US012383108B2

(12) **United States Patent**
Kim et al.

(10) **Patent No.: US 12,383,108 B2**
(45) **Date of Patent: Aug. 12, 2025**

(54) **VACUUM CLEANER STATION, VACUUM CLEANER SYSTEM, AND METHOD FOR CONTROLLING VACUUM CLEANER STATION**

(71) Applicant: **LG Electronics Inc.**, Seoul (KR)

(72) Inventors: **Sungjun Kim**, Seoul (KR); **Jinhyouk Shin**, Seoul (KR); **Ingyu Yang**, Seoul (KR); **Youngsoo Kim**, Seoul (KR); **Jungwan Ryu**, Seoul (KR); **Jeahyuk Wie**, Seoul (KR); **Dongjae Lee**, Seoul (KR)

(73) Assignee: **LG Electronics Inc.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 203 days.

(21) Appl. No.: **17/984,150**

(22) Filed: **Nov. 9, 2022**

(65) **Prior Publication Data**

US 2023/0218133 A1 Jul. 13, 2023

Related U.S. Application Data

(63) Continuation of application No. 17/799,504, filed as application No. PCT/KR2021/002565 on Mar. 2, 2021.

(30) **Foreign Application Priority Data**

Mar. 3, 2020 (KR) 10-2020-0026803
Jun. 22, 2020 (KR) 10-2020-0075901
(Continued)

(51) **Int. Cl.**
A47L 9/28 (2006.01)
A47L 5/24 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A47L 9/2873*** (2013.01); ***A47L 5/24*** (2013.01); ***A47L 7/0095*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC A47L 9/2873; A47L 9/0063; A47L 9/1683; A47L 9/22; A47L 9/2842; A47L 9/2884
See application file for complete search history.

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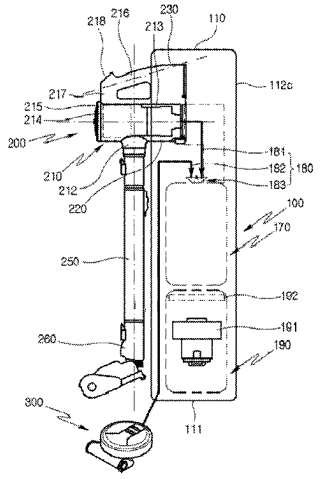
Primary Examiner — Marc Carlson
(74) *Attorney, Agent, or Firm* — Fish & Richardson P.C.

(57) **ABSTRACT**

The present disclosure relates to a cleaner system including: a cleaner; a cleaner station; and an imaginary plane including an imaginary suction flow path through line penetrating a suction flow path in a longitudinal direction and an imaginary suction motor axis defined by extending a rotation axis of a suction motor, in which when the cleaner is coupled to the cleaner station, the plane penetrates at least a part of the cleaner station, such that a center of gravity of the cleaner is disposed to pass through a space for maintaining balance of the station, and as a result, it is possible to stably
(Continued)



support the cleaner and the station while preventing the cleaner and the station from falling down.

20 Claims, 60 Drawing Sheets

(30) **Foreign Application Priority Data**

Jul. 9, 2020 (KR) 10-2020-0084782
Nov. 4, 2020 (KR) 10-2020-0145692

(51) **Int. Cl.**

A47L 7/00	(2006.01)
A47L 9/00	(2006.01)
A47L 9/10	(2006.01)
A47L 9/16	(2006.01)
A47L 9/22	(2006.01)
A47L 9/32	(2006.01)

(52) **U.S. Cl.**

CPC ***A47L 9/0063*** (2013.01); ***A47L 9/106*** (2013.01); ***A47L 9/1683*** (2013.01); ***A47L 9/22*** (2013.01); ***A47L 9/2815*** (2013.01); ***A47L 9/2842*** (2013.01); ***A47L 9/2884*** (2013.01); ***A47L 9/322*** (2013.01); *A47L 2201/022* (2013.01); *A47L 2201/024* (2013.01)

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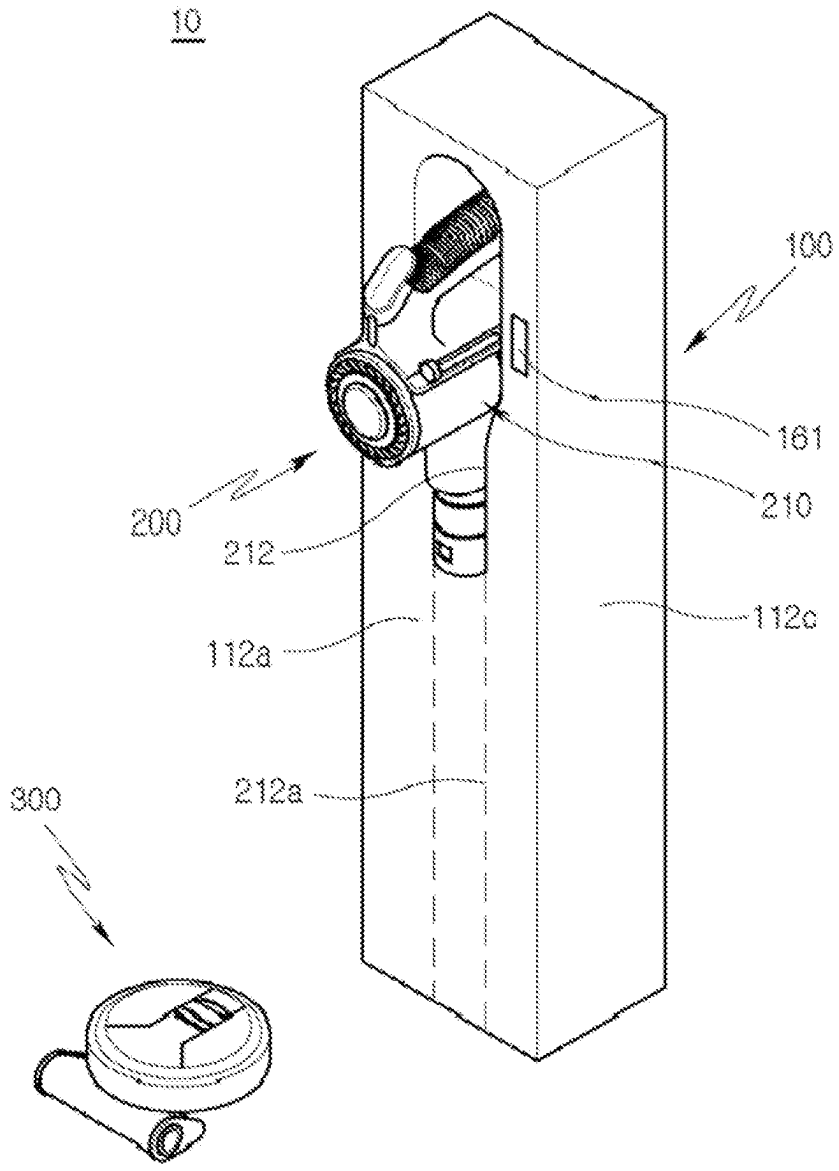
FIG. 1



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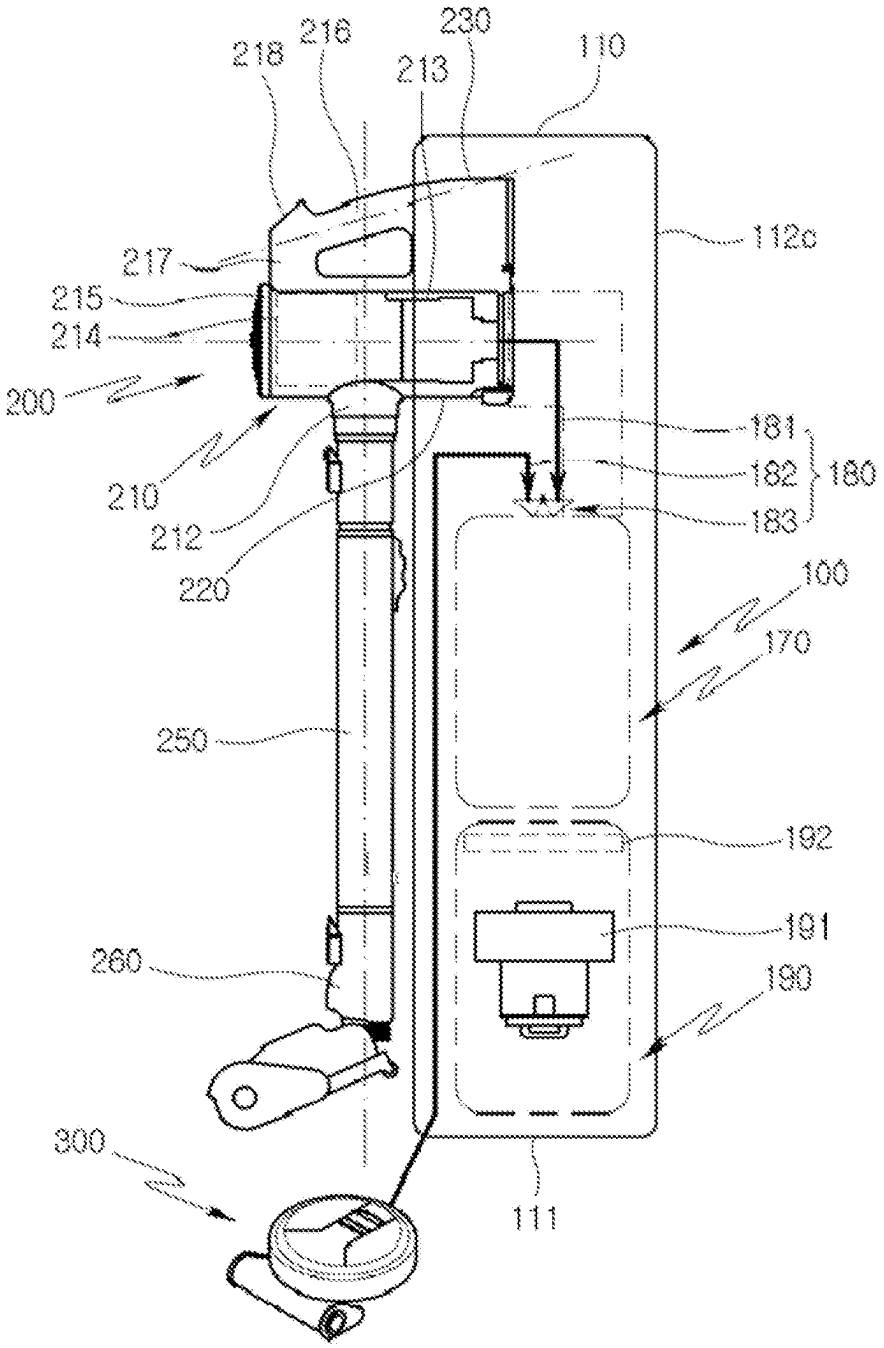
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300
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FIG. 3

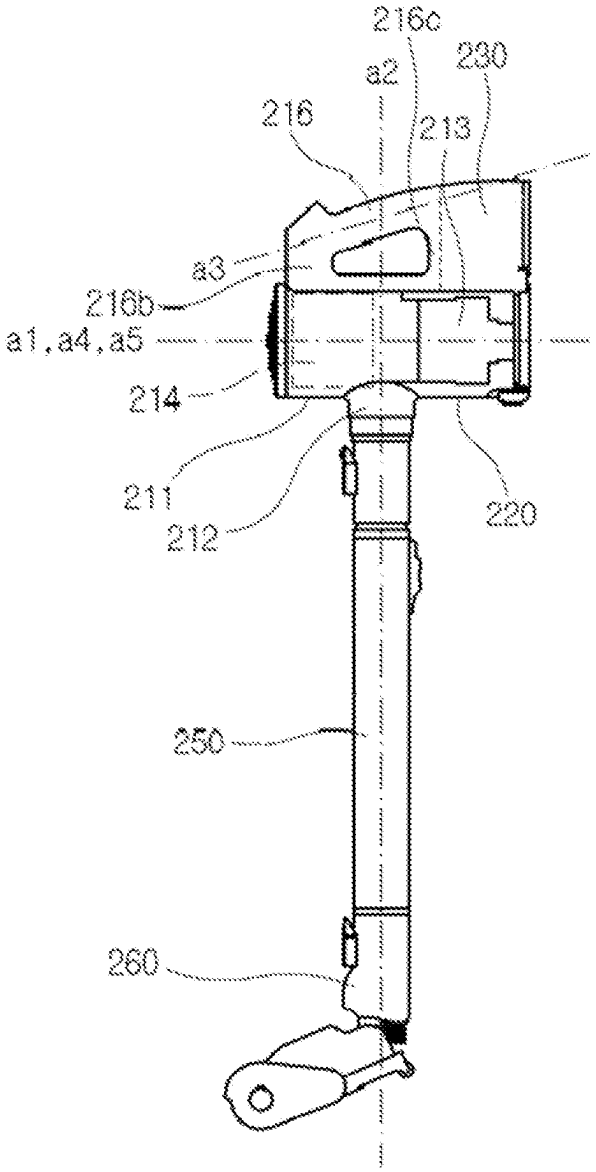


FIG. 4

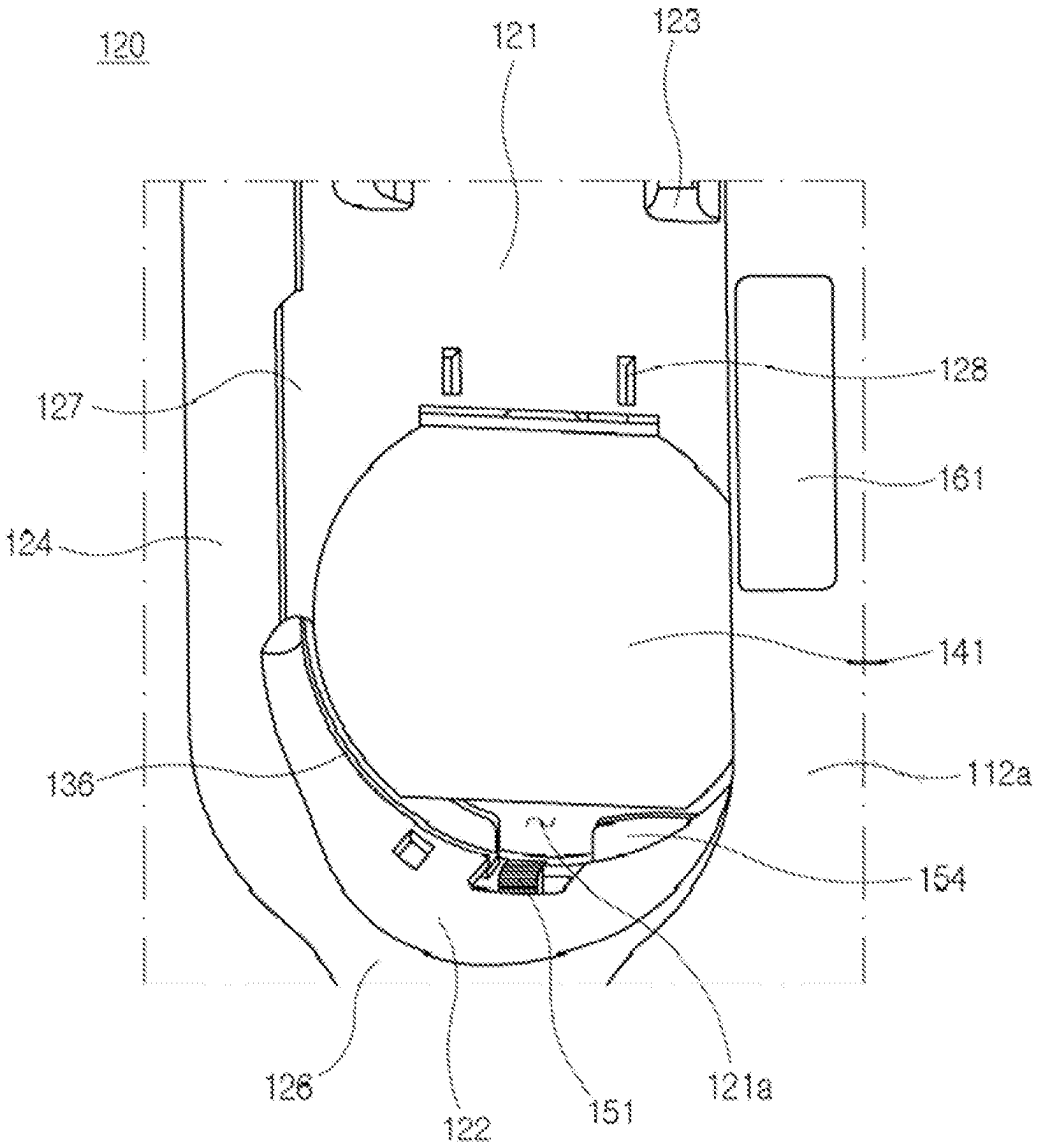


FIG. 5

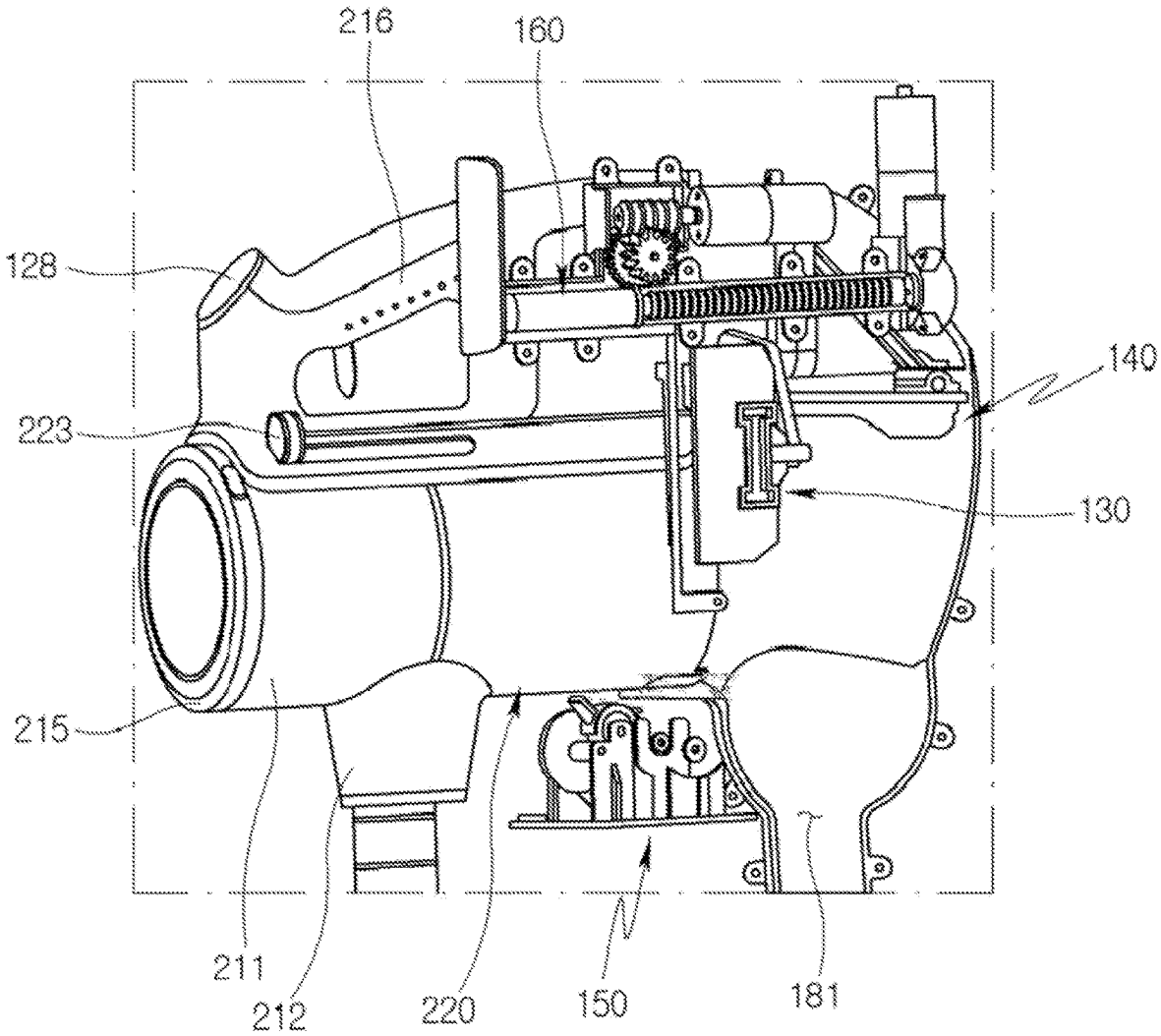
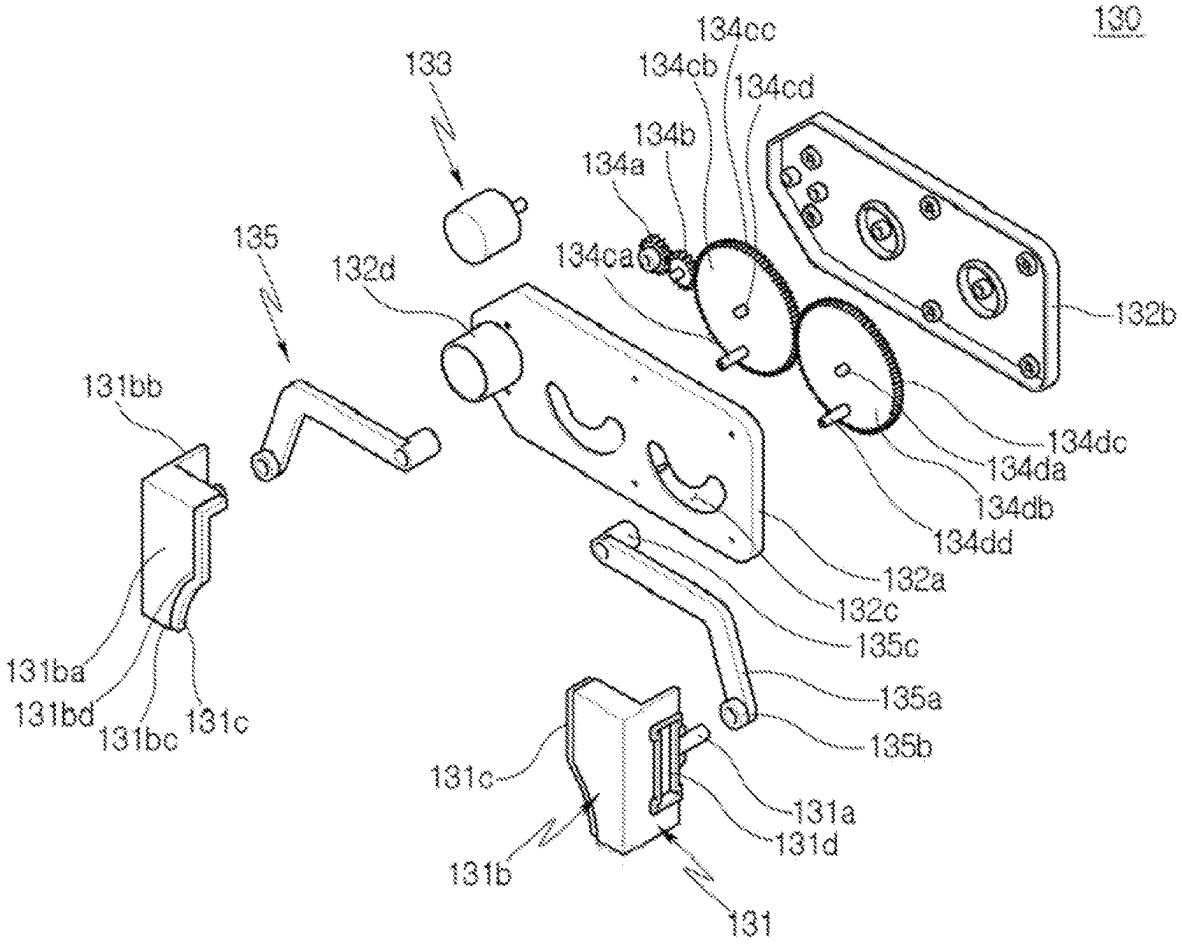


