock-off locking part **853** has a thick plate-like shape protruding forward and downward from a central front part of the recess **854**.

[0125] The lock-on locking parts **855**L, **855**R are respectively formed on left and right ends of the recess **854** and apart from the lock-off locking part **853**. The lock-on locking parts **855**L, **855**R are located behind the lock-off locking part **853** in the front-rear direction. The lock-on locking parts **855**L, **855**R each have a thick plate-like shape protruding downward. The distance between the lock-on locking part **855**L and the lock-off locking part **853** and the distance between the lock-on locking part **855**R and the lock-off locking part **853** in the left-right direction are each larger than the thickness of the projection **815** in the left-right direction. Therefore, the projection **815** (the first switch operation part **81**) is allowed to turn (into the lock-off release state) when disengaged from the lock-off locking part **853**. At this time, the first switch operation part **81** is allowed to turn until a rear wall (rear side) of the projection **815** reaches a position in front of front walls (front sides) of the lock-on locking parts **855**L, **855**R in the front-rear direction.

[0126] The operation stem **851** further has restriction walls **854**L, **854**R. The restriction walls **854**L, **854**R define the left and right ends of the recess **854**. The restriction wall **854**L is formed on the left front side of the lock-on locking part **855**L. The restriction wall **854**L abuts on the left surface of the projection **815** when the first lock switch **85** is pushed to the right. Thus, the restriction wall **854**L restricts rightward movement of the first lock switch **85** and positions the lock-on locking part **855**L directly behind the projection **815**. The restriction wall **854**R is formed on the right front side of the lock-on locking part **855**R The restriction wall **854**R abuts on the right surface of the projection **815** when the first lock switch **85** is pushed to the left. Thus, the restriction wall **854**R restricts leftward movement of the first lock switch **85** and positions the lock-on locking part **855**R directly behind the projection **815**.

[0127] The biasing member **858** is arranged behind the operation stem **851** so as to extend in the left-right direction. The biasing member **858** is configured to bias the first lock switch **85** to the lock-off position. In this embodiment, a compression coil spring is used as the biasing member **858**.

[0128] In this embodiment, a holding part **859** is integrally formed with the operation stem **851** on the rear of the operation stem **851** so as to hold the biasing member **858**. Left and right walls of the holding part **859** hold left and right ends of the biasing member **858**, respectively. The left and right walls of the holding part **859** each have an opening. Projections **149**L, **149**R protruding from left and right walls of the handle **14** abut on the left and right ends of the biasing member **858** through the openings of the holding part **859**, respectively. When the operation stem **851** is moved to the left, as shown in FIG. **15**, the biasing member **858** moves to the left together with the holding part **859**. At this time, the biasing member **858** is contracted with the right end of the biasing member **858** being supported by the right wall of the holding part **859** and with the left end of the biasing member **858** being supported by the projection **149**L. When the operation stem **851** is moved to the right, as shown in FIG. **16**, the biasing member **858** moves to the right together with the holding part **859**. At this time, the biasing member **858** is contracted with the left end of the biasing member **858** being supported by the left wall of the holding part **859** and with the right end of the biasing member **858** being supported by the projection **149**R.

[0129] As described above, the first lock switch **85** is normally placed in the lock-off position. As shown in FIG. **14**, the lock-off position is a position of the first lock switch **85** where the lock-off locking part **853** is located directly behind the projection **815**. In the lock-off position, the lock-off locking part **853** is located on the plane P**1**. The first lock switch **85** can be moved to a first lock-on position shown in FIG. **15** when pushed to the right by user's manual operation. The first lock-on position is a position of the first lock switch **85** where the lock-on locking part **855**R is located directly behind the projection **815**. In the first lock-on position, the lock-on locking part **855**R is located on the plane P**1**. Further, the first lock switch **85** can be moved to a second lock-on position shown in FIG. **16** when pushed to the left by user's manual operation. The second lock-on position is a position of the first lock switch **85** where the lock-on locking part **855**L is located directly behind the projection **815**. In the second lock-on position, the lock-on locking part **855** is located on the plane P**1**.

[0130] <Method of Operating the First Switch and the First Lock Switch>

[0131] As shown in FIGS. **12** and **14**, when the first lock switch **85** is located in the lock-off position, a rear wall of the lock-off locking part **853** abuts on (engages or interferes with) a front wall of the projection **815** of the first switch operation part **81**. Thus, the lock-off locking part **853** restricts forward movement of the projection **815** or the depressing operation of the first switch operation part **81** (in the lock-off state).

[0132] When the user pushes the operation part **851**R into the handle **14**, the first lock switch **85** is moved to the left from the lock-off position. Thus, the lock-off locking part **853** is disengaged from the projection **815** of the first switch operation part **81** (in the lock-off release state). Therefore, the projection **815** is allowed to turn clockwise, so that the depressing operation (ON operation) of the first switch operation part **81** is allowed. Further, when the user depresses the first switch operation part **81**, the projection **815** can be turned clockwise to be moved forward of the lock-on locking part **855**R in the front-rear direction.

[0133] When the user further pushes the first lock switch **85** to the left, as shown in FIG. **15**, the first lock switch **85** moves to the left until the restriction wall **854**R abuts on the right surface of the projection **815**. The lock-on locking part

855R, which is formed on the left rear side of the restriction wall 854R, is located directly behind the projection 815 when the restriction wall 854R abuts on the right surface of the projection 815. Thus, the first lock switch 85 is placed in the first lock-on position.

[0134] When the user releases the depressing operation (ON operation) of the first switch operation part 81, the biasing member 818 (see FIG. 12) applies a biasing force to the first switch operation part 81 toward the first OFF position. At this time, however, the rear wall (rear side) of the projection 815 is engaged with the front wall (front side) of the lock-on locking part 855R and restricts movement of the first switch operation part 81 to the first OFF position. Thus, the first switch operation part 81 is kept in the first ON position. Therefore, the ON operation of the first switch operation part 81 is maintained (in the lock-on state) even if the user releases the depressing operation of the first switch operation part 81. At this time, the biasing member 858 of the first lock switch 85 is contracted as shown in FIG. 15 and biases the first lock switch 85 to the lock-off position. The biasing member 818 of the first switch 80 however biases the projection 815 of the first switch operation part 81 (the first switch operation part 81) toward the first OFF position (in a direction to turn the projection 815 counterclockwise). Therefore, the biasing force of the biasing member 818 is applied to the lock-on locking part 855R via the projection 815 so that the lock-on locking part 855R is kept engaged with the projection 815. Thus, the first lock switch 85 is kept in the first lock-on position.

[0135] In the state as shown in FIG. 15 where the first lock switch 85 is placed in the first lock-on position and the ON operation of the first switch operation part 81 is maintained, the projection 815 turns clockwise when the user further depresses the first switch operation part 81. The projection 815 is then separated and disengaged from the lock-on locking part 855R. Therefore, the first lock switch 85 is returned to the lock-off position by the biasing force of the biasing member 858 (see FIG. 14). Further, the first switch operation part 81 is returned to the first OFF position by the biasing force of the biasing member 818.