FIG. 6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134b
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132d
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132b
131bb
134dc
134da
134db
134dd
132a
132c
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135a
135b
131ba
131bd
131bc
131c
131c
131a
131d
131b
131

FIG. 7

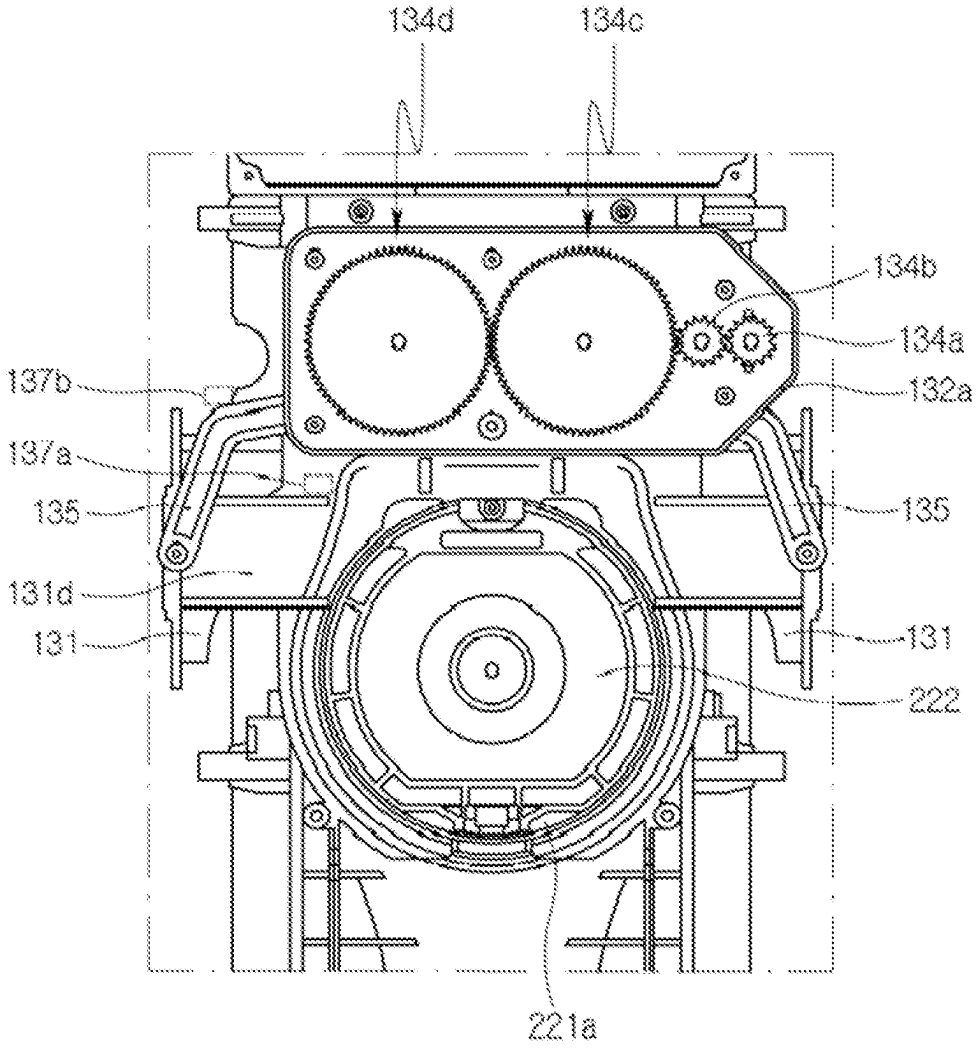
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FIG. 8A

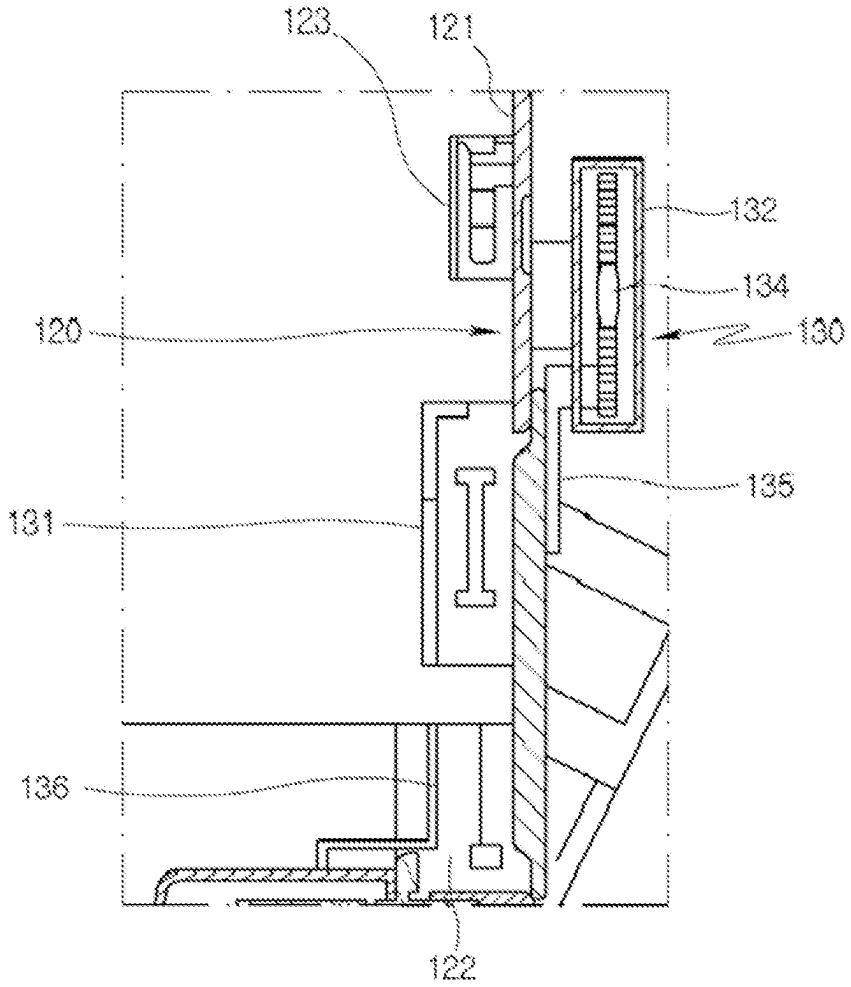


FIG. 8B

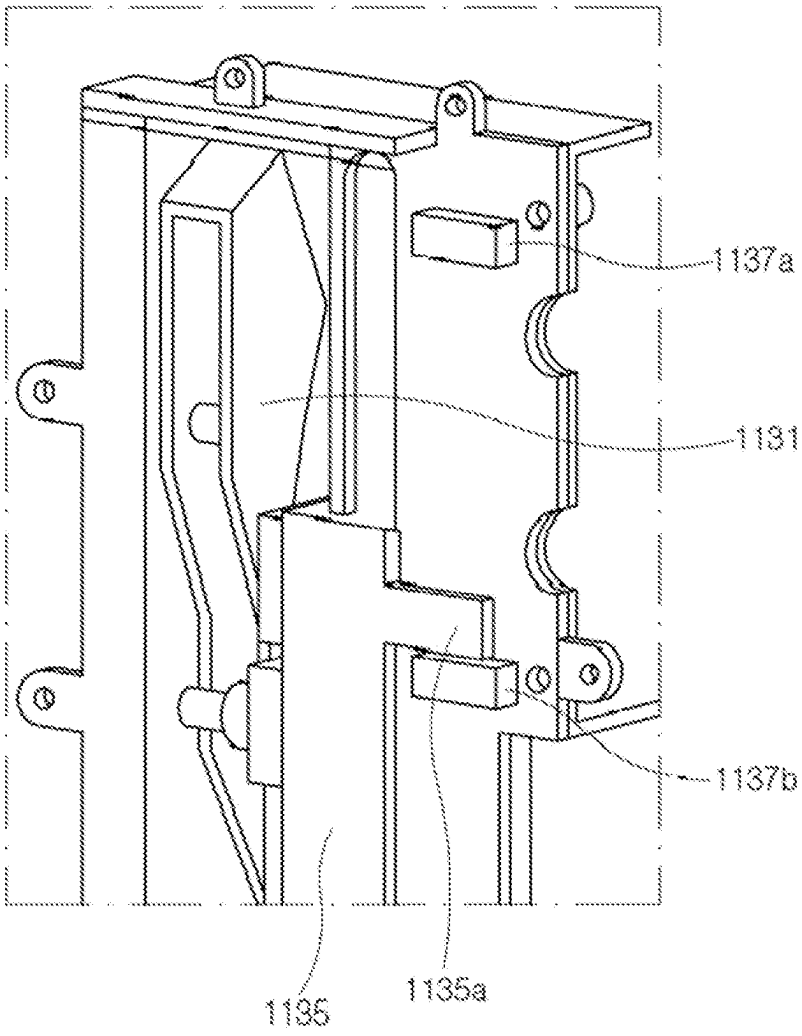


FIG. 9

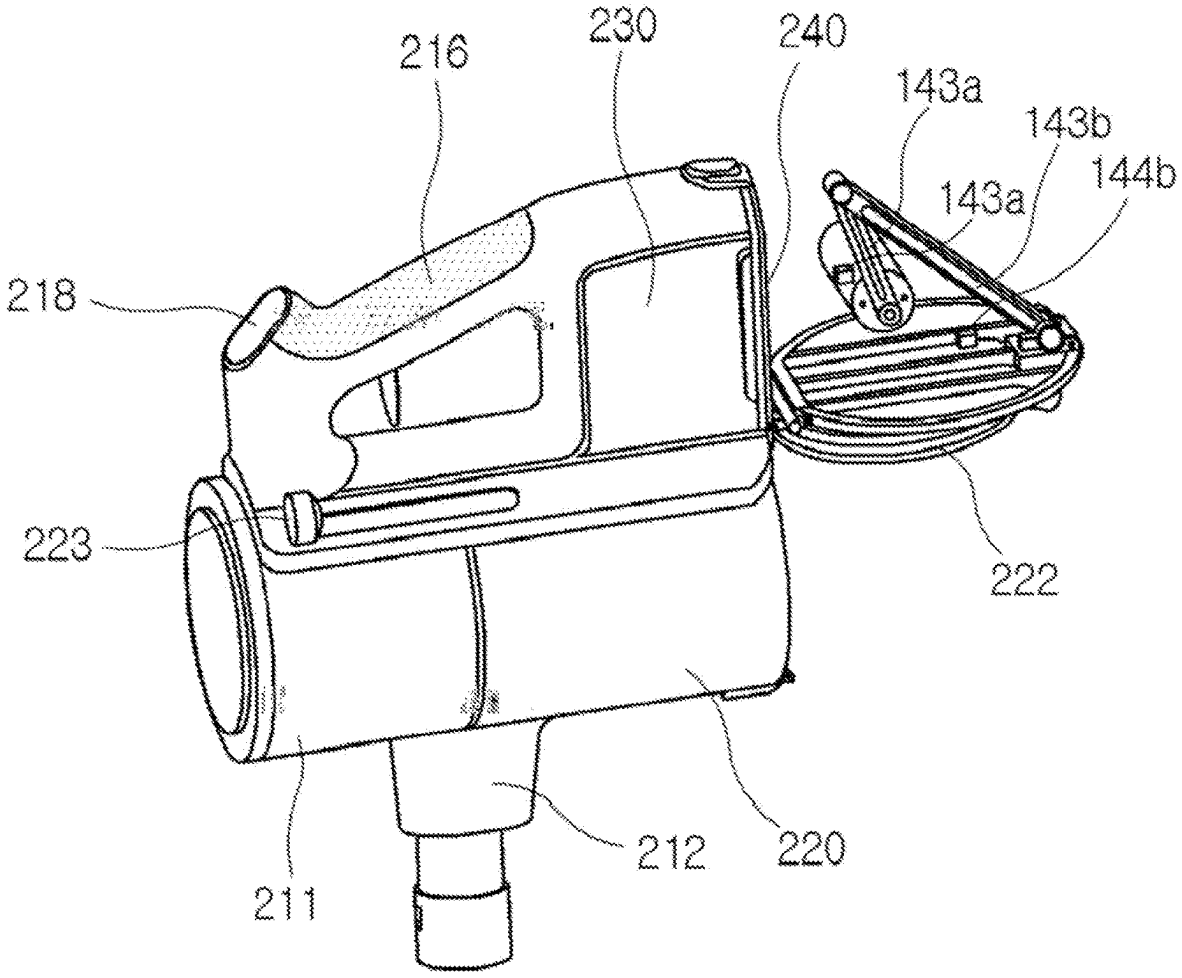
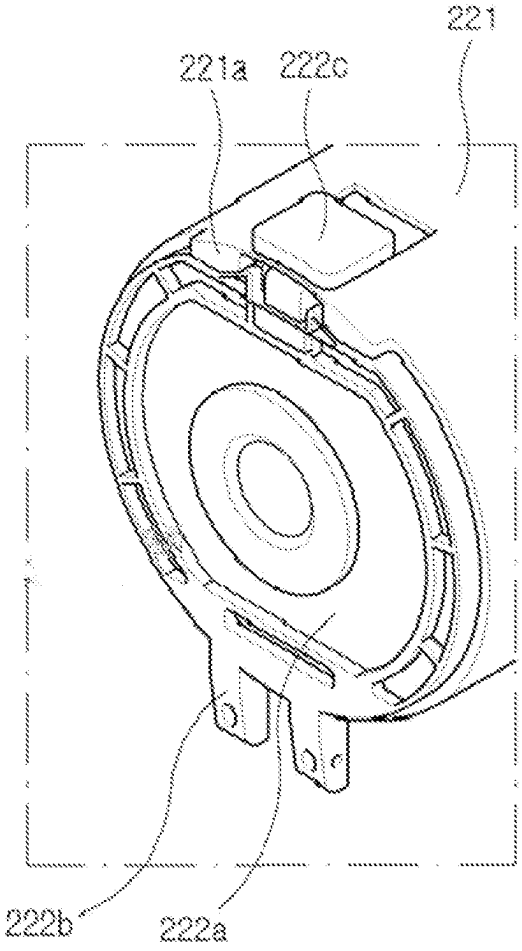


FIG. 10



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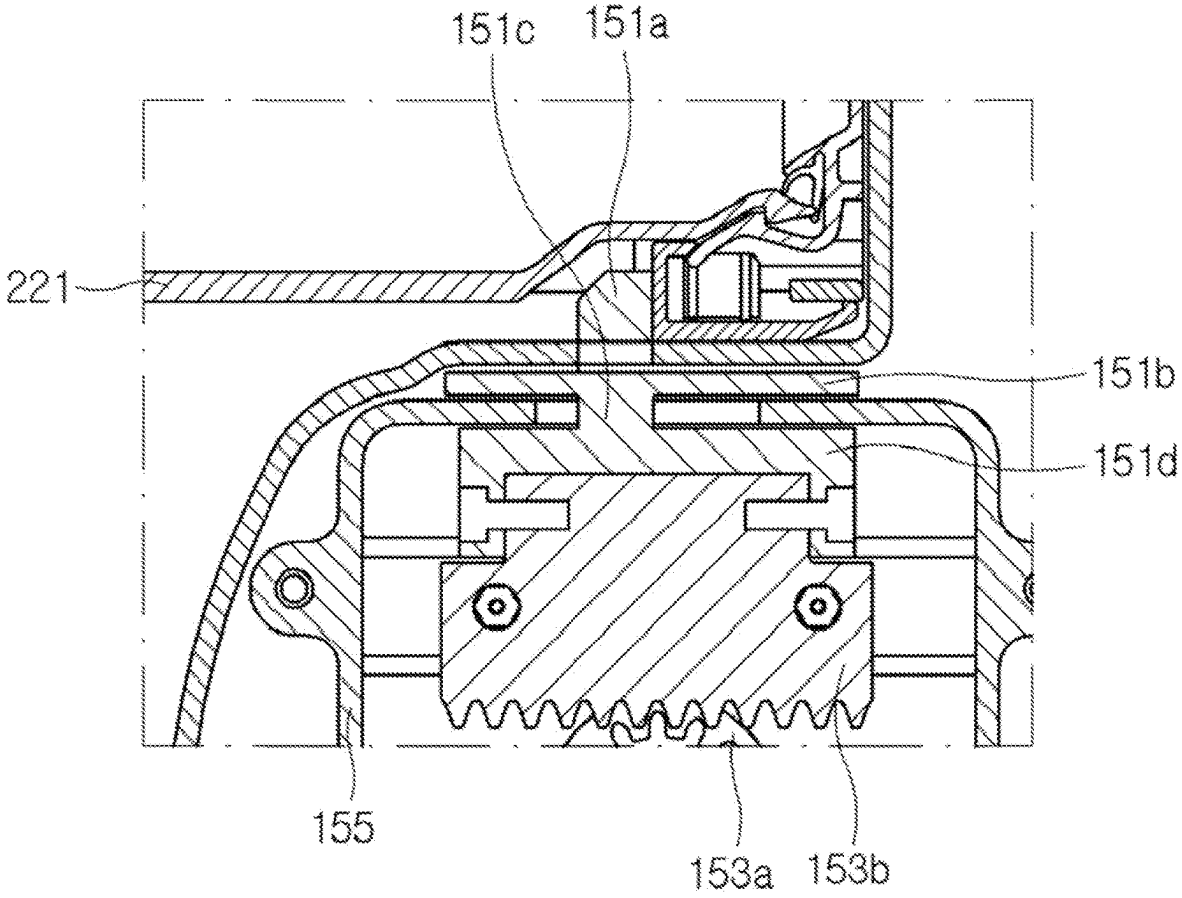
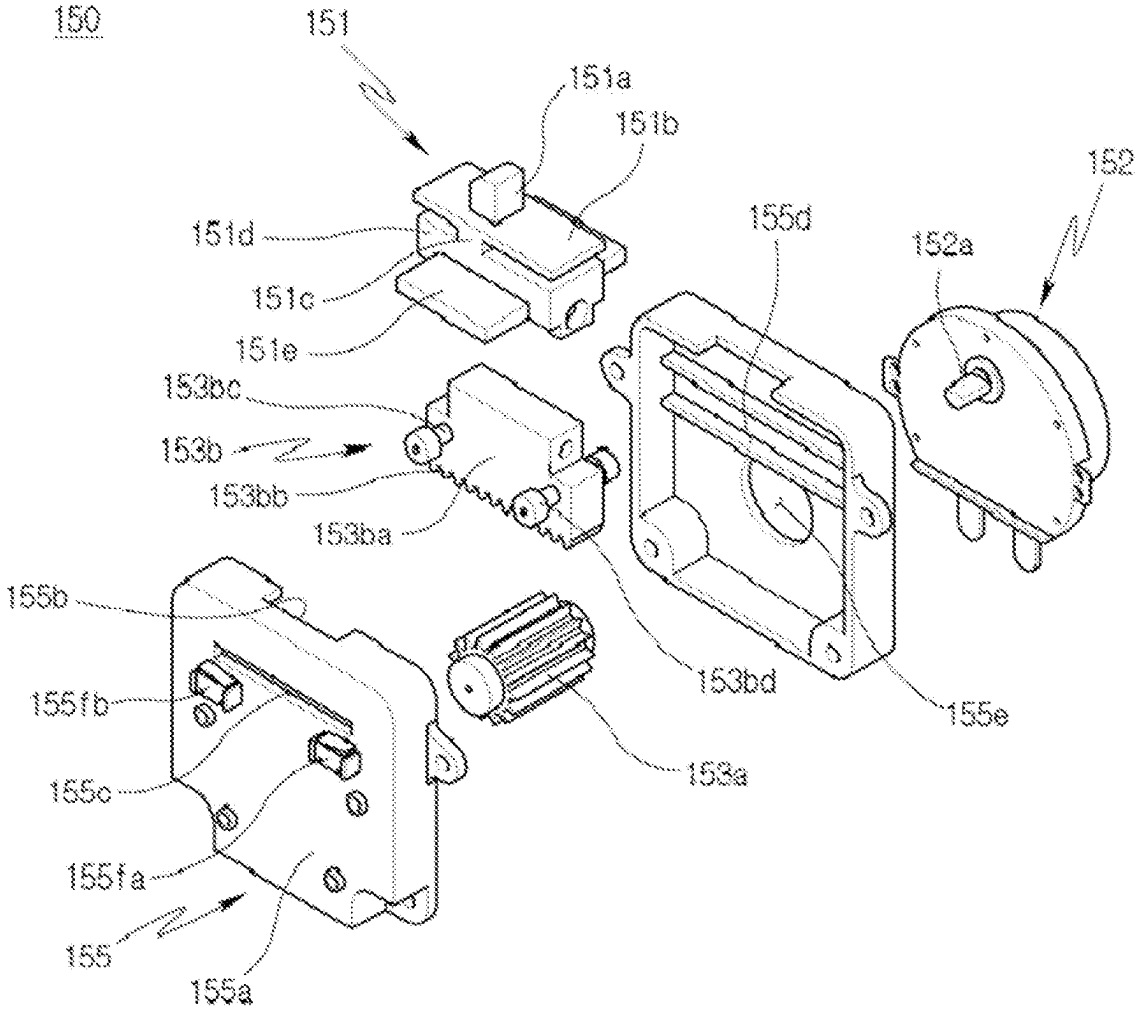


FIG. 12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153b
153bb
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155b
155fb
155c
155fa
155
155a
153bd
155e
153a

FIG. 13A

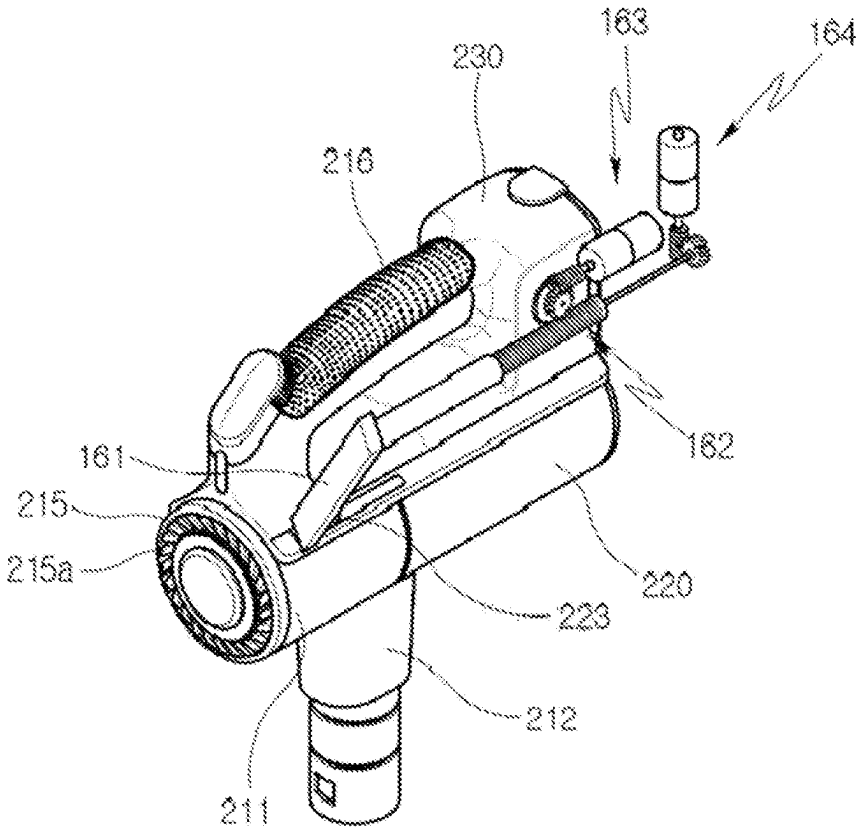


FIG. 13B

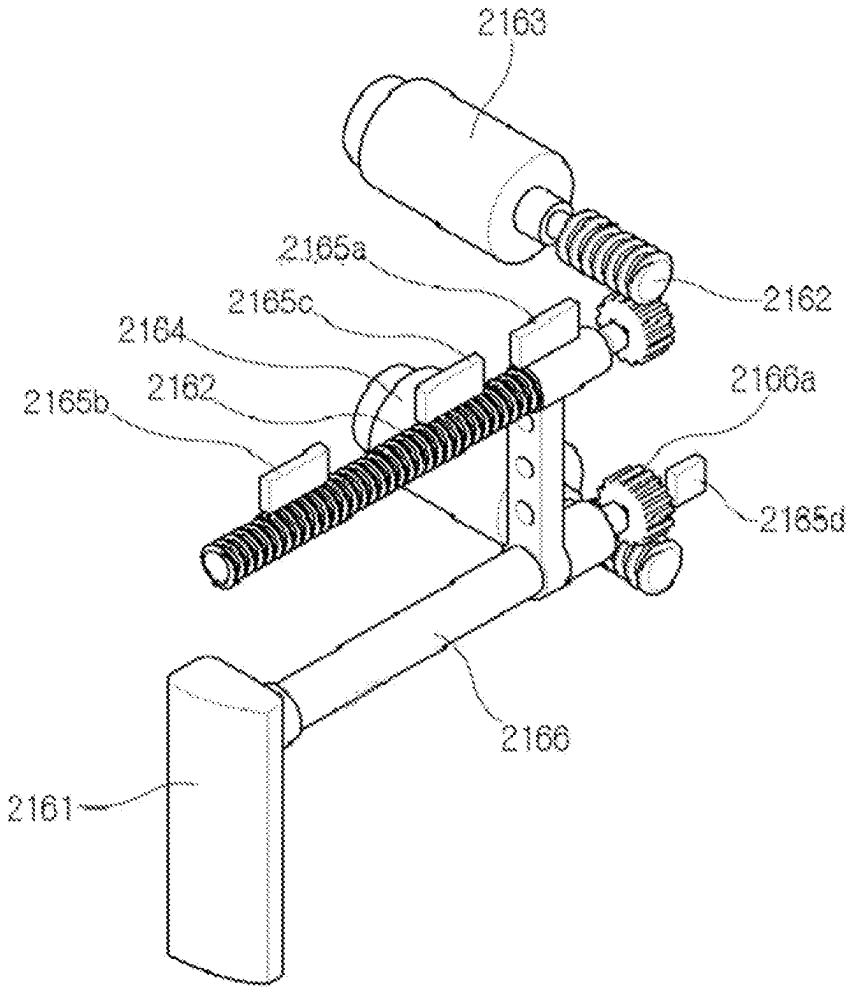


FIG. 14

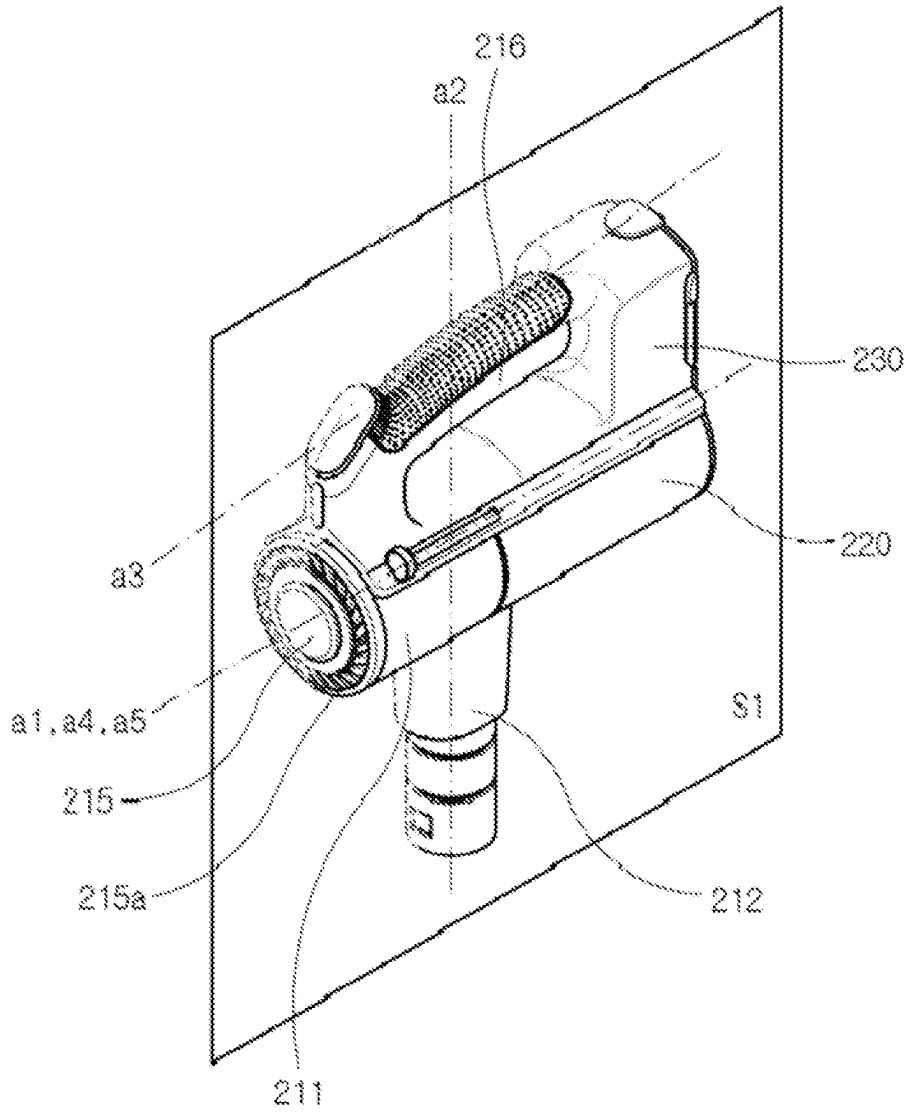


FIG. 15

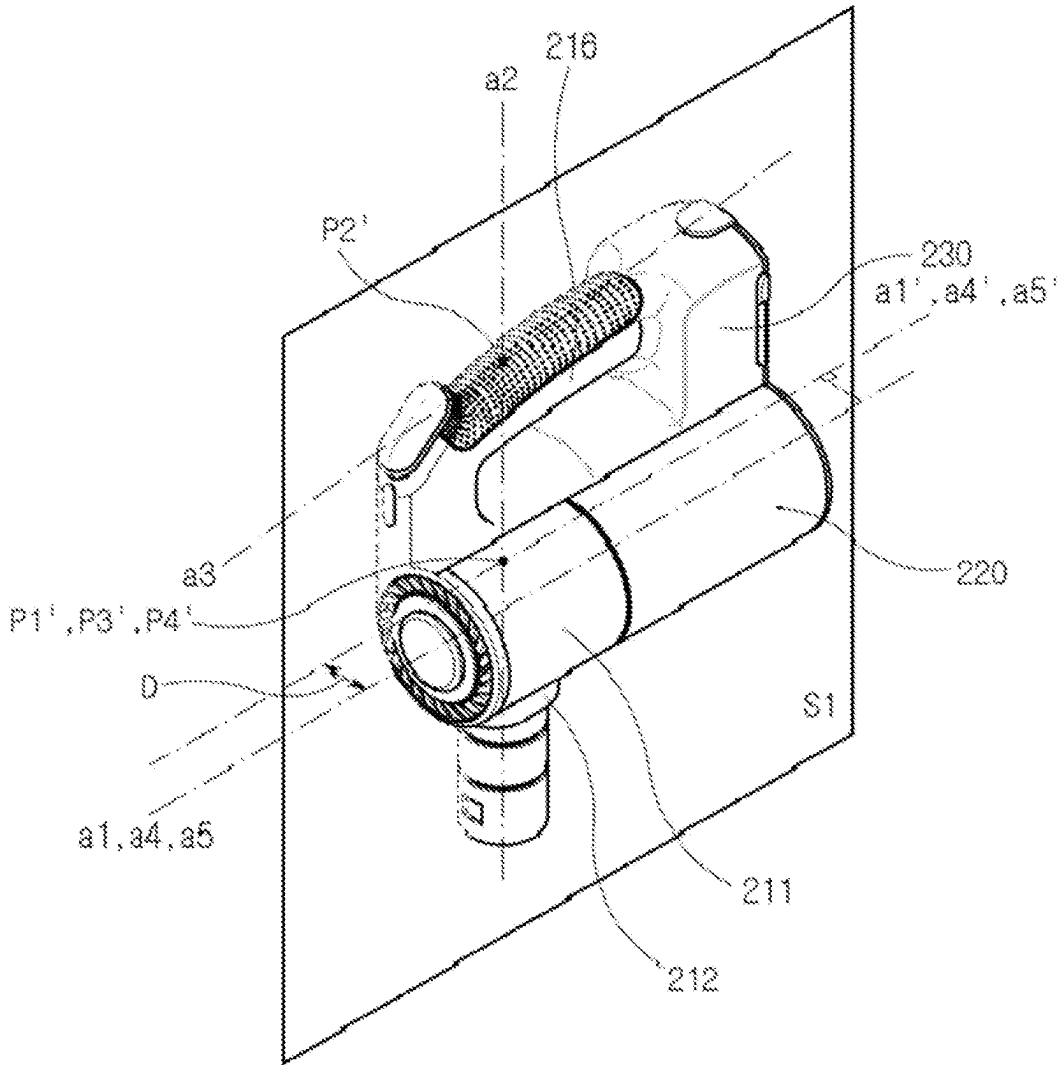


FIG. 16

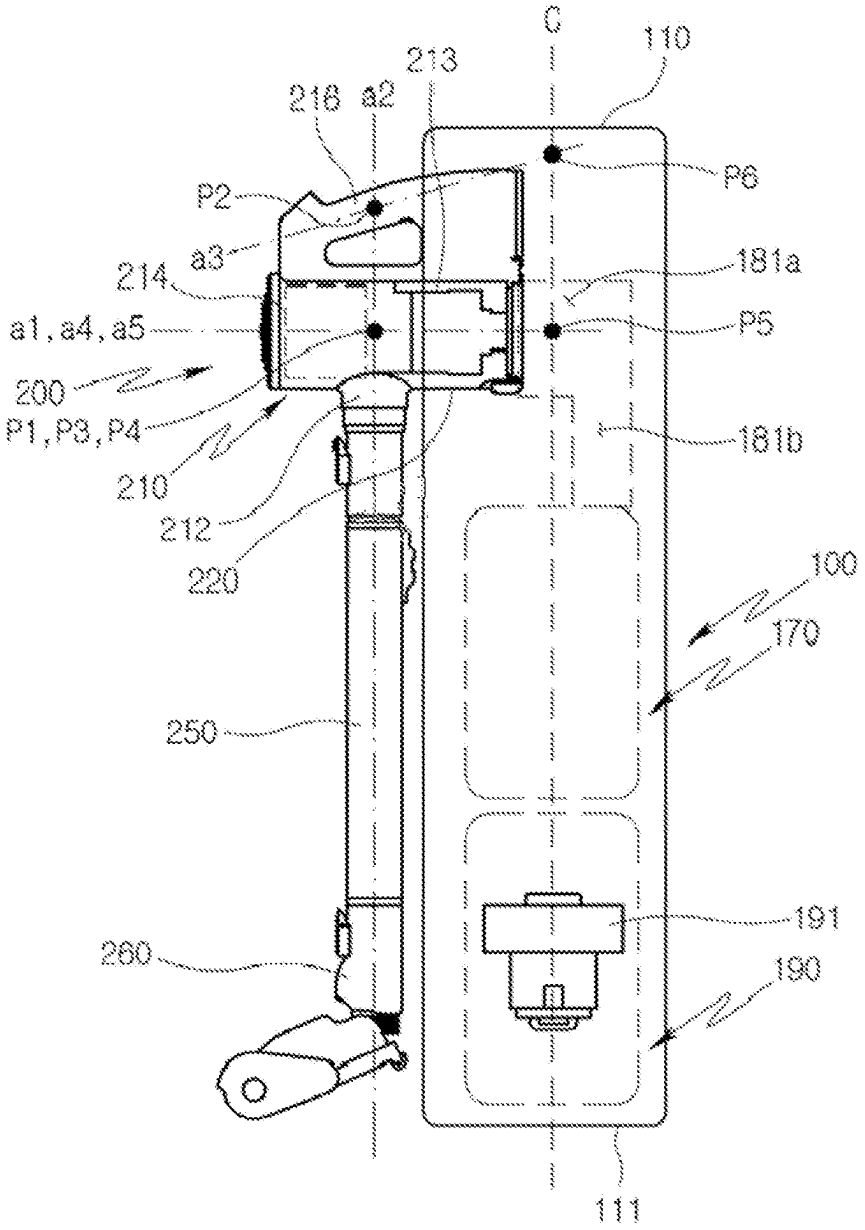
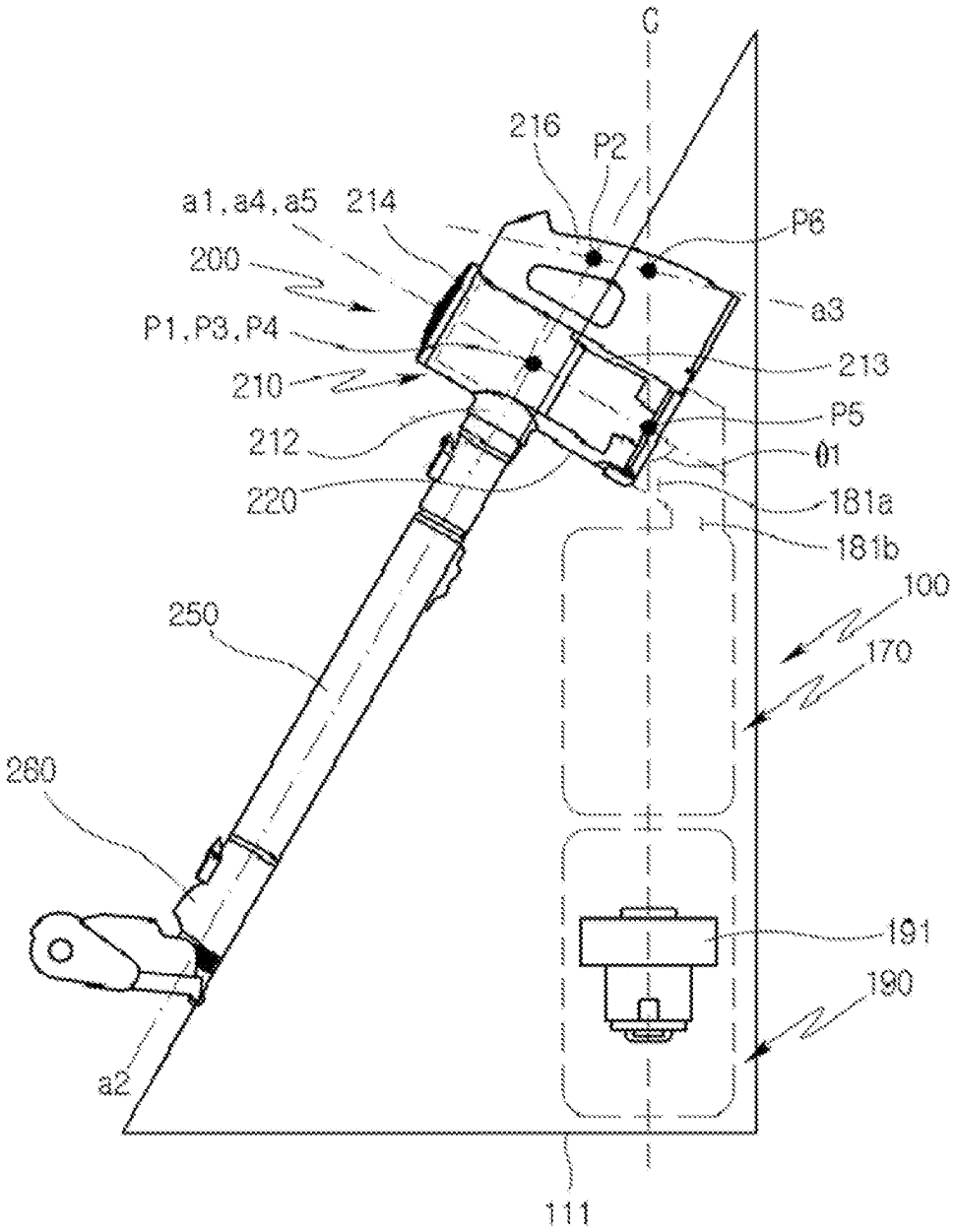

C
110
213
216
a2
P6
P2
a3
181a
214
a1, a4, a5
P5
200
P1, P3, P4
181b
210
212
220
100
170
250
191
260
190
111

FIG. 17A


C
216
P2
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214
P6
200
a3
P1, P3, P4
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P5
212
01
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181a
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100
250
170
280
191
190
a2
111

FIG. 17B

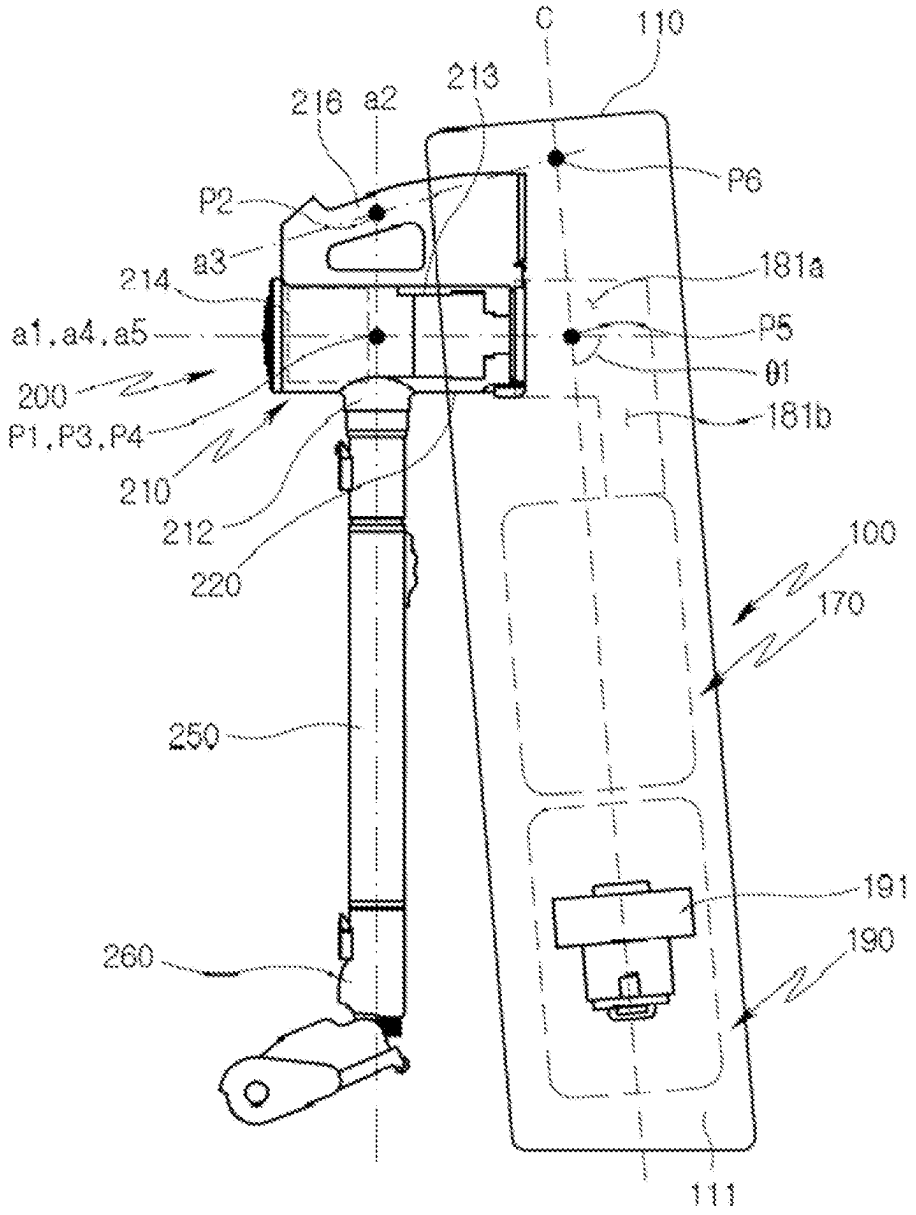
C
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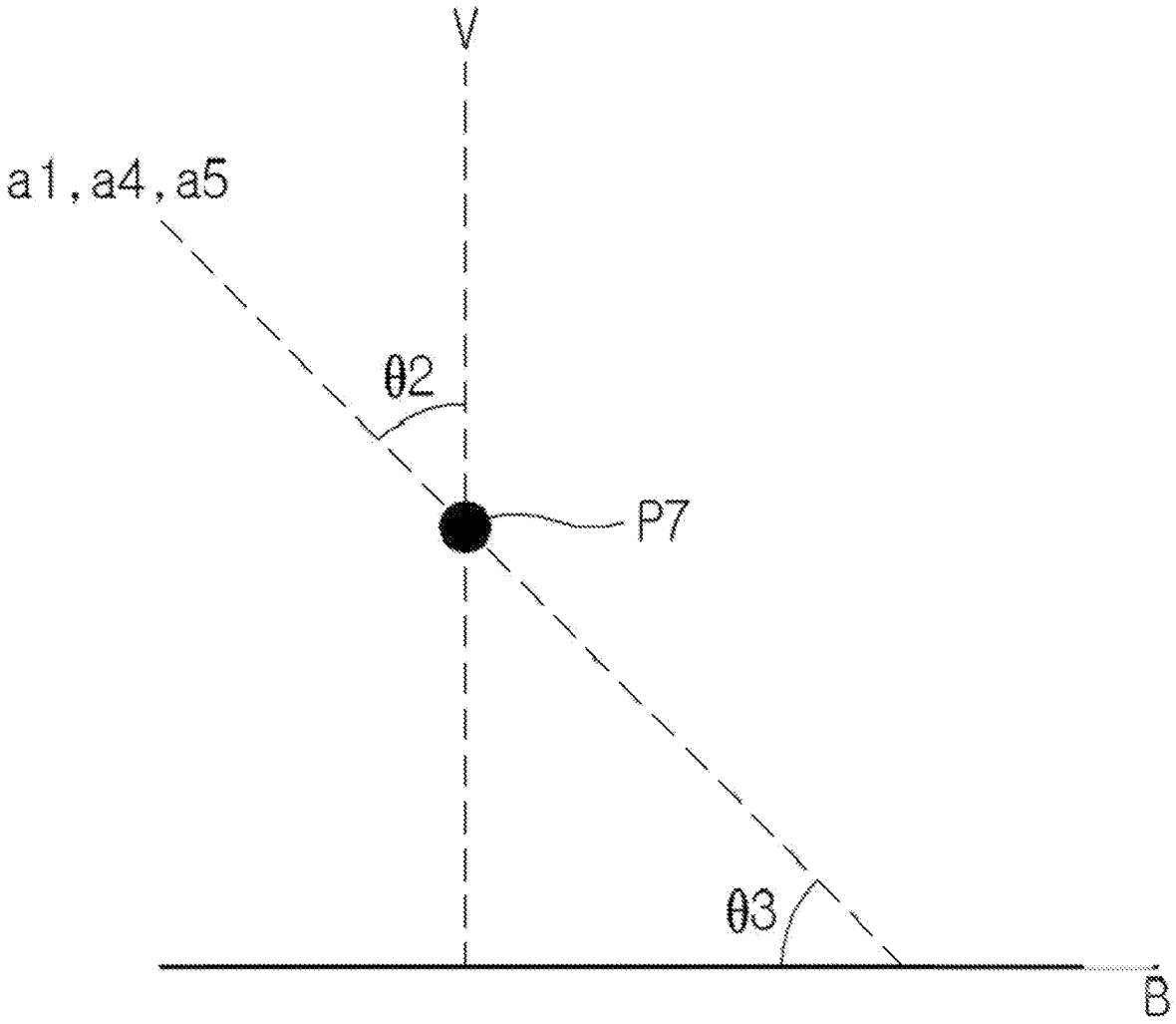
FIG. 18