[0136] The user can also move the first lock switch 85 from the lock-off position to the second lock-on position in the same manner as described above. Specifically, when the user pushes the operation part 851L into the handle 14, the first lock switch 85 is moved to the right from the lock-off position. Thus, the lock-off locking part 853 is disengaged from the projection 815 of the first switch operation part 81. Further, when the user depresses (turns on) the first switch operation part 81, the projection 815 can be moved forward of the lock-on locking part 855L in the front-rear direction.

[0137] When the user further pushes the first lock switch 85 to the right, as shown in FIG. 16, the first lock switch 85 moves to the right until the restriction wall 854L abuts on the left surface of the projection 815. The lock-on locking part 855L, which is formed on the right rear side of the restriction wall 854L, is located directly behind the projection 815 when the restriction wall 854L abuts on the left surface of the projection 815. Thus, the first lock switch 85 is placed in the second lock-on position.

[0138] When the user releases the depressing operation (ON operation) of the first lock switch 85, the biasing member 818 applies a biasing force to the first switch operation part 81 toward the first OFF position. At this time, however, the rear wall of the projection 815 abuts on the front wall of the lock-on locking part 855L and restricts movement of the first switch operation part 81 to the first OFF position. Thus, the first switch operation part 81 is kept in the first ON position. Therefore, the ON operation of the first switch operation part 81 (the lock-on state of the first switch 80) is maintained (in the lock-on state of the first switch 80) even if the user releases the depressing operation of the first lock switch 85. At this time, the biasing force of the biasing member 818 is applied to the lock-on locking part 855L (the first lock switch 85) via the projection 815, so that the first lock switch 85 is kept in the second lock-on position.

[0139] In the state as shown in FIG. 16 where the first lock switch 85 is placed in the second lock-on position and the ON operation of the first switch operation part 81 is maintained, the projection 815 turns clockwise when the user further depresses the first switch operation part 81. Thus, the projection 815 is disengaged from the lock-on locking part 855R. Therefore, the first lock switch 85 is returned to the lock-off position by the biasing force of the biasing member 858 (see FIG. 14). Further, the first switch operation part 81 is returned to the first OFF position by the biasing force of the biasing member 818.

[0140] As described above, when the first switch 80 is in the lock-on state (see FIGS. 15 and 16), the user can place the first switch 80 in the OFF state and also place the first switch 80 in the lock-off state simply by depressing the first switch operation part 81 once and then releasing the depressing operation.

[0141] <The Structure of the Second Switch>

[0142] The structure of the second switch 90 is now described. As shown in FIG. 12, the second switch 90 has a second switch operation part 91 and a second main switch 92.

[0143] The second main switch 92 is held behind the first switch 80 within the handle 14 of the body housing 11. The second main switch 92 has a body 921 that is electrically connected to the controller 5, and an actuator 922 that protrudes upward from an upper part of the body 921. The actuator 922 is pushed into the body 921 when pressed downward. The second main switch 92 is turned on (placed in the ON state) when the amount of pushing (pressing) the actuator 922 into the body 921 is a prescribed threshold or more, and turned off (placed in the OFF state) when the amount of pushing (pressing) the actuator 922 into the body 921 is less than the prescribed threshold. The body 921 outputs an ON signal to the controller 5 when the second main switch 92 is ON.

[0144] The second switch operation part 91 is arranged behind the first switch operation part 81 and the first lock switch 85. The second switch operation part 91 is arranged below an imaginary plane P2 (see FIG. 6) including the upper wall 121 of the first part 12 (the motor housing part). As shown in FIG. 12, the second switch operation part 91 is arranged in the handle 14 such that part of the second switch operation part 91 protrudes upward from the opening 149 formed in the rear upper part of the handle 14, and is movable substantially in the up-down direction. The second switch operation part 91 is configured to be manually operated by a user. The second switch operation part 91 can be moved to a second ON position and a second OFF position. In FIG. 17, the second switch operation part 91 placed in the second ON position is shown by solid lines, and the second switch operation part 91 placed in the second

OFF position is shown by broken lines. The second ON position is a position of the second switch operation part **91** where the second switch operation part **91** acts on the second main switch **92** to drive the motor **2**. The second OFF position is a position of the second switch operation part **91** to stop driving of the motor **2**. The second switch operation part **91** is normally in the second OFF position. Operations of moving the second switch operation part **91** to the second ON position and the second OFF position are also referred to as an ON operation and an OFF operation, respectively. In this embodiment, the ON operation of the second switch operation part **91** is pushing it, and the OFF operation of the second switch operation part **91** is releasing the pushing operation.

[0145] The structure of the second switch operation part **91** is now specifically described. The second switch operation part **91** has a base **911**, a pivot shaft (turning shaft) **916** extending in the left-right direction and having left and right ends supported by the handle **14**, and a biasing member **918**. The base **911** is arranged above and in front of the second main switch **92** and extends in the front-rear direction. The base **911** has a rear part projecting downward. An abutment part **912** is provided in a rear lower part of the base **911** and configured to abut on an upper end of the actuator **922**.

[0146] Part of the base **911** normally protrudes upward from the opening **149** formed in the rear upper part of the handle **14** (see FIG. **12**). This protruding part has a dorsal fin-like shape. A shaft hole **915** is formed in a front end part of the base **911** and extends in the left-right direction, and the pivot shaft **916** is inserted through the shaft hole **915**. The base **911** is turnable around the pivot shaft **916**. The base **911** is turned counterclockwise (downward) and pushed into the opening **149** by user's pushing operation.

[0147] The base **911** is formed in a block shape having a space inside. As shown in FIG. **12**, an opening **917** is formed in a left wall **911**L of the base **911**. The position and size of the opening **917** are set such that a locking part **954** of the second lock switch **95** can be inserted into the inside space of the base **911**, which will be described below in detail.

[0148] The biasing member **918** is configured to bias the second switch operation part **91** to the second OFF position. In this embodiment, a torsion spring is used as the biasing member **918**. A coil part of the torsion spring **918** is fitted on the pivot shaft **916**. A support wall **142** is formed to extend rearward and downward from the front of the base **911** within the handle **14**, and one arm **918***f* of the torsion spring **918** is fixed to the support wall **142**. The other arm (not shown) of the torsion spring **918** is fixed to the base **911** and biases the base **911** upward (in the clockwise direction).

[0149] The second switch operation part **91** is pushed into the opening **149** by user's pushing operation. At this time, the second switch operation part **91** is turned counterclockwise around the pivot shaft **916**. Thus, the abutment part **912** moves downward and pushes in the actuator **922**, so that the second main switch **92** (the second switch **90**) is placed in the ON state. This second ON position is also a position of the second switch operation part **91** where the amount of pushing (pressing) the actuator **922** is a prescribed threshold or more.

[0150] When the pushing operation of the second switch operation part **91** is released, the second switch operation part **91** is turned clockwise around the pivot shaft **916** and returned to an initial position, so that the abutment part **912** releases pushing of the actuator **922**. Thus, the second switch **90** is placed in the OFF state. The second OFF position is also a position of the second switch operation part **91** where the amount of pushing (pressing) the actuator **922** is less than the prescribed threshold.