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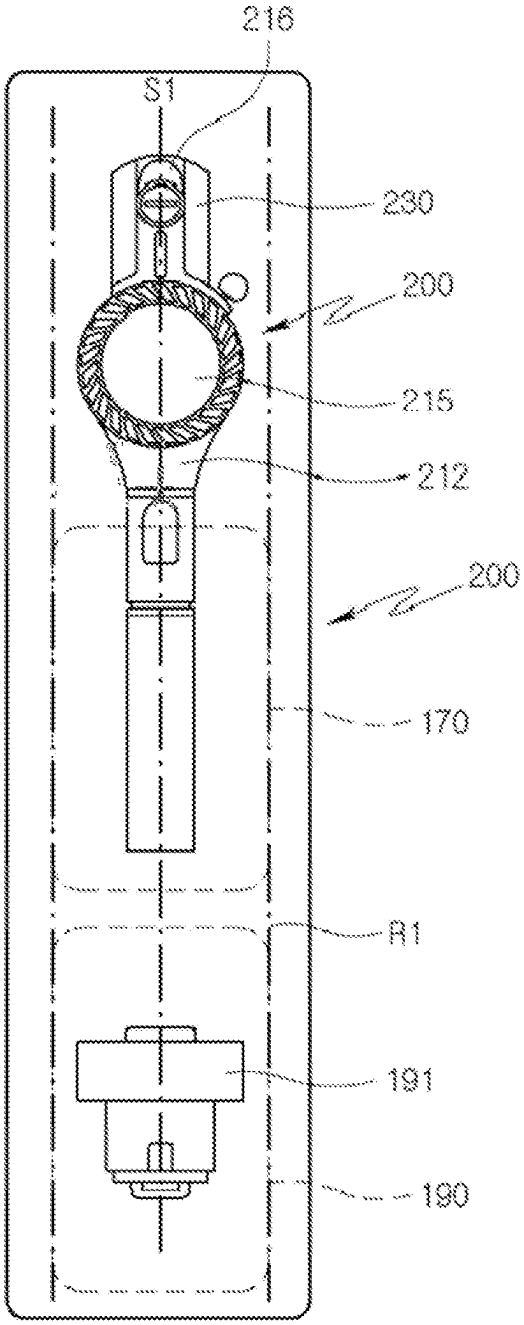


FIG. 20

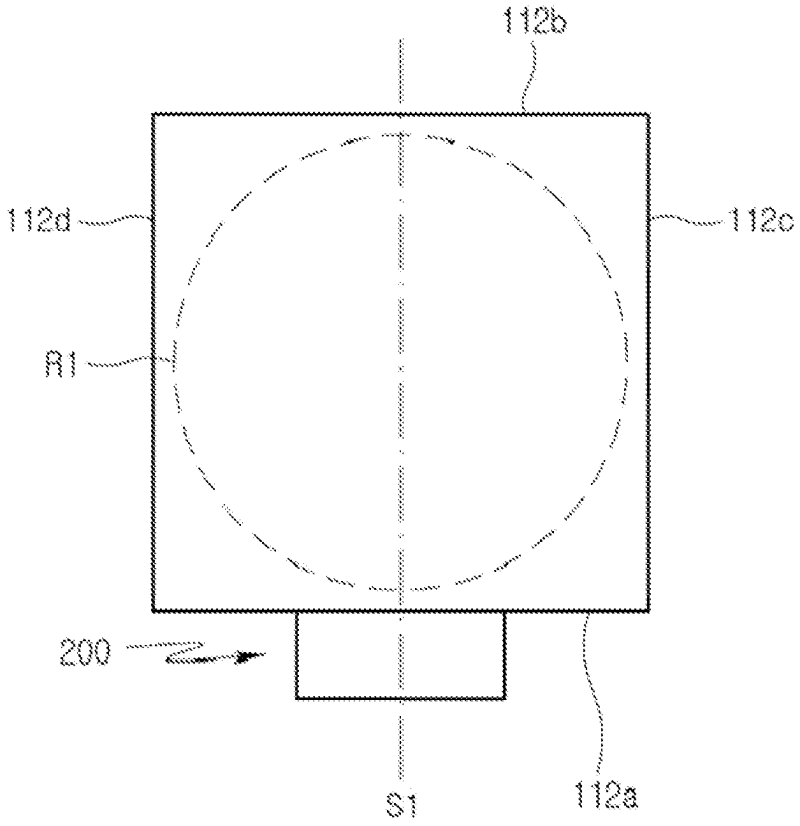


FIG. 21

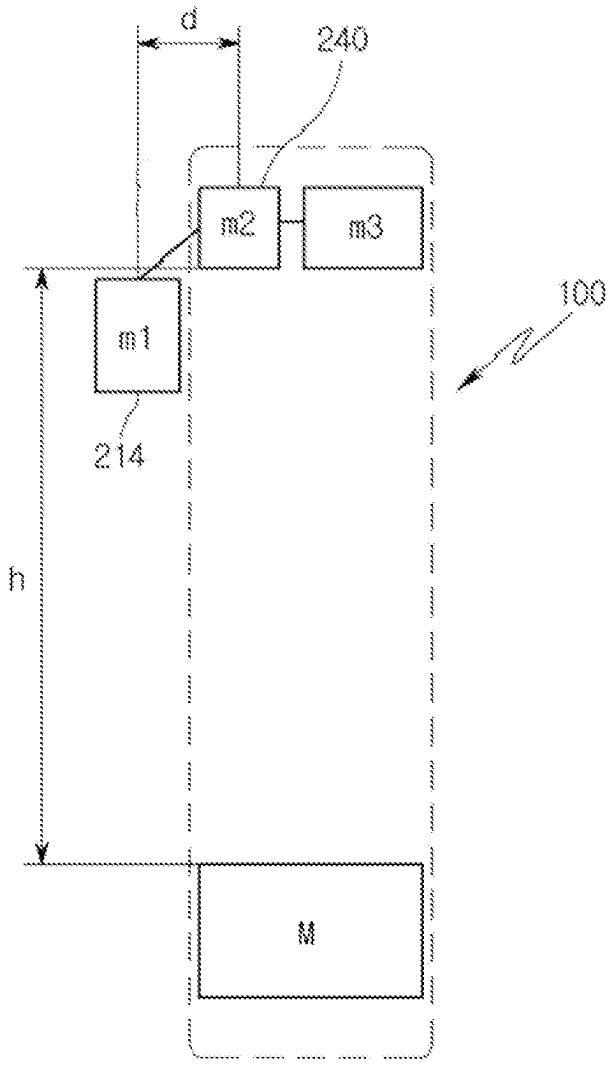


FIG. 22

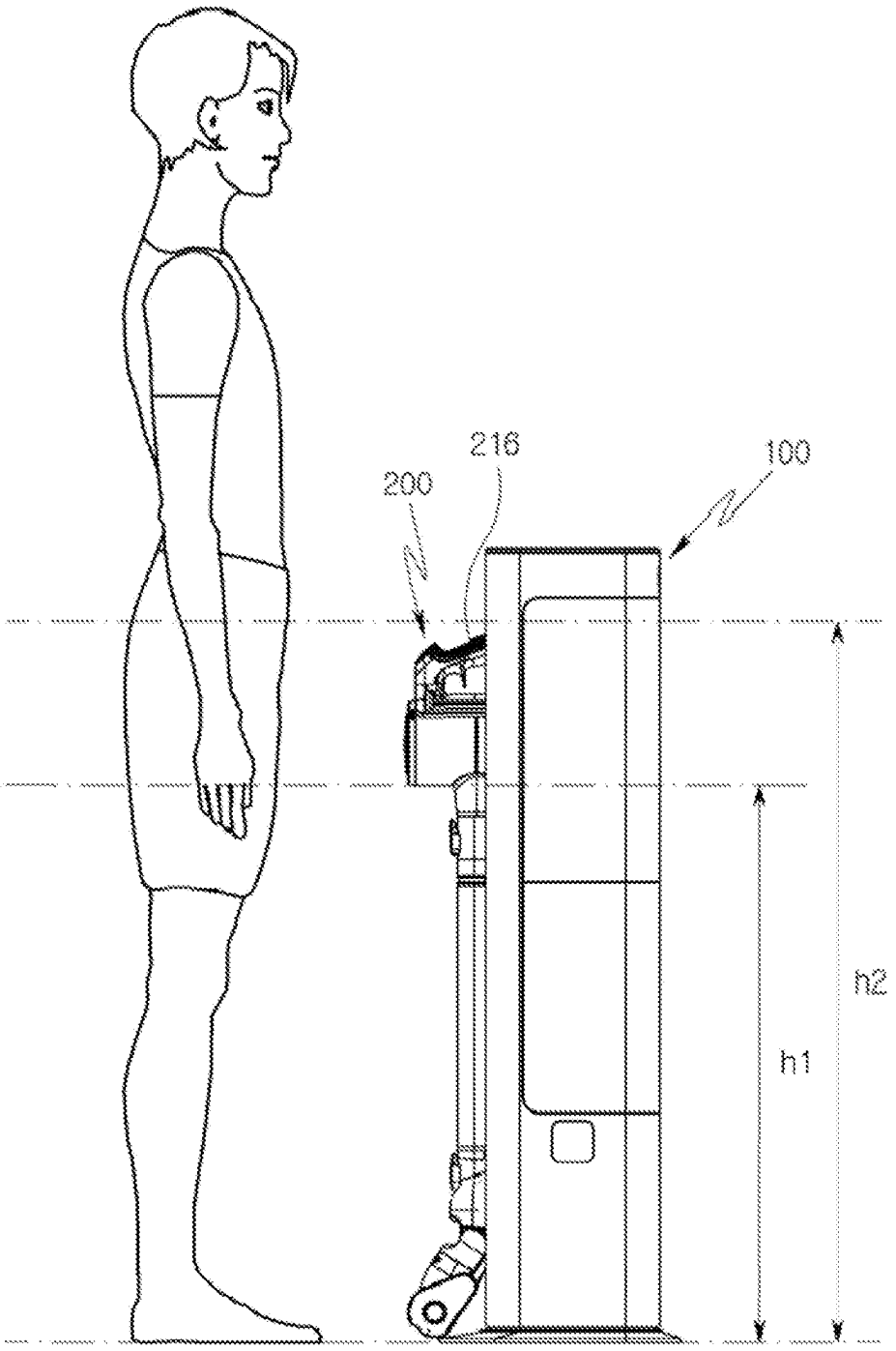


FIG. 23

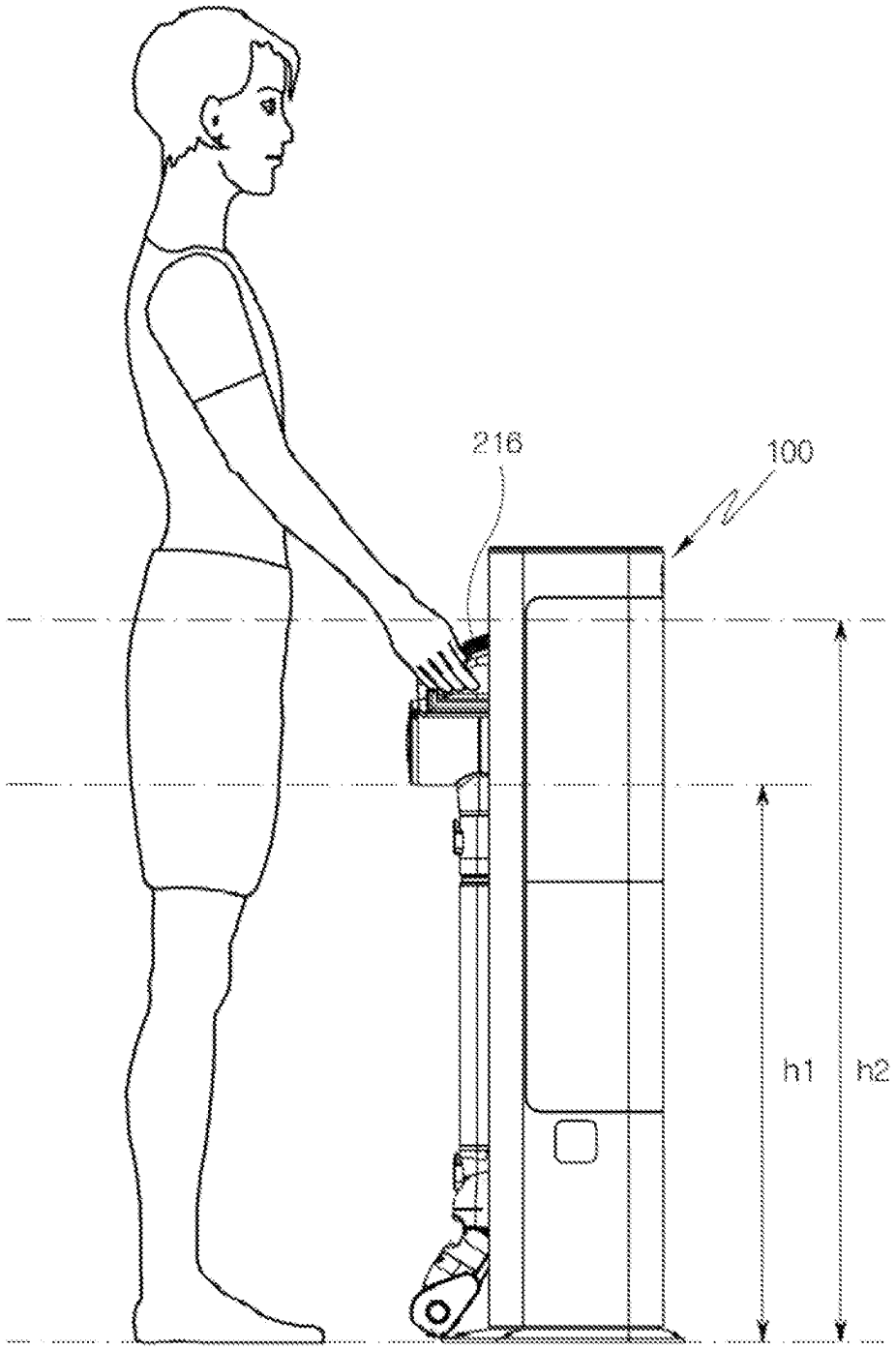


FIG. 24

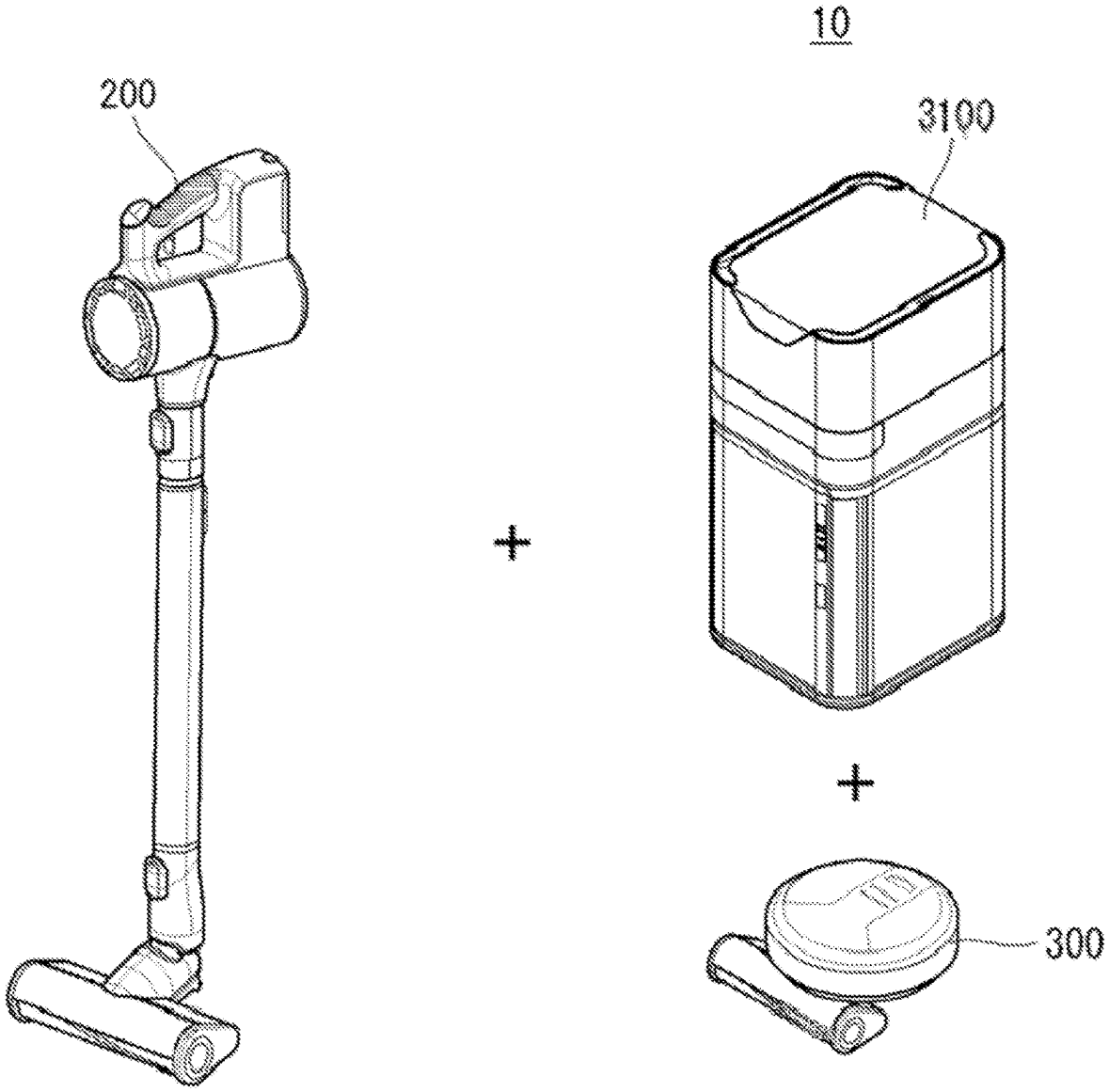
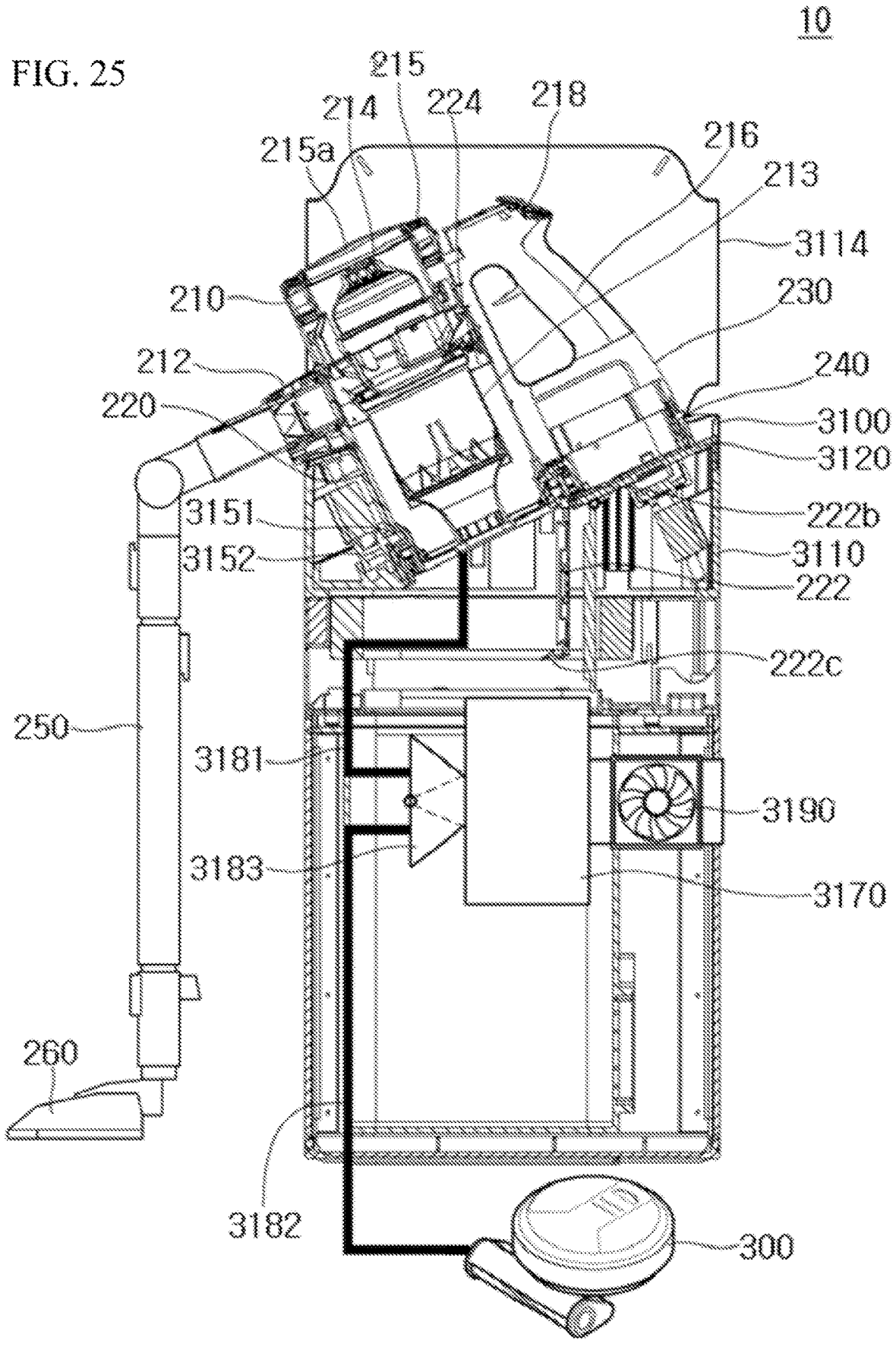


FIG. 25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3183
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260
3182
300

FIG. 26

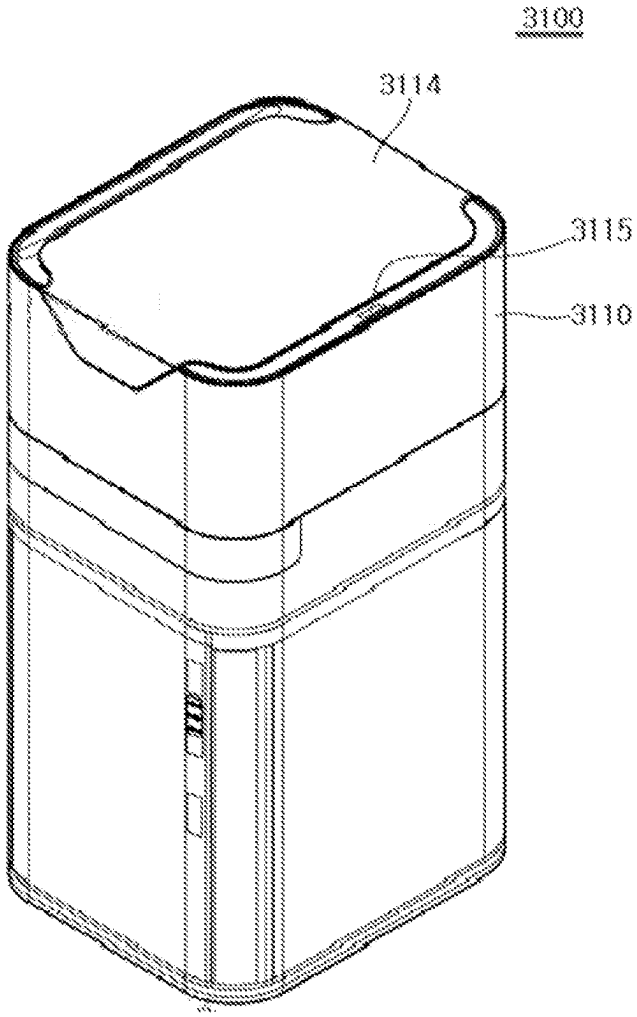


FIG. 27

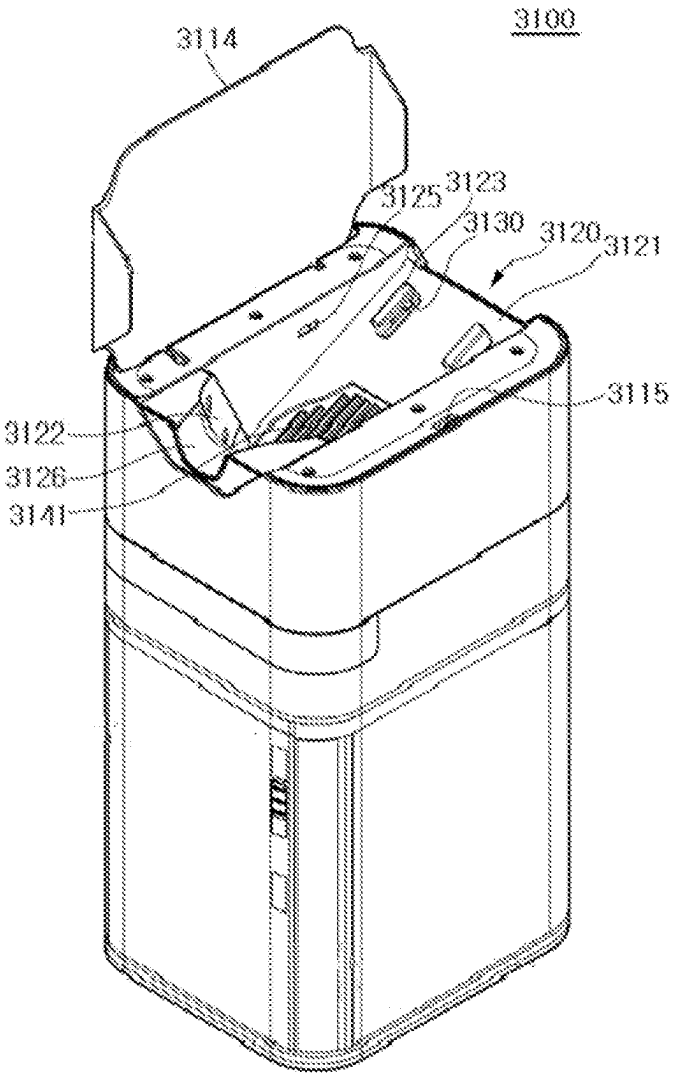


FIG. 28

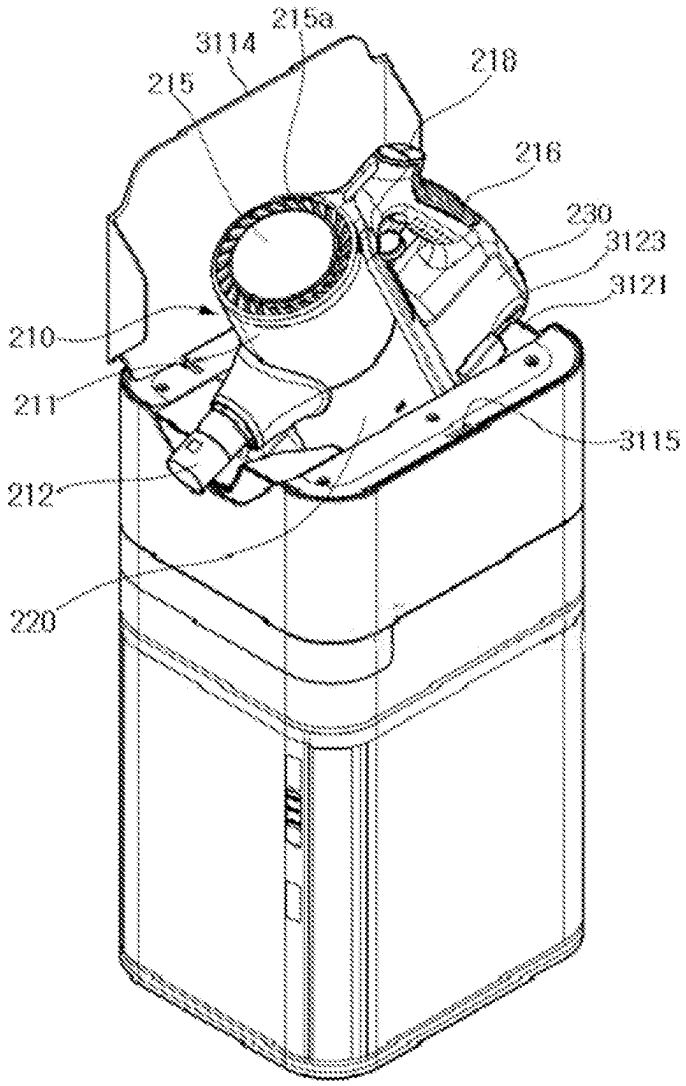


FIG. 29

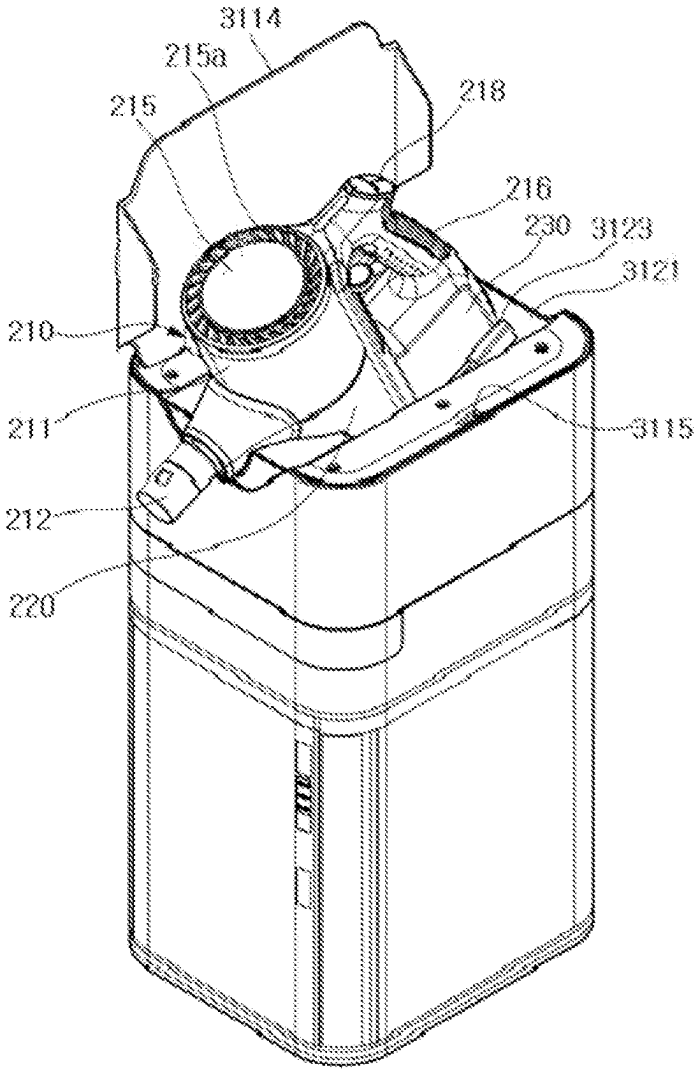


FIG. 30

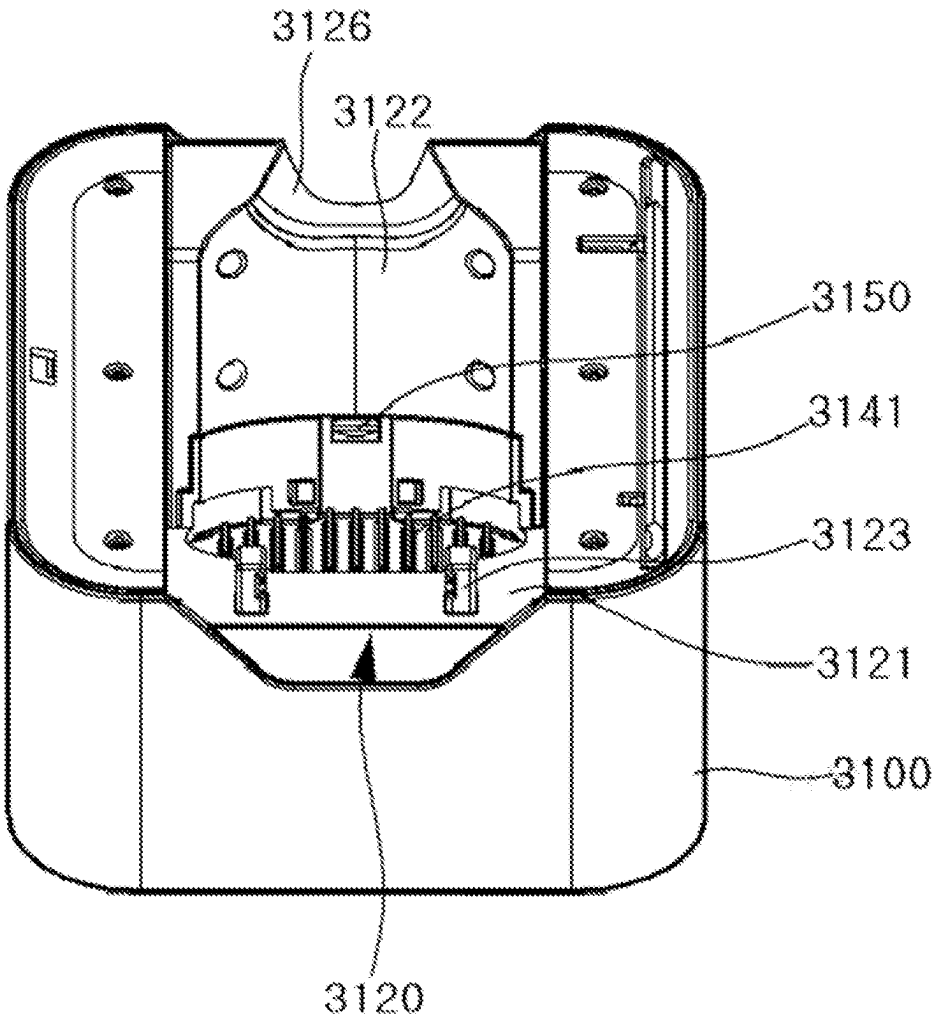


FIG. 31

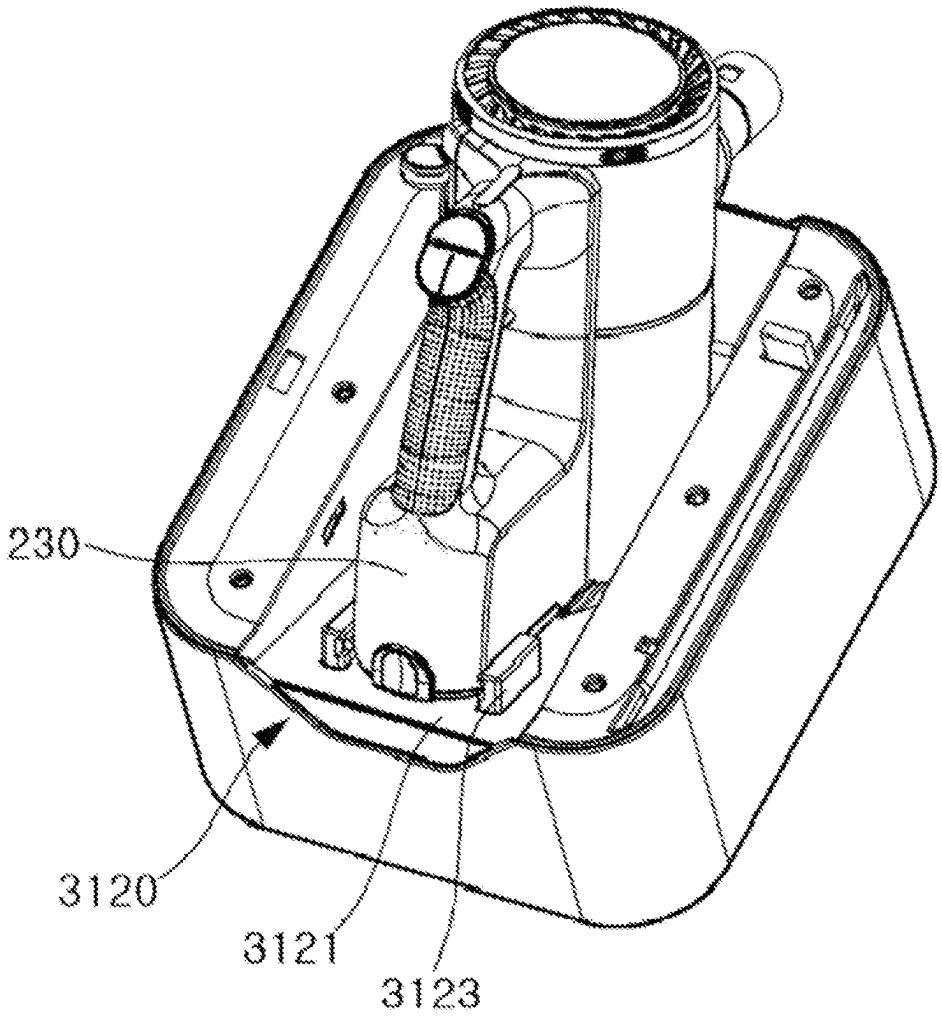


FIG. 32

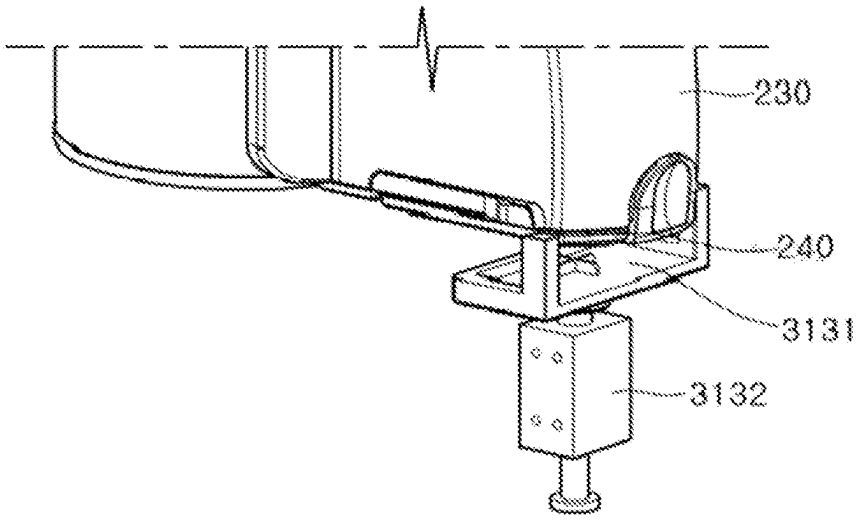


FIG. 33

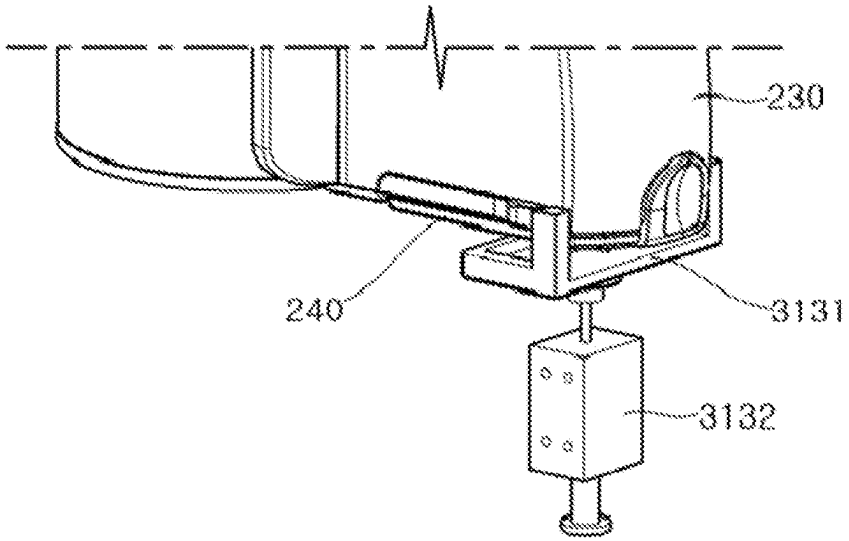


FIG. 34

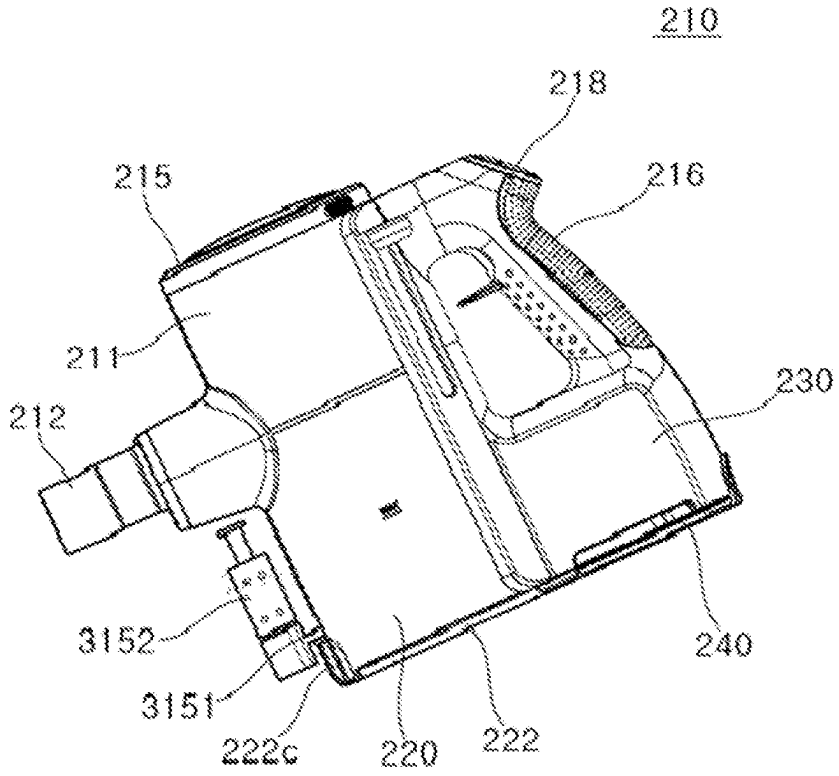
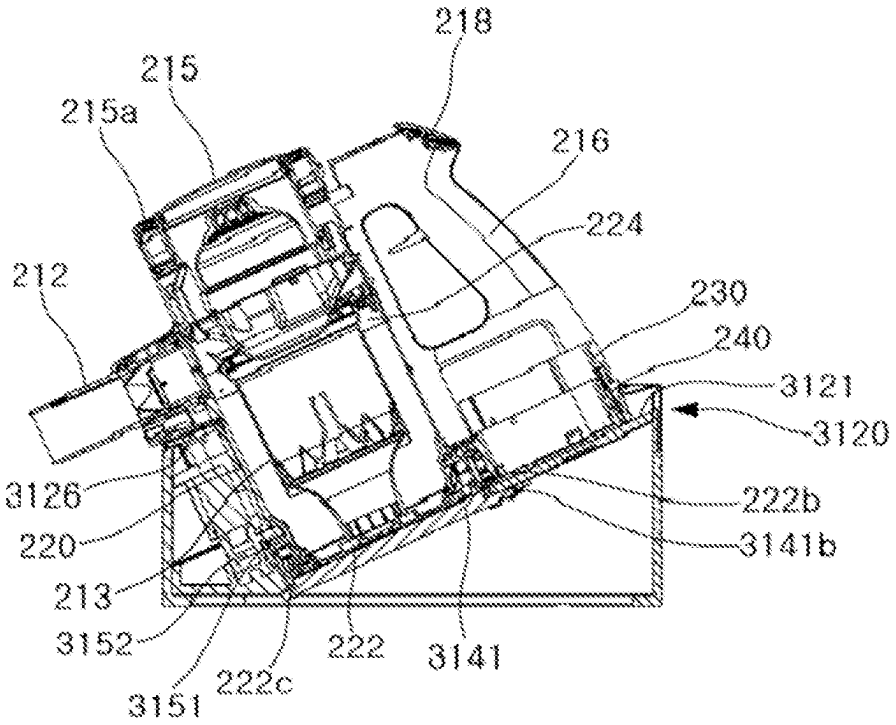