[0151] <The Structure of the Second Lock Switch>

[0152] The second lock switch **95** is provided in a rear part of the handle **14** and configured to act on the second switch **90**. The second lock switch **95** is arranged behind the first lock switch **85** in the front-rear direction and below the first lock switch **85** in the up-down direction. As shown in FIG. **18**, part of the second lock switch **95** is exposed from an opening **147** formed in the left wall **14**L of the handle **14**. The second lock switch **95** is normally placed in the OFF position (non-lock-on position) (see FIG. **18**). The second lock switch **95** can be moved to a lock-on position for maintaining the ON operation of the second switch operation part **91** by user's manual operation (see FIG. **19**).

[0153] A recess **146** is formed in a position corresponding to a rear part of the second switch operation part **91**, in the left wall **14**L of the handle **14** and recessed rightward as shown in FIGS. **18** and **19**. The second lock switch **95** is arranged in the recess **146**. The recess **146** has a multi-stepped circular shape having an inner diameter decreasing step by step to the right. The opening **147** is arranged substantially in the central part of the recess **146**. The recess **146** has a first flange **146***a* and a second flange **146***b* that are orthogonal to the left-right direction. The second flange **146***b* is an annular wall formed around the opening **147**. The first flange **146***a* is an annular wall formed on the left side of the second flange **146***b* and around the second flange **146***b*.

[0154] The second lock switch **95** has a stepped pin **953**, an operation part **951** provided on a left end part of the stepped pin **953**, and a biasing member **958**.

[0155] The stepped pin **953** extends substantially in the left-right direction and is movable in the left-right direction. The stepped pin **953** is arranged in the handle **14** so as to be inserted into the opening **917** of the base **911** when the second switch operation part **91** is pushed. The stepped pin **953** is inserted through the opening **147** while a right end part of the stepped pin **953** is arranged within the handle **14** and a left end part of the stepped pin **953** is arranged within the recess **146** (on the left side of the opening **147**). The outer diameter of the right end part of the stepped pin **953** is larger than the diameter of the opening **147**, so that the stepped pin **953** is prevented from coming off from the handle **14**. Further, the right end part of the stepped pin **953** serves as a locking part **954** that is configured to be locked to the second switch operation part **91** to keep the second switch operation part **91** in the second ON position, which will be described below in detail.

[0156] The operation part **951** has a cap-like shape to be fitted onto the left end part of the stepped pin **953**. The operation part **951** can be moved in the left-right direction together with the stepped pin **953**. The outer diameter of the operation part **951** is larger than that of the second flange **146***b* and smaller than that of the first flange **146***a*, so that the first flange **146***a* restricts rightward movement of the operation part **951**. Unlike the first lock switch **85**, the operation part **951** of the second lock switch **95** does not protrude leftward from the left wall **14**L surrounding the recess **146** in the left-right direction.

[0157] The biasing member **958** is configured to bias the second lock first switch **95** to the non-lock-on position. In

this embodiment, a compression coil spring is used as the biasing member **958**. The biasing member **958** is fitted onto the stepped pin **953**. A left end of the biasing member **958** is supported by a flange part **952** of the operation part **951** and a right end of the biasing member **958** is supported by the second flange **146***b*.

[0158] <Method of Operating the Second Switch and the Second Lock Switch>

[0159] As shown in FIGS. **12** and **18**, part of the second switch operation part **91** (the base **911**) protrudes upward from the handle **14** through the opening **149** formed in the handle **14** (in the second OFF position). As described above, the second switch operation part **91** is pushed into the opening **149** and moved to the second ON position by user's pushing operation, so that the second main switch **92** (the second switch **90**) is placed in the ON state.

[0160] When the user pushes the operation part **951** of the second lock switch **95** into the handle **14** while pushing the second switch operation part **91**, the locking part **954** of the second lock switch **95** is inserted into the inside space of the base **911** from the opening **917** formed in the base **911** of the second switch operation part **91**. When the pushing operation of the second switch operation part **91** is released, the second switch operation part **91** is returned to the initial position (the second OFF position) by the biasing force of the torsion spring **918**. Before the second switch operation part **91** is disengaged (moved) from the second ON position, however, the locking part **954** of the stepped pin **953** is engaged with the left wall **911**L surrounding the opening **917** in the base **911** (see FIG. **19**). Thus, the second switch operation part **91** is kept in the second ON position (in the lock-on state). Further, the second lock switch **95** is biased to the non-lock-on position by the biasing member **958**, but kept in the lock-on position by engagement between the locking part **954** and the base **911**. In this manner, the ON state of the second switch **90** is maintained even if the user releases the fingers from the second switch operation part **91** and the second lock switch **95**.

[0161] In the above-described lock-on state, when the user pushes the second switch operation part **91**, the second switch operation part **91** is turned counterclockwise (downward), so that the locking part **954** of the stepped pin **953** is disengaged from the left wall **911**L of the base **911**. Thus, the second lock switch **95** is returned to the non-lock-off position by the biasing force of the biasing member **958** (see FIG. **18**). Further, the second switch operation part **91** is returned to the second OFF position by the biasing force of the biasing member **918**. Thus, in the lock-on state, the user can place the second switch **90** in the OFF state simply by pushing the second switch operation part **91** once and then releasing the pushing operation.

[0162] The above-described switching mechanism **8** can be operated in the first and second use modes as follows. In the first use mode, the user pushes the second switch operation part **91**, for example, with the left hand. Then, the user can release the lock-off state of the first switch **80** by pushing in the operation part **851**R of the first lock switch **85** with the right thumb while putting the right hand on the first switch operation part **81**. Further, the user can maintain the ON state of the first switch **80** (in the lock-on state) by depressing the first switch operation part **81** with the right hand and further pushing in the operation part **851**R of the first lock switch **85** with the right thumb. In order to place the first switch **80** in the lock-on state, the user may also push the second switch operation part **91** with the right hand and push in the operation part **851**L of the first lock switch **85** with the left thumb while putting the left hand on the first switch operation part **81**. In this state, when the user releases the hand from the belt sander **1**, the second switch operation part **91** is returned to the second OFF position and the second switch **90** is placed in the OFF state. Therefore, the user can stop the belt sander **1** simply by releasing the pushing operation of the second switch operation part **91**.

[0163] In the second use mode, the user places the second switch **90** in the lock-on state by pushing the second switch operation part **91** (into the second ON position) and pushing in the second lock switch **95**. Further, the user can place the first switch **80** in the lock-on state by operating the first switch operation part **81** and the first lock switch **85** in the same manner as in the first use mode. In this manner, the user can perform a working operation while releasing the hands from the belt sander **1** and holding a workpiece. As described above, the user can place the second switch **90** in the OFF state to stop the belt sander **1** simply by pushing the second switch operation part **91** once and then releasing the pushing operation.

[0164] As described above, in the belt sander **1** of this embodiment, the ON state of the first switch **80** can be maintained with the first lock switch **85** and the ON state of the second switch **90** can be maintained with the second lock switch **95**. Therefore, in the second use mode, the belt sander **1** of this embodiment can stably continue to drive the motor **2** even if placed on a slightly uneven surface.