FIG. 35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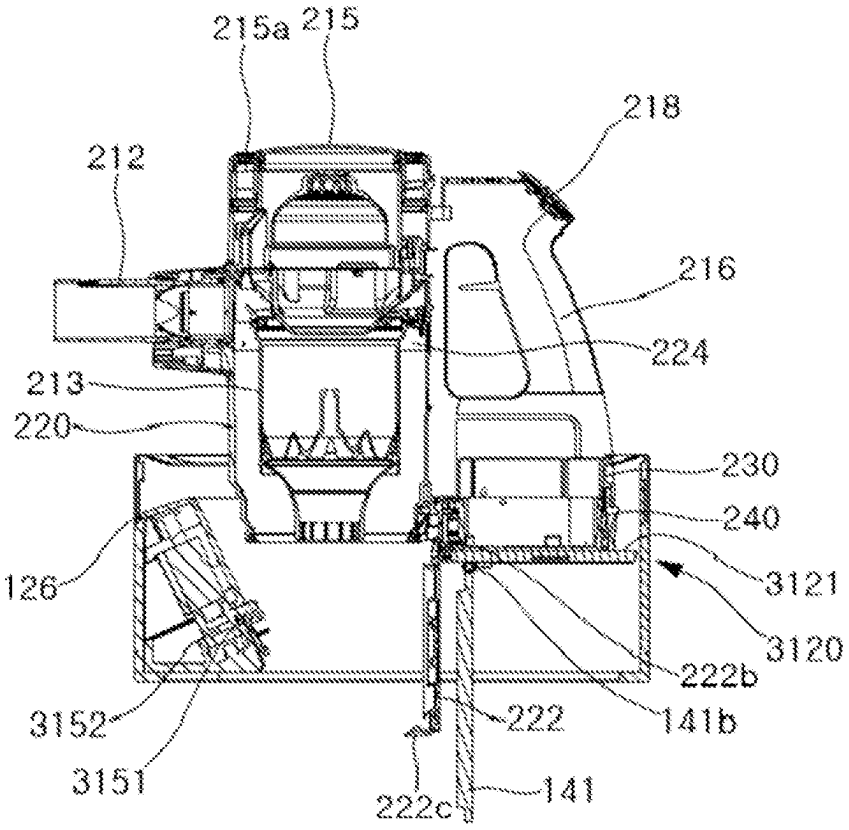
215
215a
216
224
212
230
240
3121
3120
3126
222b
220
3141b
213
3152
222
3141
222c
3151

FIG. 36


215a
215
218
212
216
224
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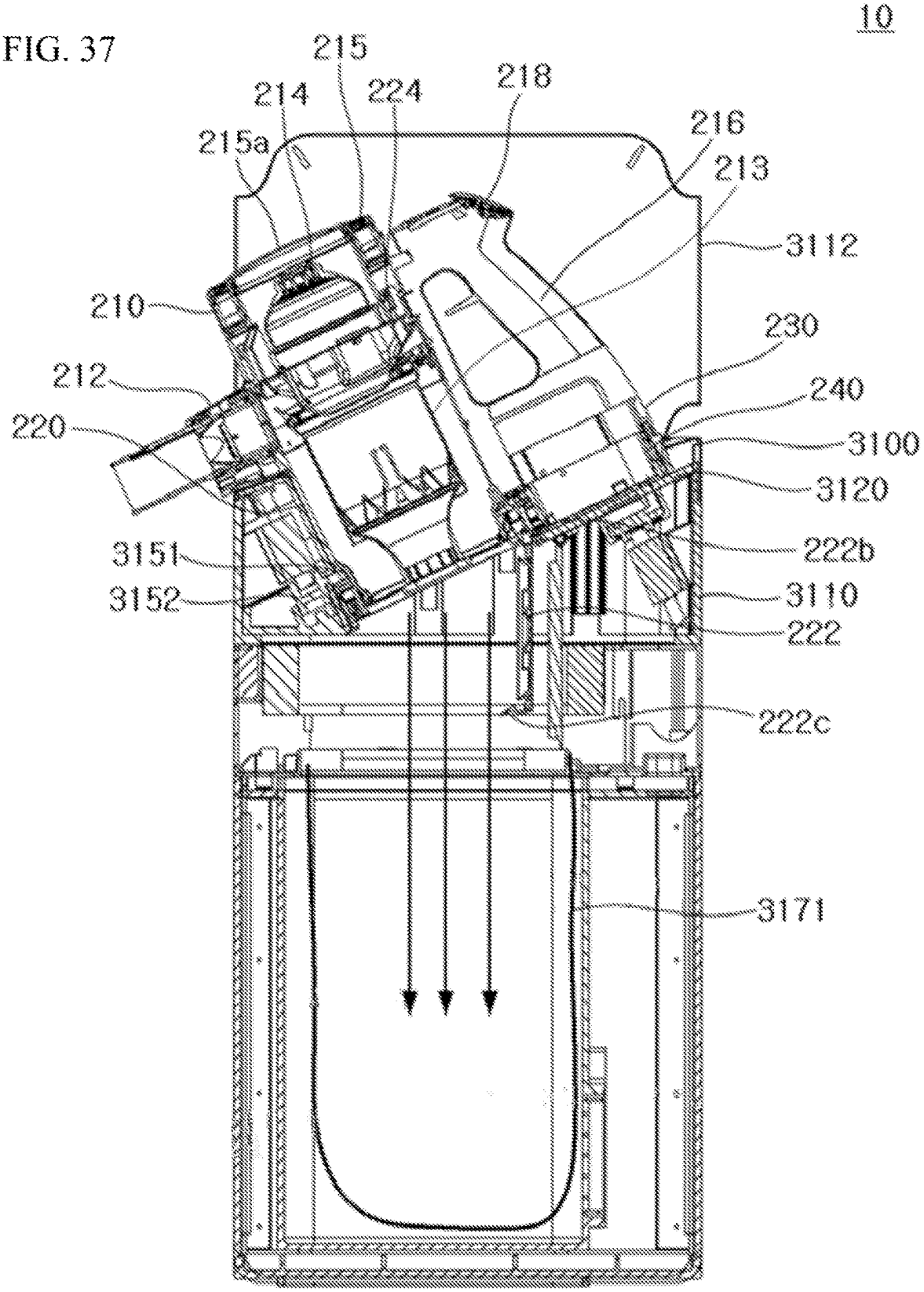
220
230
240
126
3121
3120
222b
3152
222
141b
3151
222c
141

FIG. 37


10
215
214
224
218
216
215a
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3112
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212
240
220
3100
3120
222b
3151
3152
3110
222
222c
3171

FIG. 38

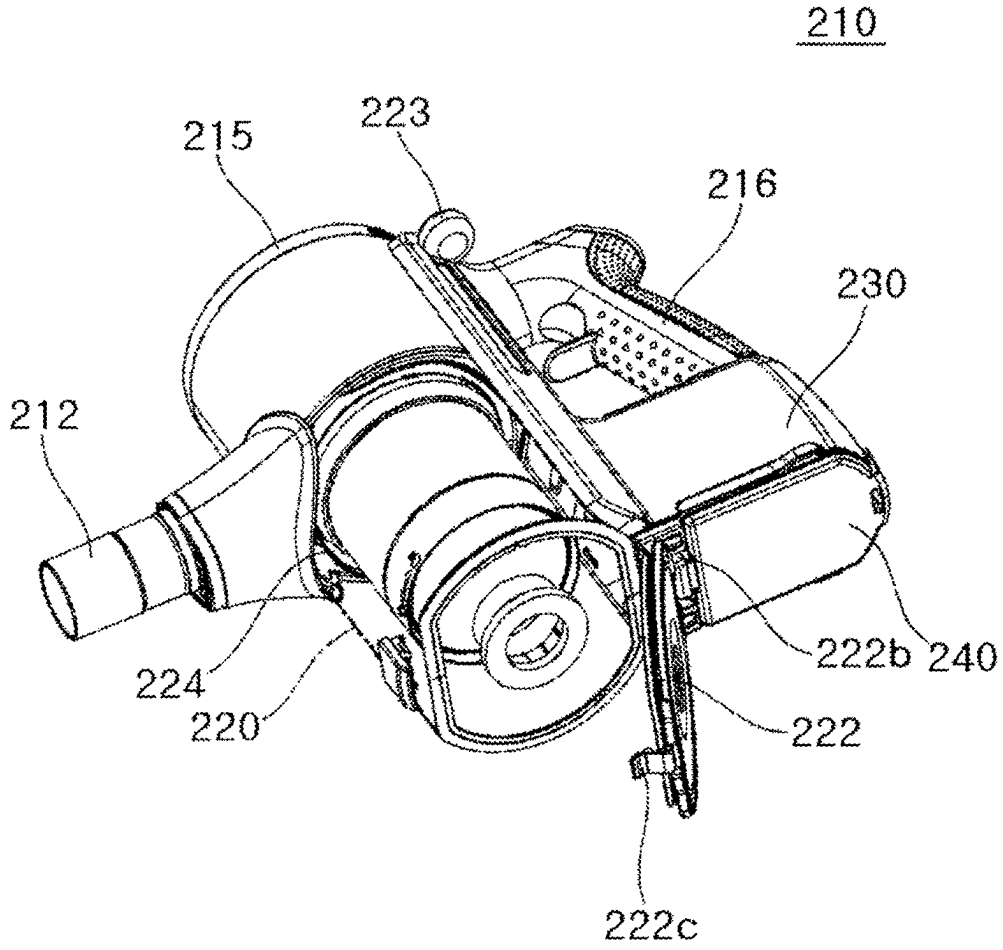


FIG. 39

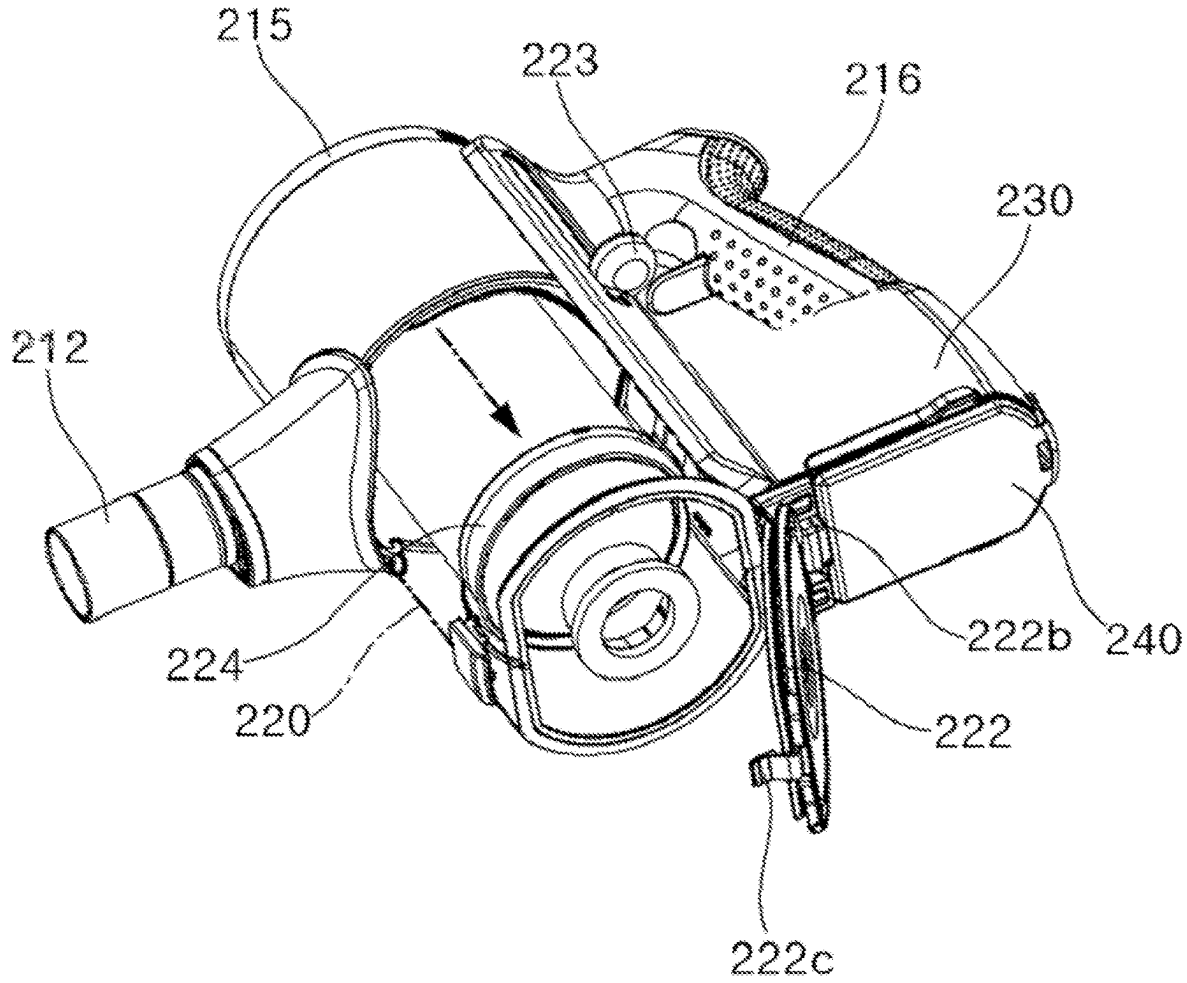
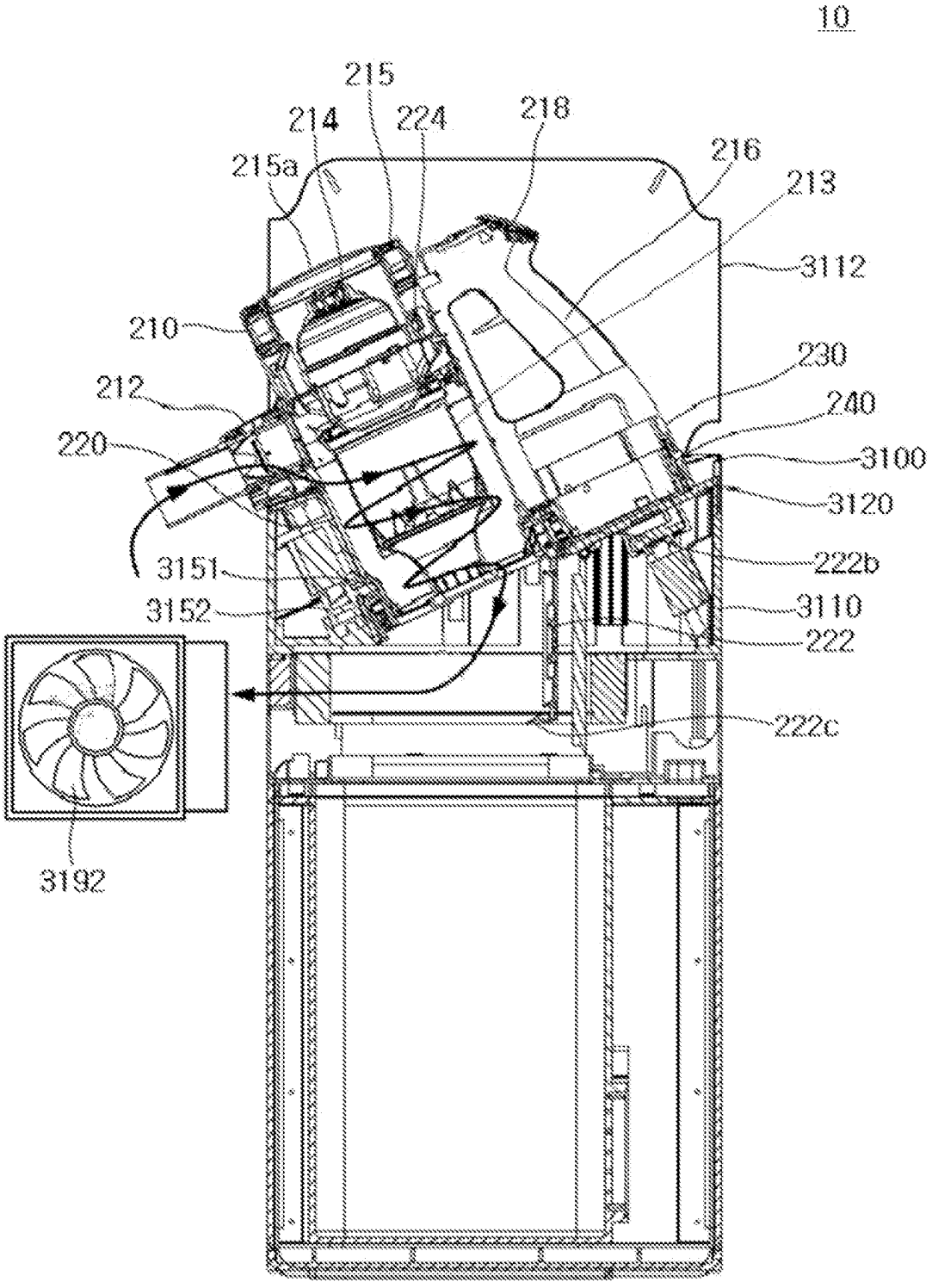


FIG. 40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216
215a
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212
240
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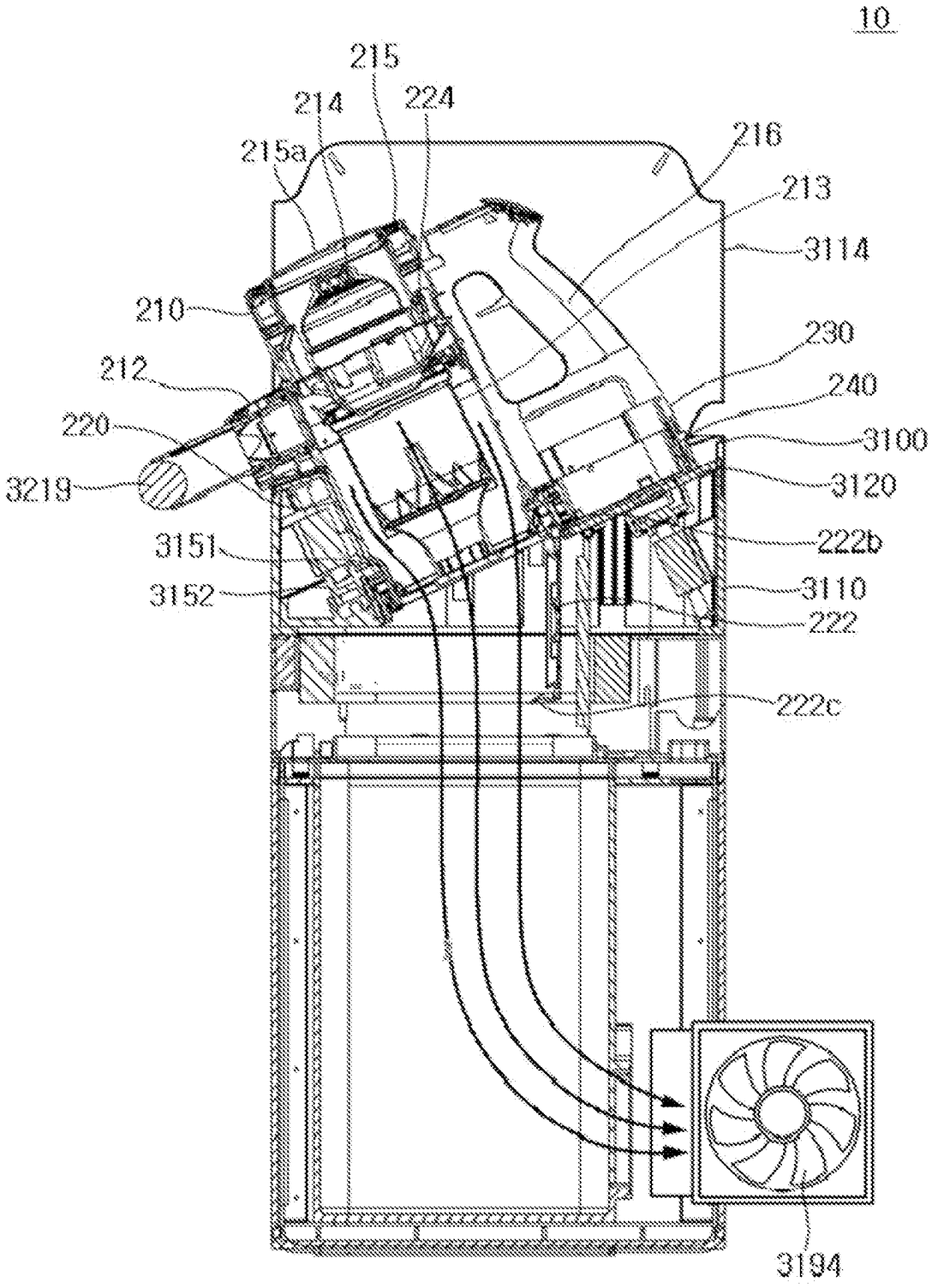
3100
3120
3151
222b
3152
3110
222
222c
3192

FIG. 41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215
214
224
215a
216
213
3114
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230
212
240
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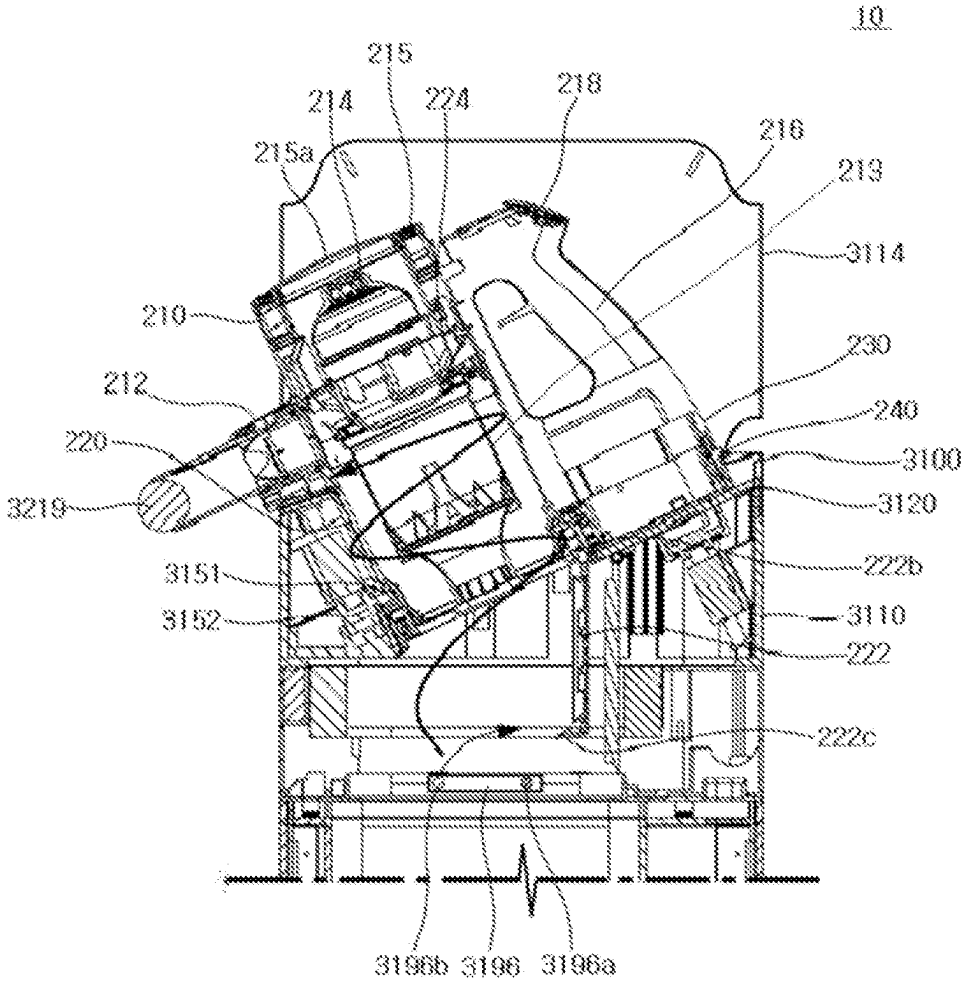
3100
3219
3120
3151
222b
3152
3110
222
222c
3194