[0165] Further, in the lock-off state, the operation parts **851**L, **851**R of the second lock switch **85** protrude from the left and right walls **14**L, **14**R of the handle **14**, respectively, and the operation part **951** of the second lock switch **95** is arranged in the recess **146** formed in the left wall **14**L of the handle **14**. This configuration facilitates continuous operations of the first and second lock switches **85**, **95** in the second use mode. Therefore, in the second use mode, the maneuverability in driving the belt sander **1** is improved.

[0166] Further, in the belt sander **1**, a part (the first part **12**) of the housing **10** in which the motor **2** is housed has the upper wall **121** that is substantially parallel to the sanding belt B, and the second switch operation part **91** is arranged below the imaginary plane P**2** including the upper wall **121**. Thus, in the second use mode, the attitude of the belt sander **1** is stabilized by the upper wall **121** being placed on a desk or a stand.

[0167] The first lock switch **85** is configured to have a function (lock-off function) of preventing the first switch **80** from being placed in the ON state, as well as a function (lock-on function) of maintaining the ON state of the first switch **80**. This can suppress complication of the switching mechanism and an increase in the size of the belt sander which may be caused by separately providing a switch having a lock-off function. Thus, according to this embodiment, the maneuverability in driving the belt sander **1** is improved, and the belt sander **1** can be more compact.

[0168] The second switch operation part **91** protrudes from the upper surface of the handle **14**, so that the user can push in the second switch operation part **91** from above to place the second switch **90** in the ON state. Thus, in the first use mode, the maneuverability in driving the belt sander **1** is also improved.

[0169] Further, the second switch operation part **91** is returned to the second OFF position when the user releases

the pushing operation of the second switch operation part **91**. Thus, in the first use mode, the belt sander **1** is prevented from moving by itself even if the user releases the hand from the belt sander **1**.

[0170] The second lock switch **95** is moved in the left-right direction crossing the moving direction (substantially the up-down direction) of the second switch operation part **91**. Therefore, the second lock switch **95** is avoided from being unintentionally operated by being carelessly touched with the user' s hand. In this embodiment, the second lock switch **95** is configured not to protrude outward from the handle **14** (to the left from the left wall **14**L). Thus, the second lock switch **95** is further avoided from being unintentionally operated.

[0171] (Other Embodiments of the Switching Mechanism>

[0172] The first and second switches **80**, **90** may have configurations other than those described above only if each configured as a momentary switch. For example, the first switch operation part **81** and the second switch operation part **91** may be each configured as a sliding operation part that is moved to the first or second ON position and the first or second OFF position by user's sliding operation. Likewise, the first lock switch **85** and the second lock switch **95** may have configurations other than those described above only if configured to maintain their respective ON operations of the first and second switches **80**, **90**.

[0173] In the above-described embodiment, a compression coil spring is used as the biasing members **818**, **858**, **958**, and a torsion spring is used as the biasing member **918**, but other biasing members (elastic bodies) may be used as the biasing members **818**, **858**, **918**, **958**.

[0174] In the above-described embodiment, the second lock switch **95** is provided on the left wall **14**L of the handle **14**, but it may be provided on the right wall **14**R of the handle **14** or on the left and right walls **14**L, **14**R.

[0175] <The Structure of the Battery Mounting Part>

[0176] The structure of the battery mounting part **4** is now described with reference to FIGS. **1** to **5** and **20**. The battery mounting part **4** is provided above the belt driving part **6** (on the second part **13** of the body housing **11**). The battery mounting part **4** is configured such that a rechargeable battery **300** having a well-known structure can be mounted and removed to and from the battery mounting part **4** by being slid in a sliding direction relative to the battery mounting part **4**.

[0177] One example of the battery that can be removably mounted to the battery mounting part **4** is first described. The battery **300** shown in FIG. **20** is an example of a battery pack to be mounted to the battery mounting part **4**. In FIG. **20**, the battery **300** has a case **310** for housing a plurality of battery cells, and a mounting part **320** configured to be removably mounted to the battery mounting part **4**. The mounting part **320** has a mounting face **321** that faces a mounting face **41** of the battery mounting part **4** when the battery **300** is mounted to the battery mounting part **4**. As for the directions of the battery **300** shown in FIG. **20**, the side of the case **310** on which the mounting face **32** is provided is defined as a lower side and the opposite side is defined as an upper side. A direction crossing the up-down direction and corresponding to the sliding direction of the battery **300** is defined as a front-rear direction, and in the front-rear direction, the side on which a locking member **305** (described below) is provided is defined as a front side and the opposite side is defined as a rear side. Further, a direction crossing the up-down direction and the front-rear direction is defined as a left-right direction.

[0178] The mounting part **320** has the mounting face **321**, a pair of rail receiving parts **322**, a pair of power terminals **324** and a signal terminal **326**. The mounting face **321** faces the mounting face **41** (described below in detail) of the battery mounting part **4** when the battery **300** is mounted to the battery mounting part **4** of the belt sander **1**. In this embodiment, the mounting face **321** is a lower surface of the case **310** and includes a lower surface of a part (a protruding part **311**) of a front lower part of the case **310** that protrudes downward. The mounting face **321** is substantially parallel to the front-rear direction and the left-right direction. The battery **300** has a rectangular box-like shape having a shorter length (width) in the up-down direction than the lengths (widths) in the front-rear direction and the left-right direction. The battery **300** (the case **310**) has a long side in the sliding direction. A surface (an upper surface **312**) of the battery **300** on the side opposite to the mounting face **321** has the largest area on the battery **300**. The rail receiving parts **322** are respectively provided on left and right surfaces of the protruding part **311** and extend in the long-side direction of the case **310** (the front-rear direction). The rail receiving parts **322** are configured to be engaged with a pair of guide rails **42** (see FIG. **5**) of the battery mounting part **4**.

[0179] The mounting part **320** further has a locking member **305** provided in a front lower part of the protruding part **311**. The locking member **305** is engaged with a lock receiving part of the battery mounting part **4** to lock the battery **300** to the battery mounting part **4**. When an unlock button (not shown) is pushed by a user, the locking member **305** is disengaged or unlocked from the lock receiving part.

[0180] As shown in FIGS. **2** and **5**, the battery mounting part **4** is provided on the second part **13** of the body housing **11**. The battery mounting part **4** is formed inside the upper wall **131** and the side walls **133** and configured such that the battery **300** can be mounted thereto from the front. As described above, a part of the body housing **11** that is located above the belt driving part **6** has a stepped shape in which the upper wall **131** of the second part **13** is located below the upper wall **121** of the first part **12**. It can also be said that the battery mounting part **4** is provided in front of the motor **2** and above the belt driving part **6** since the first part **12** houses the motor **2**. Further, it can also be said that the battery mounting part **4** overlaps with the belt driving part **6** when viewed from above and overlaps with the motor **2** when viewed from the front.

[0181] As shown in FIG. **6**, the battery mounting part **4** is configured such that the battery **300** mounted to the battery mounting part **4** (this state is hereinafter referred to as a battery mounted state) does not protrude upward from the upper wall **121** of the housing **10** in the up-down direction. Further, the battery mounting part **4** is configured such that the battery **300** does not protrude forward from a front end of the body housing **11** in the front-rear direction in the battery mounted state. In this embodiment, as shown in FIG. **6**, the surface (the upper surface **312**) of the battery **300** on the side opposite to the mounting face **321** is located substantially in the same position as the upper wall **121** of the first part **12** of the body housing **11** in the up-down direction. Further, a front surface **314** of the battery **300** is located substantially in the same position as the front end of the body housing **11** in the front-rear direction. Further, as

shown in FIG. **4**, the battery mounting part **4** is configured such that the battery **300** does not protrude leftward from a left end of the left body housing **11**L and rightward from a right end of the right body housing **11**R in the left-right direction. In other words, the battery mounting part **4** is configured such that the battery **300** is fitted within the width of the second part **13** of the boy housing **11** in the left-right direction in the battery mounted state. In this embodiment, a right surface **313** of the battery **300** is located substantially in the same position as the side walls **123**, **133** of the right body housing **11**R in the left-right direction.

[0182] The battery mounting part **4** has a mounting face **41**, a pair of guide rails **42**, a pair of power terminals **44** and a signal terminal **46**. In this embodiment, the battery **300** is slid in the front-rear direction relative to the battery mounting part **4**. Specifically, the battery **300** is mounted onto the battery mounting part **4** in a direction from the front to the rear, and the battery **300** is removed from the battery mounting part **4** in a direction from the rear to the front.

[0183] The mounting face **41** faces a surface (the mounting face **321**) of the battery **300** when the battery **300** is mounted to the battery mounting part **4**. The mounting face **41** is substantially parallel to the front-rear direction and the left-right direction. The guide rails **42** are respectively provided on the insides of the side walls **133** of the second part **13** and extend in the front-rear direction. The guide rails **42** are configured to be engaged with the rail receiving parts **322** of the battery **300**. The guide rails **42** guide the rail receiving parts **322** in the front-rear direction when the mounting part **320** of the battery **300** is mounted to the battery mounting part **4**. It can also be said that the mounting face **41** is substantially parallel to the sliding direction of the battery **300**.

[0184] The power terminals **44** are provided between the guide rails **42**. The power terminals **44** each have a plate-like shape protruding upward from the mounting face **41** and extending in the front-rear direction. The power terminals **44** are configured to receive power from the battery **300** mounted to the battery mounting part **4**. The signal terminal **46** is provided between the power terminals **44**, protrudes upward from the mounting face **41** and extends in the front-rear direction. The signal terminal **46** is configured to transmit and receive signals to and from the battery **300** mounted to the battery mounting part **4**.

[0185] When the mounting part **320** of the battery **300** is slid onto the battery mounting part **4** from the front, the rail receiving parts **322** of the battery **300** are engaged with the guide rails **42** of the battery mounting part **4** and the battery **300** is mounted to the battery mounting part **4**. At this time, the mounting face **41** of the battery mounting part **4** faces the mounting face **321** of the battery **300**. Further, the power terminals **44** of the battery mounting part **4** are electrically connected to the power terminals **324** of the battery **300**, respectively, and the signal terminal **46** of the battery mounting part **4** is electrically connected to the signal terminal **326** of the battery **300**.

[0186] The battery mounting part **4** further includes a lock receiving hole **47** that is engaged with the locking member **305** of the battery **300**. When the battery **300** is mounted to the battery mounting part **4**, the locking member **305** is engaged with the lock receiving hole **47**, and the battery **300** is locked to be immovable in the front-rear direction. When the unlock button of the battery **300** is pushed down in this locked state, the locking member **305** is disengaged or unlocked from the lock receiving hole **47**. In the disengaged state, the battery **300** is removed from the battery mounting part **4** when slid forward relative to the battery mounting part **4**.

[0187] The belt sander **1** of this embodiment further has a front handle **17**. The front handle **17** is connected to the housing **10** so as to be turnable relative to the housing **10**. As shown in FIG. **3**, a pivot axis A**4** of the front handle **17** extends in the left-right direction. The front handle **17** is also referred to as a "second handle".

[0188] The front handle **17** turns around the pivot axis A**4** extending in the left-right direction. The front handle **17** has an arm **171** having a proximal end part **172** and a distal end part **173** and extending in a direction crossing the pivot axis A**4**, and a grip part **175** configured to be held by a user.

[0189] As shown in FIGS. **4** and **5**, the proximal end part **172** of the arm **171** is removably mounted to a turning part **18** provided on a left wall (the fan housing **161**) of the housing **10**. The turning part **18** is configured to be engaged with the proximal end part **172** of the arm **171** so as to allow the arm **171** to turn within a prescribed range around the pivot axis A**4**. The grip part **175** extends rightward from the distal end part **173** of the arm **171**. The grip part **175** is parallel to the left-right direction. A distal end (right end) of the grip part **175** is located on the left side of a right end (the right walls **123**, **133**) of the housing **10**. The length of the grip part **175** in the left-right direction is set such that the grip part **175** is fitted within the width of the housing **10** in the left-right direction. The length of the arm **171** of the front handle **17** and the position of the proximal end part **172** of the arm **171** on the housing **10** are adjusted to prevent the grip part **175** from coming into contact with the housing **10** and the battery **300** mounted to the battery mounting part **4** when the front handle **17** is turned.

[0190] A plurality of radially extending cam faces are formed on the turning part **18** and a part (a right surface of the proximal end part **172** of the grip part **175**) of the front handle **17** that faces the turning part **18**. The front handle **17** is configured to be positioned at a plurality of turning positions by engagement between the cam faces of the front handle **17** and the cam faces of the turning part **18**. In this embodiment, the front handle **17** can be positioned at four turning positions (angular positions). As shown in FIG. **3**, by turning of the arm **171** around the pivot axis A**4**, the front handle **17** (the grip part **175**) is moved to positions R**1**, R**2**, R**3** and R**4** in order from the lower position to the upper position. The grip part **175** is fixedly positioned in the position R**1**, R**2**, R**3** or R**4** by engagement between the proximal end part **172** of the arm **171** and the turning part **18**.

[0191] In the position R**1**, the grip part **175** is located in front of the front end of the housing **10** (the second part **13**) and below the mounting face **41**. In the position R**2**, the grip part **175** is located in front of the front end of the housing **10** and directly in front of the battery **300** mounted to the battery mounting part **4**. In this embodiment, in the position R**2**, as shown in FIG. **6**, an upper end of the grip part **175** is located substantially in the same position in the up-down direction as an upper end part of the housing **10** (the upper wall **121** of the first part **12**) and the upper surface **312** of the battery **300** mounted to the battery mounting part **4**. In the position R**2**, the plane P**2** including the upper wall **121** passes the upper end of the grip part **175** and the upper surface **312** of the battery **300**. The position R**2** is also referred to as a "first turning position".

[0192] In the positions R**3** and R**4**, the grip part **175** is located behind the front end of the housing **10** and above the upper wall **121** of the housing **10** in the up-down direction. The position R**3** is a position suitable for a user to perform a working operation in the first use mode while holding the handle **14** with one hand and holding the front handle **17** with the other hand. The position R**4** is a position suitable for a user to carry the belt sander **1** (while holding the handle **14** with one hand and holding the front handle **17** with the other hand). In the position R**1**, the grip part **175** is located below the mounting face **41**, and in the positions R**3** and R**4**, the grip part **175** is located above the upper end part of the housing **10** (the upper wall **121** of the first part **12**), that is, above the battery **300** mounted to the battery mounting part **4**. Thus, the user can turn the front handle **17** to move the grip part **175** to the position R**1**, R**3** or R**4** and mount and remove the battery **300** to and from the battery mounting part **4**. The positions R**1**, R**3** and R**4** are also each referred to as a "second turning position".