FIG. 42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218
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215a
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210
230
212
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3100
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3151
222b
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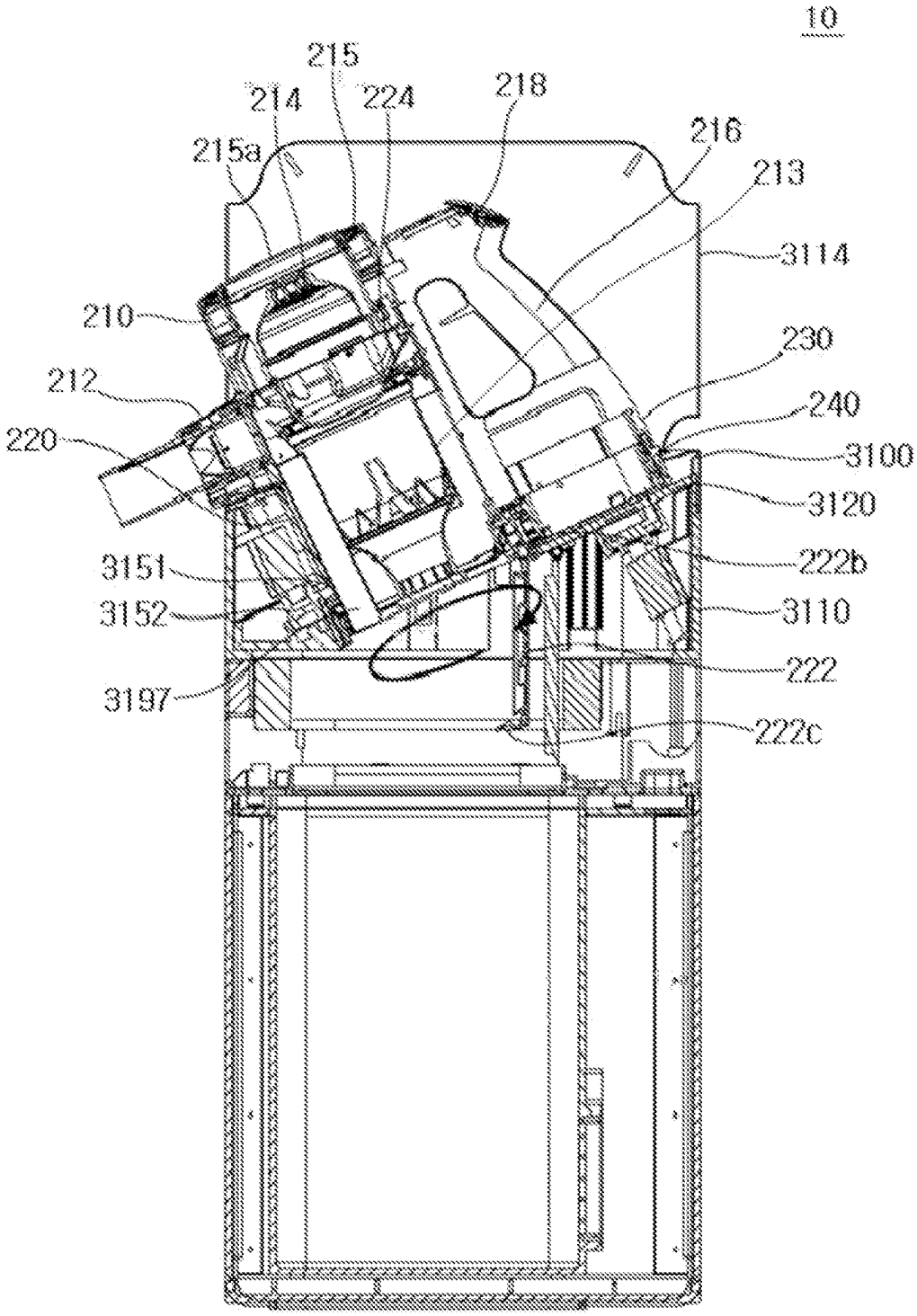
3110
222
222c
3196b
3196
3196a

FIG. 43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222b
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3152
3110
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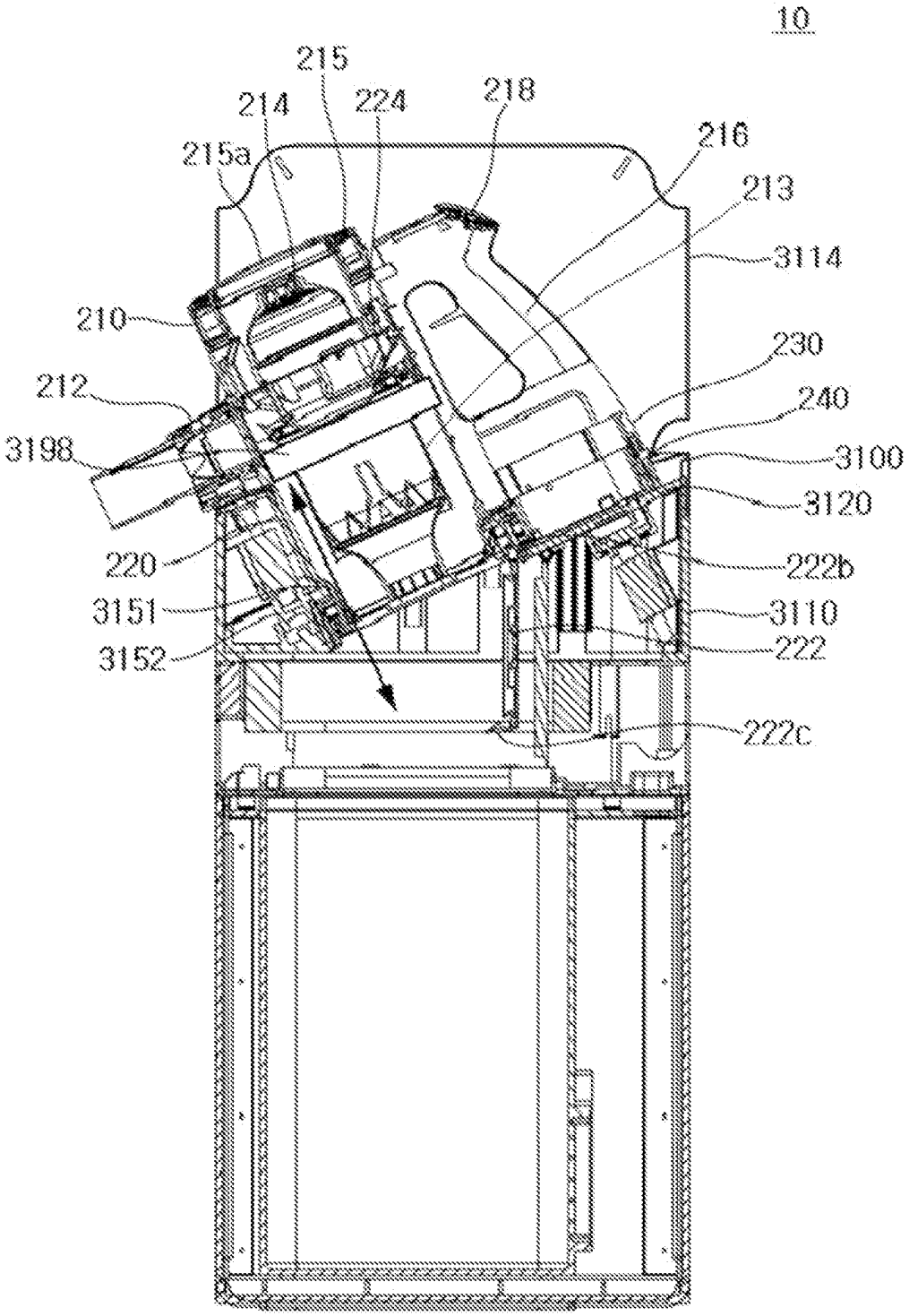
3197
222c

FIG. 44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215a
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3114
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212
240
3198
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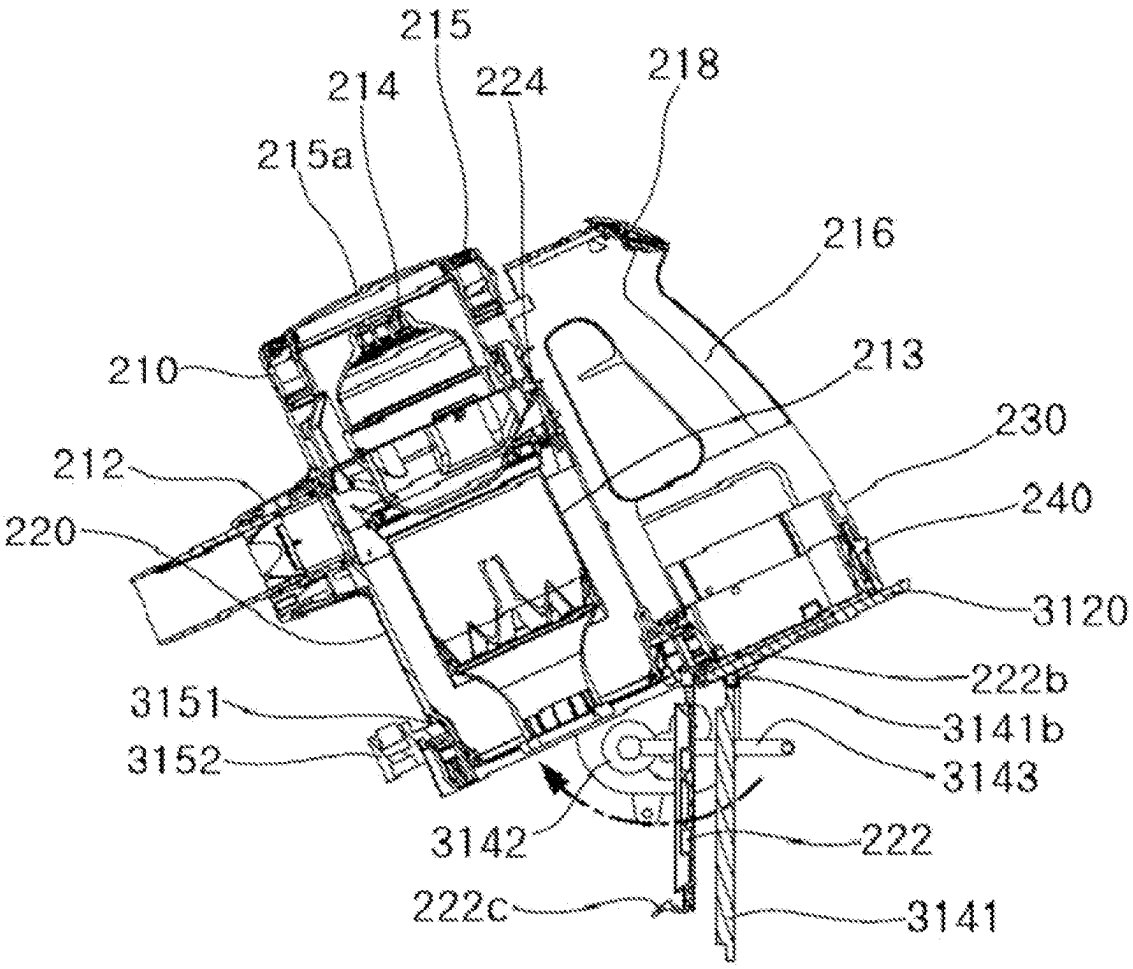
3120
220
222b
3151
3110
3152
222
222c

FIG. 45


215
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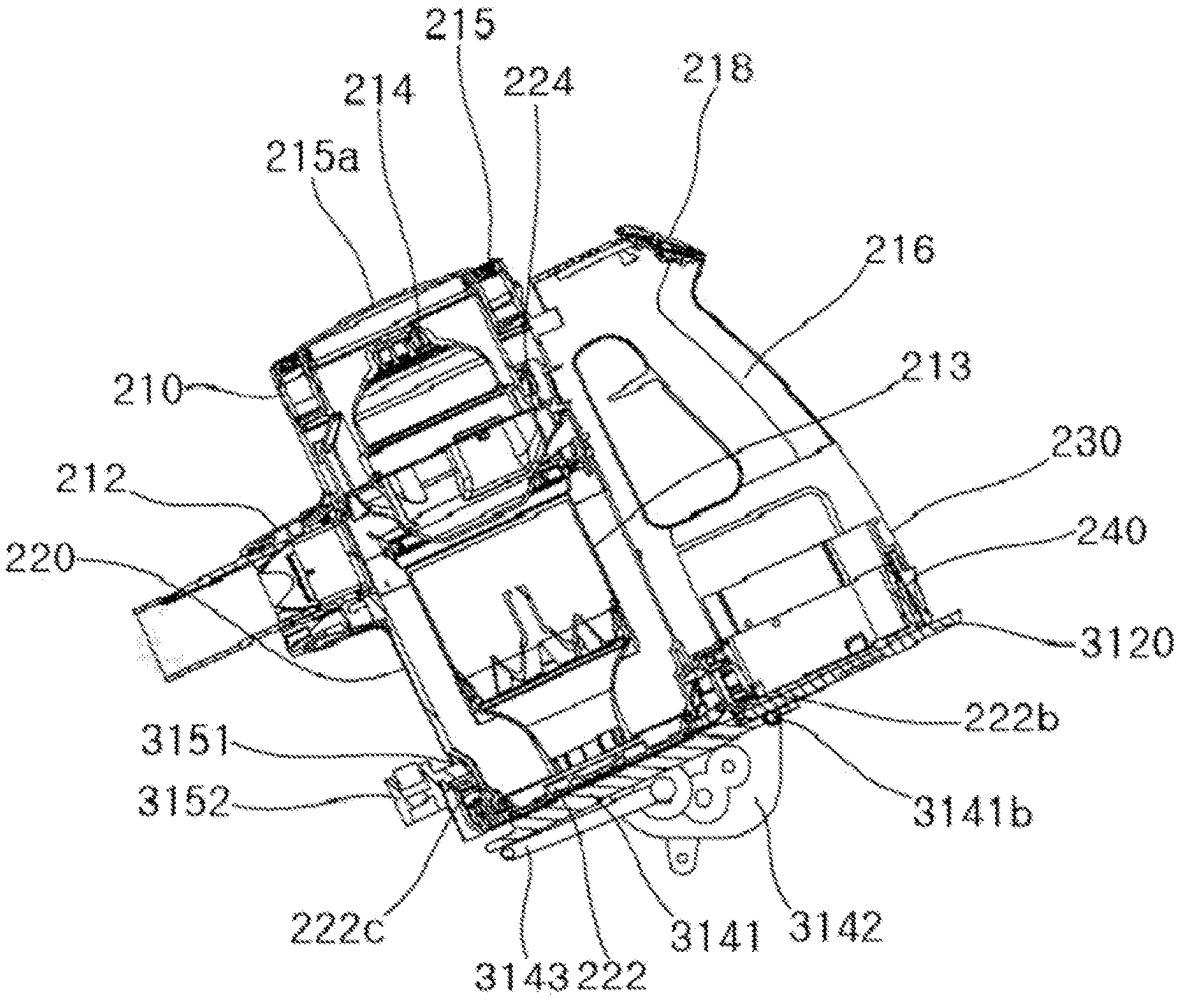
224
218
215a
216
210
213
230
212
240
220
3120
222b
3151
3141b
3152
3143
3142
222
222c
3141

FIG. 46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224
218
215a
216
213
210
230
212
240
220
3120
222b
3151
3152
3141b
222c
3141
3142
3143
222