[0193] Effects of the belt sander **1** having the battery mounting part **4** of this embodiment are now described. The battery mounting part **4** of this embodiment is arranged in a position to overlap with the belt driving part **6** (the sanding belt B, the sanding surface B**1**) when viewed from above and to overlap with the motor **2** when viewed from the front. Therefore, the weights of the motor **2** and the battery **300** mounted to the battery mounting part **4** are applied to the sanding surface B**1** during driving of the belt sander **1**. Thus, the working operation can be performed by utilizing the masses of the motor **2** and the battery **300**, so that the operational efficiency of the belt sander **1** is improved.

[0194] Further, the battery mounting part **4** is configured such that the upper surface **312** of the battery **300** is located substantially in the same position as the upper wall **121** of the first part **12** of the body housing **11** in the up-down direction in the battery mounted state. Further, the right surface **313** of the battery **300** is located substantially in the same position as the side walls **123**, **133** of the right body housing **11**R in the left-right direction. Furthermore, the front surface **314** of the battery **300** is located substantially in the same position as the front end of the body housing **11** in the front-rear direction. With this configuration, the belt sander **1** can be more compact in the up-down direction, the left-right direction and the front-rear direction in the battery mounted state, and the possibility that the working range of the belt sander **1** is restricted by contact of the battery **300** with a structure such as a wall located in front or on the right or left of the belt sander **1** is reduced.

[0195] Further, when the user uses the belt sander **1** in the mode (the second use mode) in which the belt sander **1** is set upside down with the sanding surface B**1** facing vertically upward and a user performs a working operation by pressing a workpiece onto the sanding belt B while holding the workpiece, the upper wall **121** of the housing **10** and the upper surface **312** of the battery **300** are placed in contact with a desk or the like since the upper surface **312** of the battery **300** is located substantially in the same position as the upper wall **121** of the housing **10** in the up-down direction in the battery mounted state. Therefore, the attitude of the belt sander **1** in the second use mode is stabilized. Further, the upper surface **312** of the battery **300** has the largest area on the battery **300**, so that the contact area with the desk or the like is relatively large. Thus, the attitude of the belt sander **1** in the second use mode is more stabilized.

[0196] The battery **300** is mounted to the battery mounting part **4** of the belt sander **1** along the extending direction of the handle **14** in a direction from the front to the rear. Therefore, for example, when mounting the battery **300** to the battery mounting part **4**, the user can easily apply a force in a direction (from the rear to the front) opposite to the mounting direction of the battery **300** with the hand holding the handle **14**. Thus, the belt sander **1** of this embodiment provides the advantage that the battery **300** can be easily mounted to the battery mounting part **4**.

[0197] Further, the belt sander **1** has the front handle **17** that is turnable relative to the housing **10**. By turning the front handle **17**, the grip part **175** is moved to the position R**1** (the second turning position) in which the grip part **175** is located below the battery **300** mounted to the battery mounting part **4** in the up-down direction, the position R**2** (the first turning position) in which the upper end of the grip part **175** is located substantially in the same position as the upper wall **121** of the housing **10**, and the positions R**3** and R**4** (the second turning position) in which the grip part **175** is located above the battery **300** mounted to the battery mounting part **4**. Therefore, when the front handle **17** is turned such that the grip part **175** is moved to the position R**2** and the belt sander **1** is used in the second use mode, the upper wall **21** of the housing **10**, the grip part **175** and the upper surface **312** of the battery **300** mounted to the battery mounting part **4** are placed in contact with a desk or the like on which the belt sander **1** is placed. Thus, the attitude of the belt sander **1** in the second use mode is further stabilized. Further, the battery **300** can be mounted to and removed from the battery mounting part **4** by turning the front handle **17** to move the grip part **175** to the position R**1**, R**3** or R**4**.

[0198] Further, in view of the nature of the present disclosure and the above-described embodiment, the following aspects can be provided. At least one of the following aspects can be adopted in combination with at least one of the above-described embodiment, its modifications and the claimed invention.

[0199] (Aspect 1-1) A belt sander, comprising:

[0200] an electric motor;

[0201] a housing that includes a motor housing part for housing the motor;

[0202] a belt driving part that includes a drive roller configured to be rotated by the motor, and a driven roller, and is configured to drive an endless sanding belt looped over the drive roller and the driven roller, wherein:

[0203] where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, the belt driving part is arranged below the motor, and a polishing surface is defined by a lower surface of the sanding belt;

[0204] a first handle that is provided on one side or rear side of the motor in the front-rear direction to extend in the front-rear direction and configured to be held by a user; and

[0205] a battery mounting part configured such that a battery as a power source of the motor can be mounted thereto and removed therefrom by being slid in a sliding direction,

[0206] wherein:

[0207] the battery mounting part is arranged in a position to overlap with the polishing surface when viewed from above and to overlap with the motor when viewed from the front, and

[0208] the sliding direction is a horizontal direction including the front-rear direction and the left-right direction.

[0209] (Aspect 1-2) The motor housing part has an upper wall substantially parallel to the polishing surface, and

[0210] the battery mounting part is provided below the upper wall in the up-down direction.

[0211] (Aspect 1-3) The battery mounting part is configured such that the battery mounted to the battery mounting part does not protrude upward from the upper wall in the up-down direction.

[0212] (Aspect 1-4) The battery mounting part is configured such that the battery mounted to the battery mounting part protrudes upward from the upper wall by a prescribed protruding length in the up-down direction, and

[0213] the protruding length is 10% or less of a length of the battery in the up-down direction.

[0214] (Aspect 1-5) The battery mounting part is configured such that the battery mounted to the battery mounting part does not protrude from a front end of the housing in the front-rear direction.

[0215] (Aspect 1-6) The battery mounting part is configured such that the battery mounted to the battery mounting part protrude forward from a front end of the housing by a prescribed protruding length in the front-rear direction, and

[0216] the protruding length is 10% or less of a length of the battery in the front-rear direction.

[0217] (Aspect 1-7) The battery mounting part is configured such that the battery mounted to the battery mounting part does not protrude from left and right ends of the housing in the left-right direction.

[0218] (Aspect 1-8) The battery mounting part is configured such that the battery mounted to the battery mounting part protrudes leftward or rightward from the left or right end of the housing by a prescribed protruding length in the left-right direction, and

[0219] the protruding length is 10% or less of a length of the battery in the left-right direction.

[0220] (Aspect 1-9) The sliding direction is the front-rear direction, and

[0221] the battery mounting part is configured such that the battery can be mounted to the battery mounting part by being slid in a direction from the front to the rear relative to the battery mounting part.

[0222] (Aspect 1-10) The battery mounting part is configured such that the battery can be mounted thereto and removed therefrom by being slid in the left-right direction.

[0223] (Aspect 1-11) The belt sander includes a second handle, the second handle having an arm having a pivot axis extending in the left-right direction and connected to the housing, and a grip part connected to the arm and configured to be held by a user, the second handle being turnable relative to the housing, and

[0224] according to a turning operation of the second handle, the grip part moves to:

[0225] a first turning position in which an upper end of the grip part is located substantially in the same position as an upper wall of the motor housing part in the up-down direction, and

[0226] a second turning position in which the grip part is located below or above the battery mounted to the battery mounting part, in the up-down direction.

[0227] (Aspect 1-12) A belt sander, comprising:

[0228] an electric motor;

[0229] a housing that includes a motor housing part for housing the motor;

[0230] a belt driving part that includes a drive roller configured to be rotated by the motor, and a driven roller, and is configured to drive an endless sanding belt looped over the drive roller and the driven roller, wherein:

[0231] where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, the belt driving part is arranged below the motor, and a polishing surface is defined by a lower surface of the sanding belt;

[0232] a first handle that is provided on one side or rear side of the motor in the front-rear direction to extend in the front-rear direction and configured to be held by a user;

[0233] a second handle that has an arm having a pivot axis extending in the left-right direction and connected to the housing, and a grip part connected to the arm and configured to be held by a user, the second handle being turnable relative to the housing; and

[0234] a battery mounting part configured such that a battery as a power source of the motor can be mounted thereto and removed therefrom by being slid in a sliding direction,

[0235] wherein:

[0236] the battery mounting part is arranged in a position to overlap with the polishing surface when viewed from above and to overlap with the motor when viewed from the front,

[0237] the battery mounting part is configured such that the battery mounted to the battery mounting part does not protrude from an upper wall of the motor housing part in the up-down direction,

[0238] according to turning (turning operation) of the second handle, the grip part moves to:

[0239] a first turning position in which an upper end of the grip part is located substantially in the same position as the upper wall in the up-down direction, and

[0240] a second turning position in which the grip part is located below or above the battery mounted to the battery mounting part, in the up-down direction.

[0241] (Aspect 1-13) The battery mounting part is configured such that an upper surface of the battery mounted to the battery mounting part is located substantially in the same position as the upper wall in the up-down direction.

[0242] (Aspect 1-14) A belt sander, comprising:

[0243] an electric motor;

[0244] a housing that includes a motor housing part for housing the motor;

[0245] a belt driving part that includes a drive roller configured to be rotated by the motor, and a driven roller, and is configured to drive an endless sanding belt looped over the drive roller and the driven roller, wherein:

[0246] where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, the belt driving part is arranged below the motor, and a polishing surface is defined by a lower surface of the sanding belt;

[0247] a first handle that is provided on one side or rear side of the motor in the front-rear direction to extend in the front-rear direction and configured to be held by a user; and

[0248] a battery mounting part configured such that a battery as a power source of the motor can be mounted thereto and removed therefrom by being slid in a sliding direction,

[0249] wherein:

[0250] the battery mounting part is arranged on an upper wall of the motor housing part to overlap with the motor and the polishing surface when viewed from above, and

[0251] the battery mounting part is configured such that the battery can be mounted thereto by being slid in a direction from the rear to the front relative to the battery mounting part.

[0252] (Aspect 1-15) The belt sander to which the battery is removably mounted.

[0253] (Aspect 2-1) A belt sander, comprising:

[0254] an electric motor;

[0255] a housing that houses the motor;

[0256] a belt driving part that includes a drive roller configured to be rotated by the motor, and a driven roller, and is configured to drive an endless sanding belt looped over the drive roller and the driven roller, wherein:

[0257] where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, the belt driving part is arranged below the motor, and a polishing surface is defined by a lower surface of the sanding belt;

[0258] a first switch that is arranged in the housing and has a first switch operation part, the first switch operation part being configured to be manually operated by a user to be moved to a first ON position to place the first switch in an ON state and a first OFF position to place the first switch in an OFF state; and

[0259] a second switch that is arranged in the housing and has a second switch operation part, the second switch operation part being configured to be manually operated by a user to be moved to a second ON position to place the second switch in an ON state and a second OFF position to place the second switch in an OFF state;

[0260] wherein:

[0261] the first and second switches are each a momentary switch,

[0262] the motor is configured to be driven when the first and second switches are in the ON state, and to be stopped when at least one of the first and second switches is in the OFF state,

[0263] the belt sander further comprising:

[0264] a first lock switch that is arranged in the housing and configured to keep the first switch operation part in the first ON position; and

[0265] a second lock switch that is arranged in the housing and configured to keep the second switch operation part in the second ON position.

[0266] (Aspect 2-2) The housing includes a motor housing part for housing the motor, and a grip part that is connected to the motor housing part and extends rearward from the motor housing part,

[0267] the second switch operation part is provided in the grip part and shaped to protrude upward from the grip part in the second OFF position, and

[0268] the second switch operation part is configured to be moved from the second OFF position to the second ON position when pushed relative to the grip part.

[0269] (Aspect 2-3) The second lock switch is provided in the housing so as to be movable in a direction crossing a moving direction of the second switch operation part.

[0270] (Aspect 2-4) The first and second lock switches are provided on the same side of the housing.

[0271] (Aspect 2-5) The second lock switch is provided below the first lock switch.

[0272] (Aspect 2-6) The first lock switch is configured to be moved to:

[0273] a lock-off position to be engaged with the first switch operation part placed in the first OFF position to restrict movement of the first switch operation part to the first ON position, and

[0274] a lock-on position to be engaged with the first switch operation part placed in the first ON position to restrict movement of the first switch operation part to the first OFF position.

[0275] (Aspect 2-7) The first switch has a first biasing member that biases the first switch operation part placed in the first ON position to be returned to the first OFF position, and

[0276] the second switch has a second biasing member that biases the second switch operation part placed in the second ON position to be returned to the second OFF position.

[0277] (Aspect 2-8) The grip part extends rearward and downward from the motor housing part,

[0278] the first switch operation part is provided in the grip part between the second switch and the motor housing part and shaped to protrude downward from the grip part in the first OFF position, and

[0279] the first switch operation part is configured to be moved from the first OFF position to the first ON position when depressed relative to the grip part.

[0280] (Aspect 2-9) An upper wall of the motor housing part is substantially parallel to the polishing surface, and

[0281] the second switch operation part is provided below an imaginary plane including the upper wall.

DESCRIPTION OF THE REFERENCE NUMERALS

[0282] **1**: belt sander, **10**: housing, **11**: body housing, **11**L: left body housing, **11**R: right body housing, **12**: first part, **121**: upper wall, **122**: front wall, **123**: side wall, **124**: rear wall, **13**: second part, **131**: upper wall, **133**: side wall, **14**: handle, **14**L: left wall, **14**R: right wall, **142**: support wall, **144**: opening, **145**L: opening, **145**R: opening, **146**: recess, **146***a*: first flange, **146***b*: second flange, **147**: opening, **149**: opening, **149**L: projection, **149**R: projection, **15**: controller housing part, **16**: side housing, **161**: fan housing, **162**: gear cover, **163**: belt cover, **165**: air outlet, **140**: discharge nozzle, **150**: suction nozzle, **17**: front handle, **171**: arm, **172**: proximal end part, **173**: distal end part, **175**: grip part, A**4**: pivot axis, **18**: turning part, **19**: dust collection port, **2**: motor, **21**: motor body, **22**: shaft, A**3**: rotational axis, **3**: fan, **31**: guide plate, **32**: baffle plate, **4**: battery mounting part, **41**: mounting face, **42**: guide rail, **44**: power terminal, **46**: signal terminal, **47**: lock receiving hole, **5**: controller, **6**: belt driving part, **61**: drive roller, **62**: driven roller, A**1**, A**2**: rotational axis, **64**: support frame, **8**: switching mechanism, **80**: first switch, **81**: first switch operation part, **811**: base, **812**: abutment part, **814**: boss, **815**: projection, **818**: biasing member, **82**: first main switch, **821**: body, **822**: plunger, **85**: first lock switch, **851**: operation stem, **851**L, **851**R: operation part, **853**: lock-off locking part, **854**: recess, **854**L, **854**R: restriction wall, **855**L, **855**R: lock-on locking part, **858**: biasing member, **859**: holding part, **90**: second switch, **91**: second switch operation part, **911**: base, **911**L: left wall, **912**: abutment part , **915**: shaft hole, **916**: pivot shaft, **917**: opening, **918**: torsion spring, **918***f* arm, **92**: second main switch, **921**: body, **922**: actuator, **95**: second lock switch, **951**: operation part, **952**: flange part, **953**: stepped pin, **954**: locking part, **958**: biasing member, **35**: power transmitting part, **39**: dial, **101**: partition, **102**: wall part, **191**: first passage, **192**: second passage, **200**: dust box, **210**: first nozzle, **212**: O-ring, **220**: second nozzle, **222**: O-ring, **230**: container part, **231**: upper surface, **232**: rear wall, **233**: side surface, **234**: lower surface, **235**: window part, **240**: nozzle connection part , **240**L: left nozzle part, **240**R: right nozzle part, **241**: partition, **242**: groove, **243**: rear end part, **244**: O-ring, **245**: engagement part, **246**: nut, **247**: plate, **250**: body part, **253**: front end part, **258**: tubular part, **260**: filter, **261**: opening, **262**: frame, **265**: earth member, **270**: attaching/detaching part, **271**: mounting screw, **272**: knob, **273**: shaft, **274**: front end part, **281**: first space, **282**: second space, **300**: battery, **305**: locking member, **310**: case, **311**: protruding part, **312**: upper surface, **313**: side surface, **314**: front surface, **320**: mounting part, **321**: mounting face, **322**: rail receiving part, **324**: power terminal, **326**: signal terminal, B: sanding belt, B**1**: sanding surface, F**1**, F**2**: air flow, P**1**, P**2**: imaginary plane, R**1**, R**2**, R**3**, R**4**: turning position

1. A dust box, which is configured to be removably mounted to a belt sander, the belt sander having a belt driving part configured to rotate an endless sanding belt, and a housing that has a discharge nozzle and a suction nozzle and houses an electric motor for driving the belt driving part and a dust collecting fan, the dust box comprising:

a first nozzle configured to be connected to the discharge nozzle;

a second nozzle configured to be connected to the suction nozzle;

a container part formed of synthetic resin and connected to the first and second nozzles; and

a filter that is configured to separate dust from air and arranged within the container part to partition an inside space of the container part into a first space that communicates with the first nozzle and a second space that communicates with the second nozzle.

2. The dust box as defined in claim **1**, wherein the filter is arranged closer to the second nozzle than to the first nozzle within the container part.

3. The dust box as defined in claim **1**, wherein:

the belt driving part includes a drive roller that is rotated by the motor, and a driven roller, and where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, a polishing surface is defined by a lower surface of the sanding belt, and

the dust box is configured such that, when the dust box is mounted to the belt sander, the first nozzle is located below the second nozzle, and the first space is a lower space within the container part.

4. The dust box as defined in claim **1**, wherein the first and second nozzles are open in the same direction.

5. The dust box as defined in claim **1**, wherein the filter is a bag-like air filter having an open end.

6. The dust box as defined in claim **1**, wherein:

the container part has a nozzle connection part that is connected to the first and second nozzles, and a body part that is removably fitted to the nozzle connection part, and

the filter is provided on the nozzle connection part.

7. The dust box as defined in claim **6**, further comprising an attaching/detaching part configured to attach and detach the body part to and from the nozzle connection part.

8. The dust box as defined in claim **1**, wherein at least part of the dust box is formed of conductive synthetic resin.

9. The dust box as defined in claim **8**, wherein:

where an up-down direction is defined with the side of the belt sander on which the belt driving part is arranged being defined as a lower side and the opposite side defined as an upper side,

at least part of the container part that is located below a central position of the container part in the up-down direction when the dust box is mounted to the belt sander is formed of the conductive synthetic resin.

10. The dust box as defined in claim **8**, further comprising an earth member having one end part connected to the part formed of the conductive synthetic resin, and the other end part exposed outside the dust box.

11. The dust box as defined in claim **2**, wherein:

the belt driving part includes a drive roller that is rotated by the motor, and a driven roller, and where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, a polishing surface is defined by a lower surface of the sanding belt, and

the dust box is configured such that, when the dust box is mounted to the belt sander, the first nozzle is located below the second nozzle, and the first space is a lower space within the container part.

12. The dust box as defined in claim **11**, wherein the first and second nozzles are open in the same direction.

13. A belt sander, having the dust box as defined in claim **1** and removably mounted thereto.

14. The belt sander as defined in claim **13**, comprising:

an electric motor;

a dust collecting fan;

a housing that houses the motor and the dust collecting fan; and

a belt driving part that includes a drive roller configured to be rotated by the motor, and a driven roller, and is configured to drive an endless sanding belt looped over the drive roller and the driven roller,

wherein:

where a direction in which a rotational axis of the drive roller and a rotational axis of the driven roller extend is defined as a left-right direction, a direction in which the drive roller and the driven roller are arranged in parallel is defined as a front-rear direction, and a direction orthogonal to the left-right direction and the front-rear direction is defined as an up-down direction, the belt driving part is arranged below the housing,

the housing includes:

a discharge nozzle configured to discharge dust generated by the working operation from the housing and a suction nozzle configured to suck air from the dust box into the housing;

a dust collection port provided behind the belt driving part;

an air outlet that communicates with a space where the dust collecting fan is housed;

a first passage that connects the dust collection port and the discharge nozzle, and

a second passage that connects the suction nozzle and the air outlet, wherein:

the first passage is separated from spaces where the motor and the dust collecting fan are housed within the housing, and the second passage, and

the second passage communicates with the space where the dust collecting fan is housed, and

the dust collecting fan is configured to rotate to generate an air flow from the dust collection port toward the discharge nozzle through the first passage, and an air flow from the suction nozzle toward the air outlet through the second passage.

15. The belt sander as defined in claim **14**, wherein:

the suction nozzle and the discharge nozzle are open to the rear, and

the discharge nozzle is arranged below the suction nozzle.

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