FIG. 47

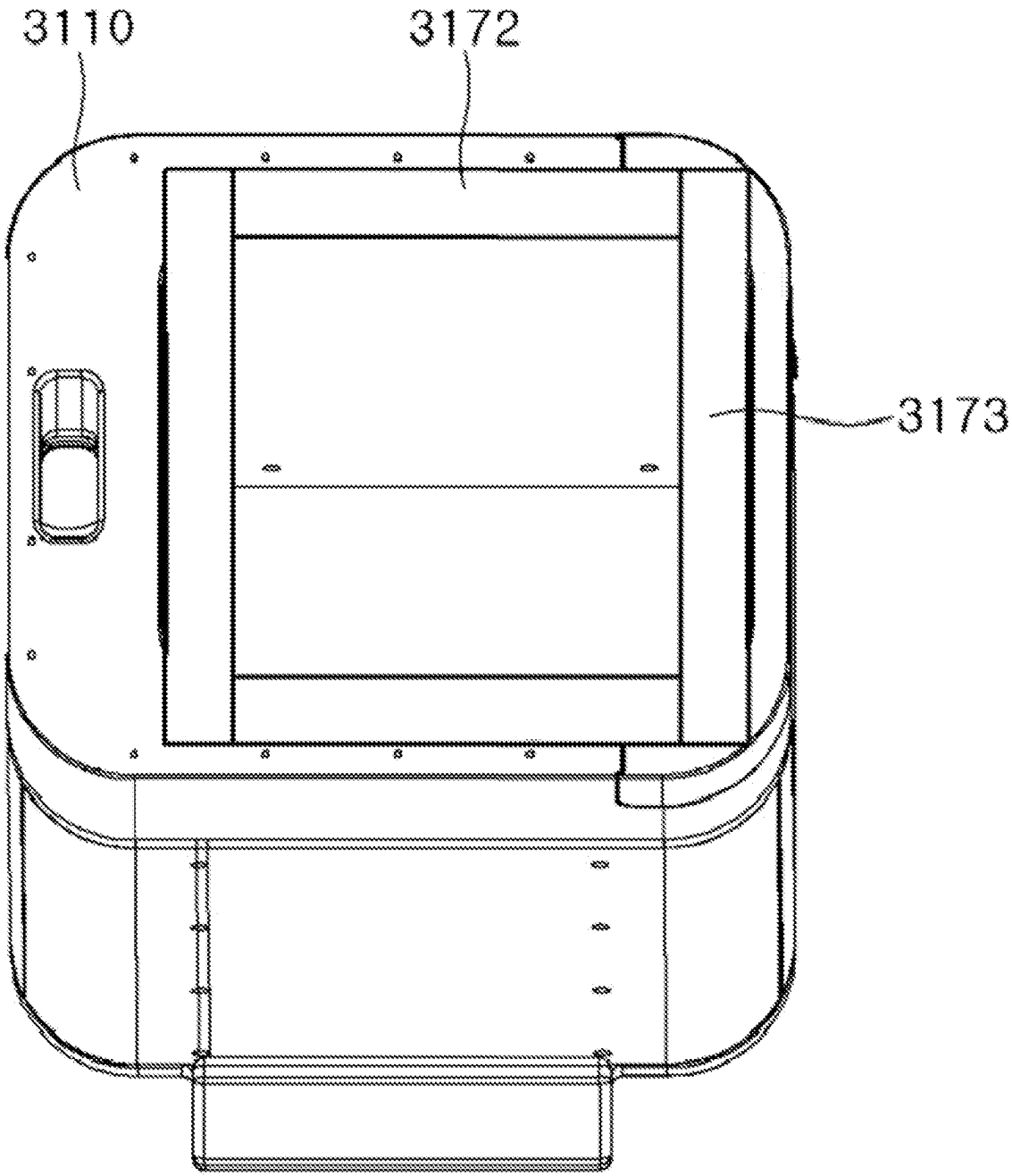


FIG. 48

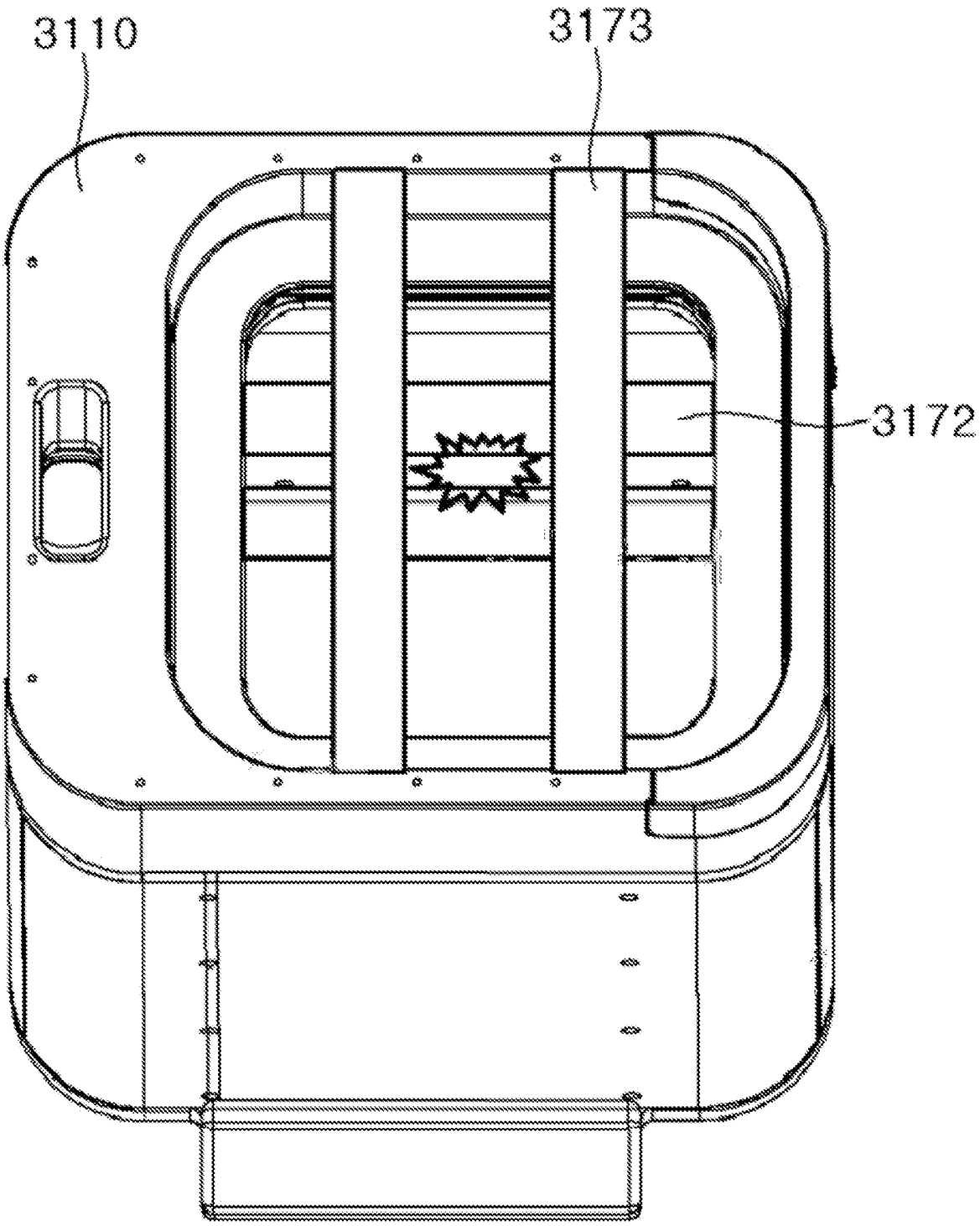


FIG. 49

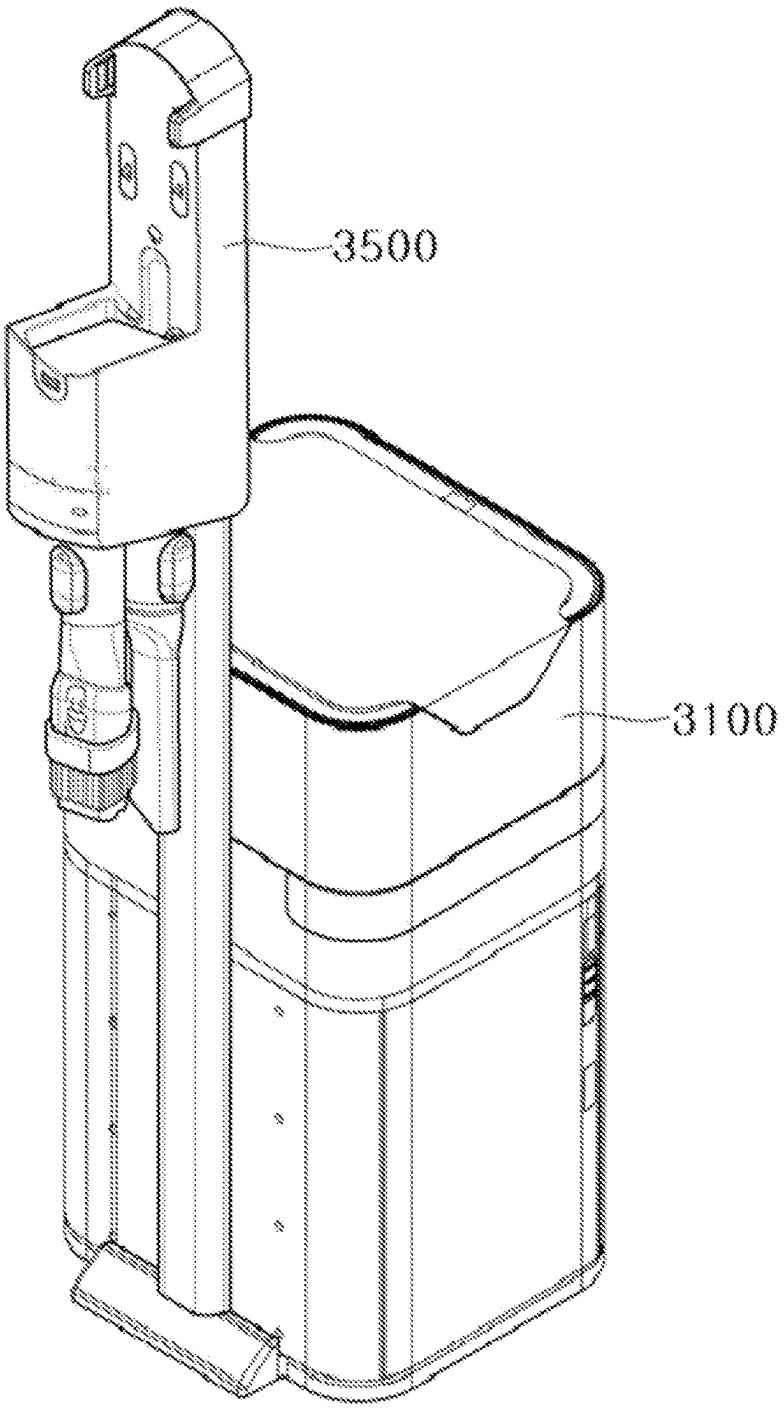


FIG. 50

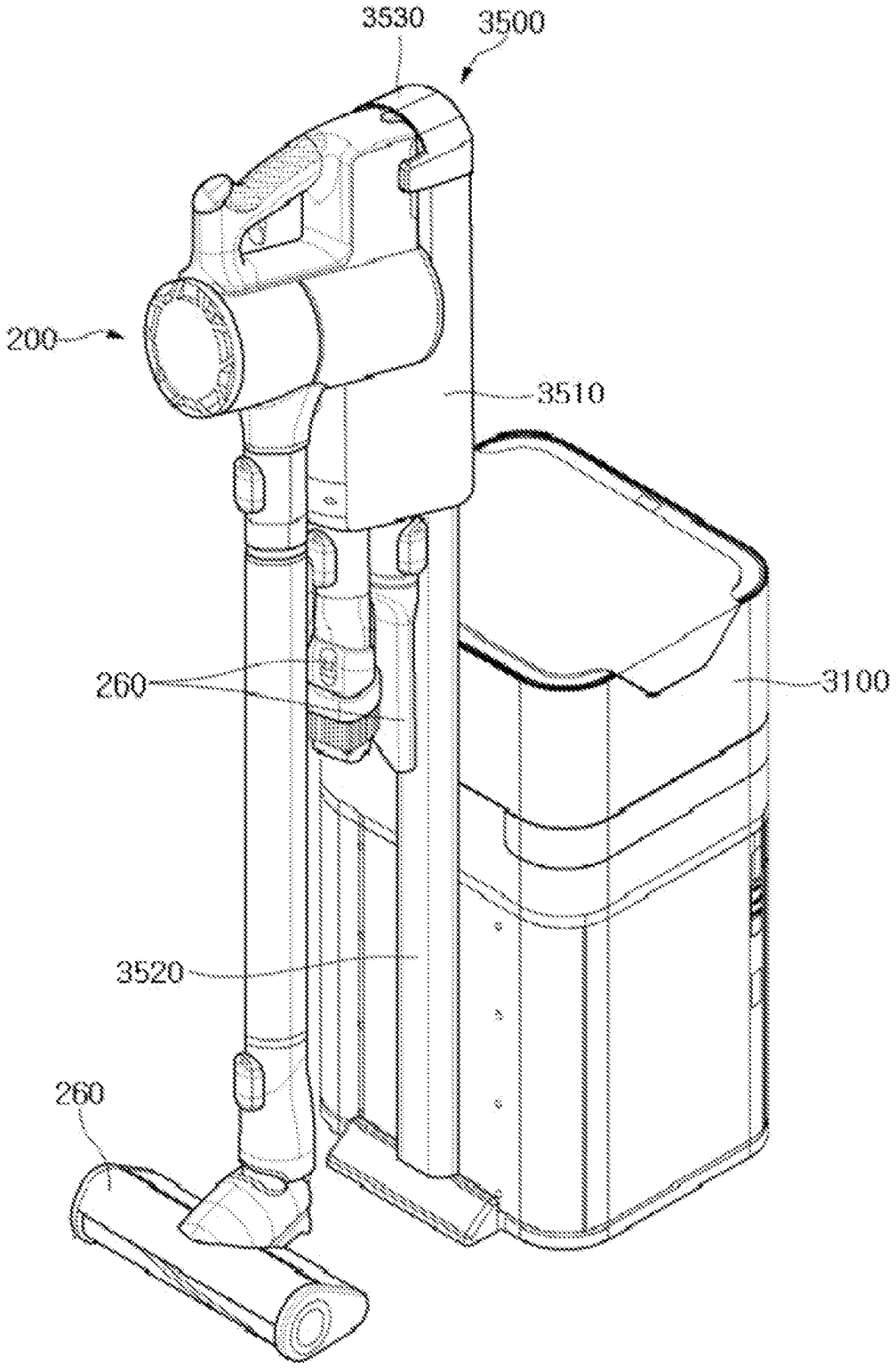


FIG. 51

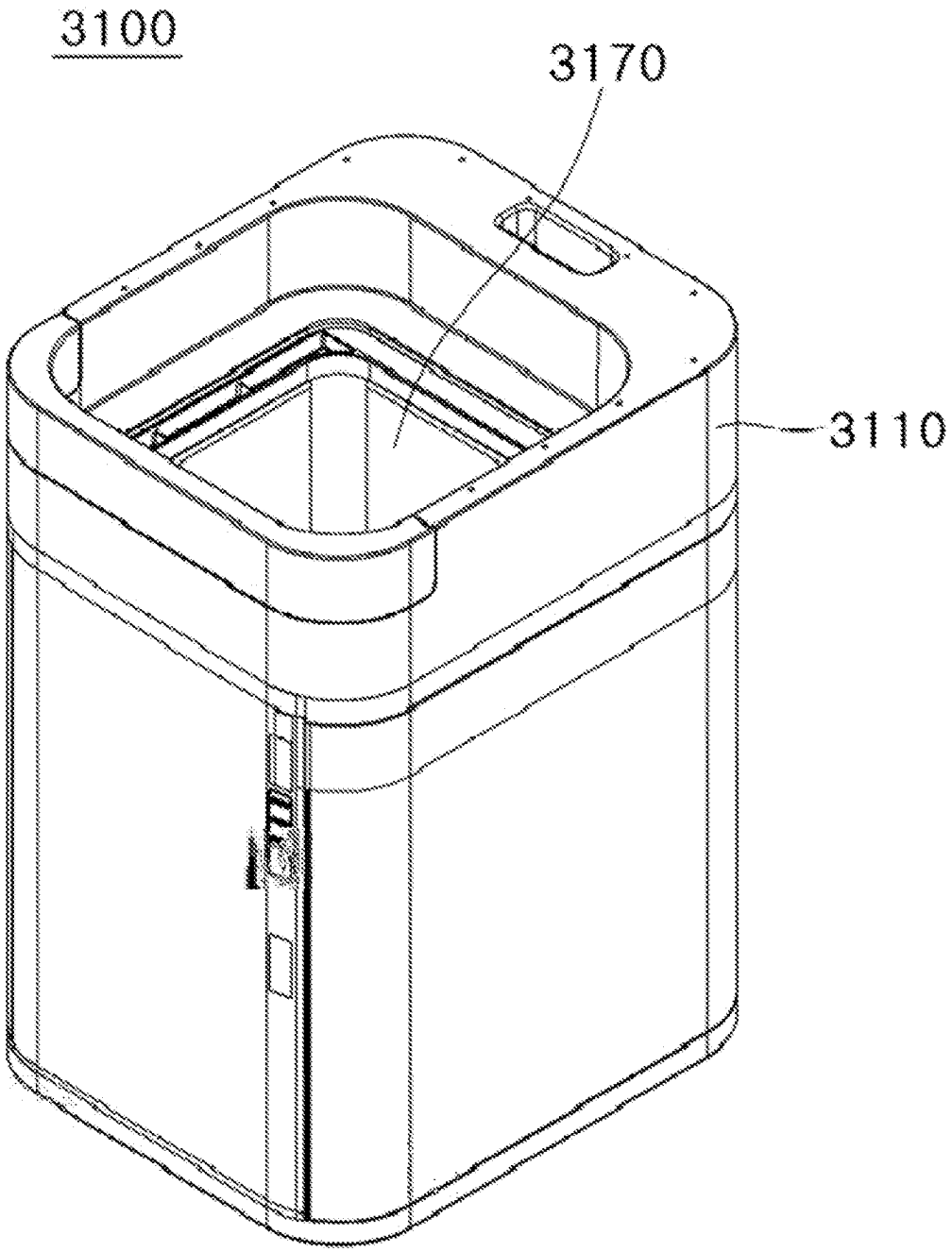


FIG. 52

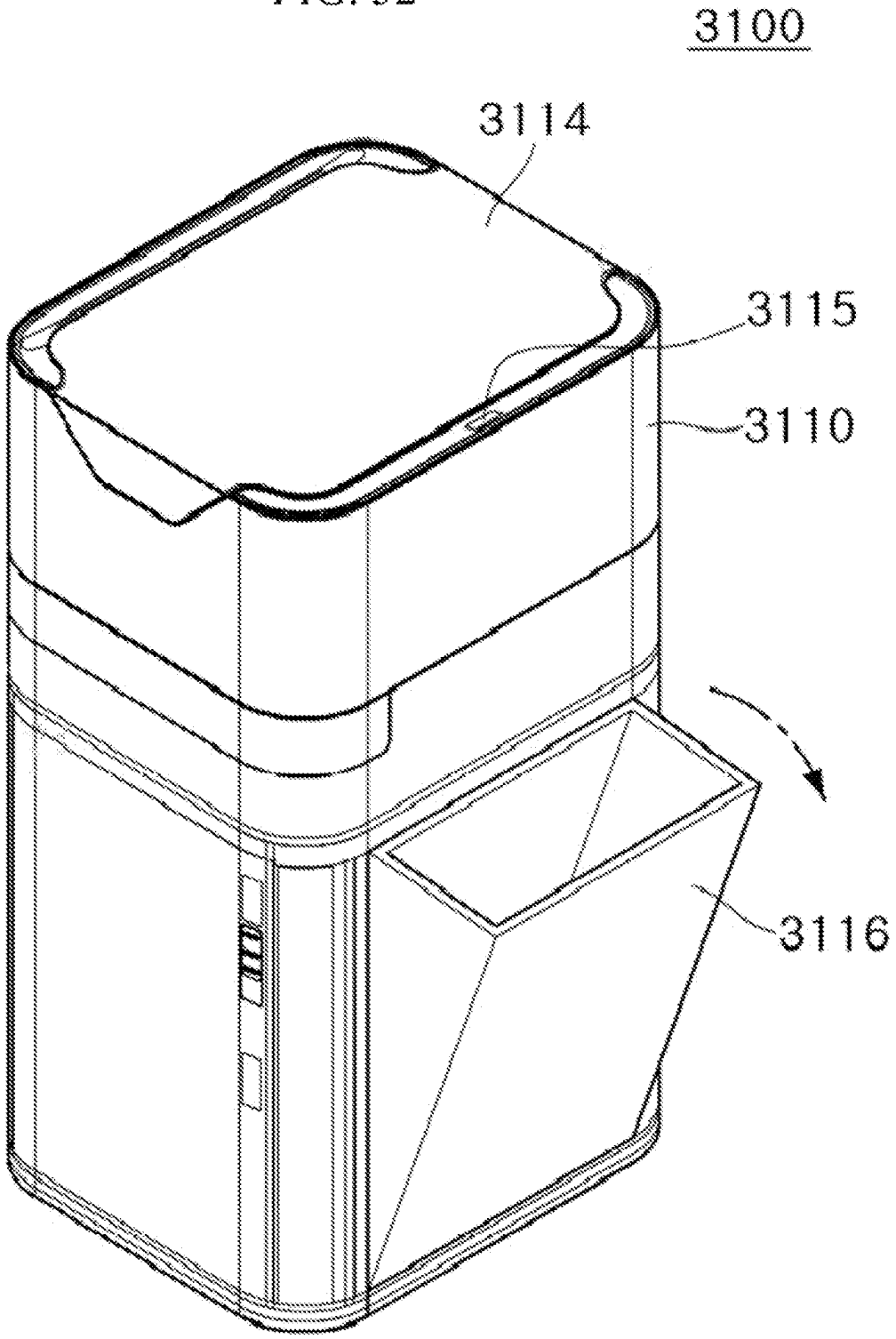


FIG. 53

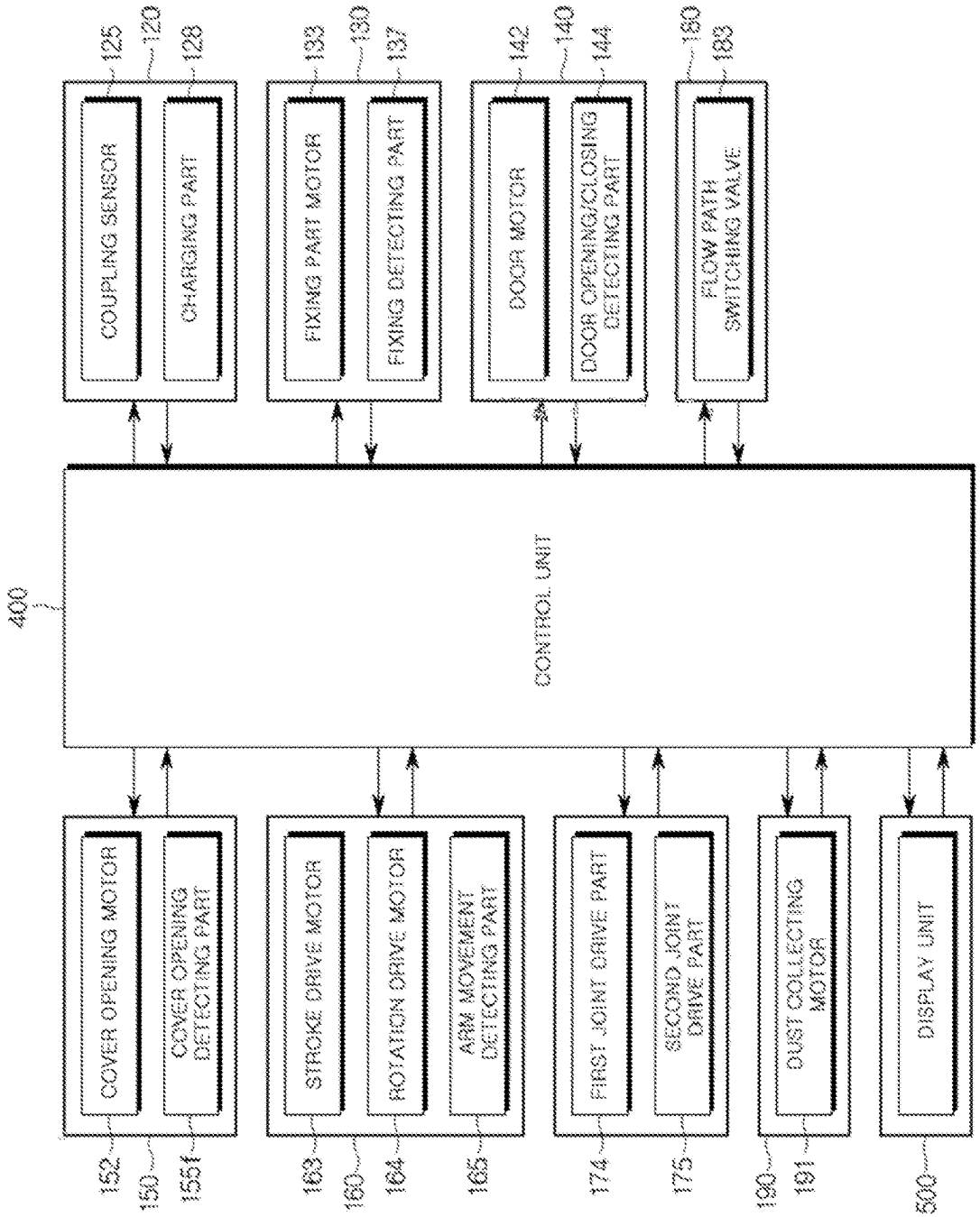

400
CONTROL UNIT
125
120
128
COUPLING SENSOR
CHARGING PART
133
130
137
FIXING PART MOTOR
FIXING DETECTING PART
142
140
144
DOOR MOTOR
DOOR OPENING/CLOSING DETECTING PART
180
183
FLOW PATH SWITCHING VALVE
COVER OPENING MOTOR
COVER OPENING DETECTING PART
STROKE DRIVE MOTOR
ROTATION DRIVE MOTOR
ARM MOVEMENT DETECTING PART
FIRST JOINT DRIVE PART
SECOND JOINT DRIVE PART
DUST COLLECTING MOTOR
DISPLAY UNIT
152
150
151
163
160
164
165
174
175
190
191
500

FIG. 54

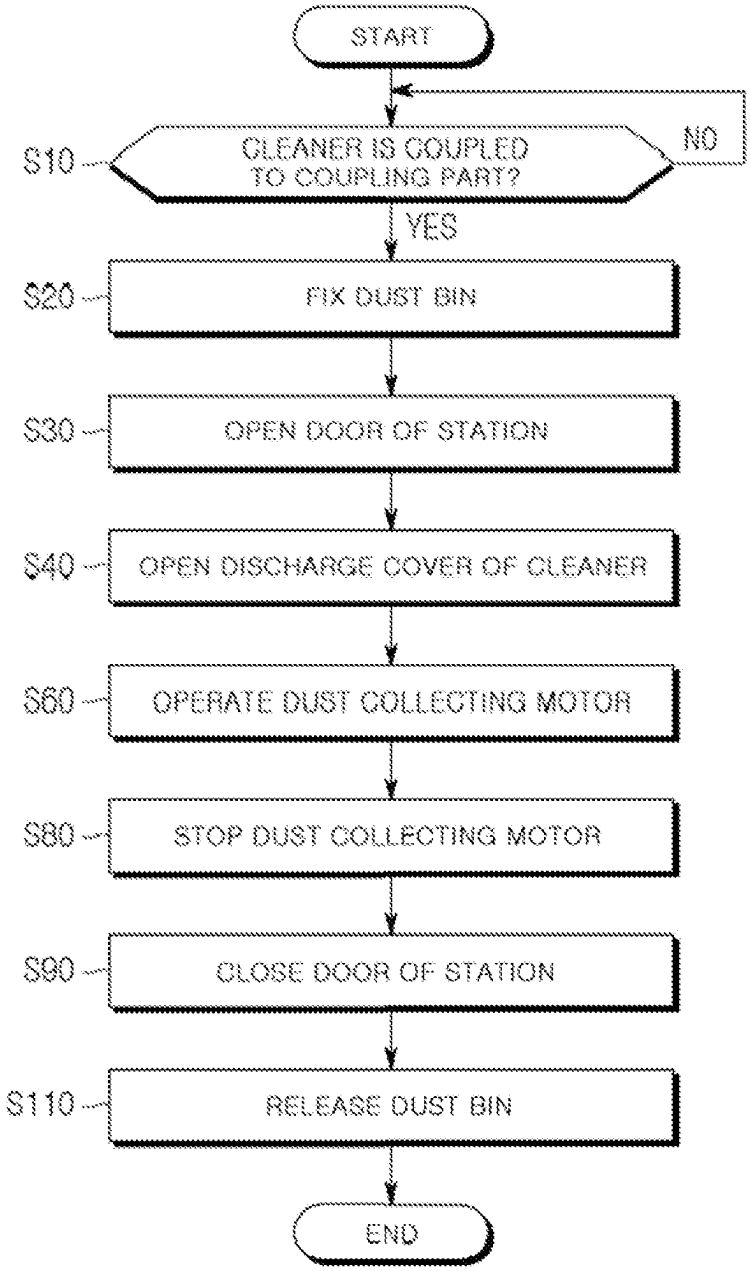

START
S10
CLEANER IS COUPLED TO COUPLING PART?
NO
YES
S20
FIX DUST BIN
S30
OPEN DOOR OF STATION
S40
OPEN DISCHARGE COVER OF CLEANER
S60
OPERATE DUST COLLECTING MOTOR
S80
STOP DUST COLLECTING MOTOR
S90
CLOSE DOOR OF STATION
S110
RELEASE DUST BIN
END

FIG. 55

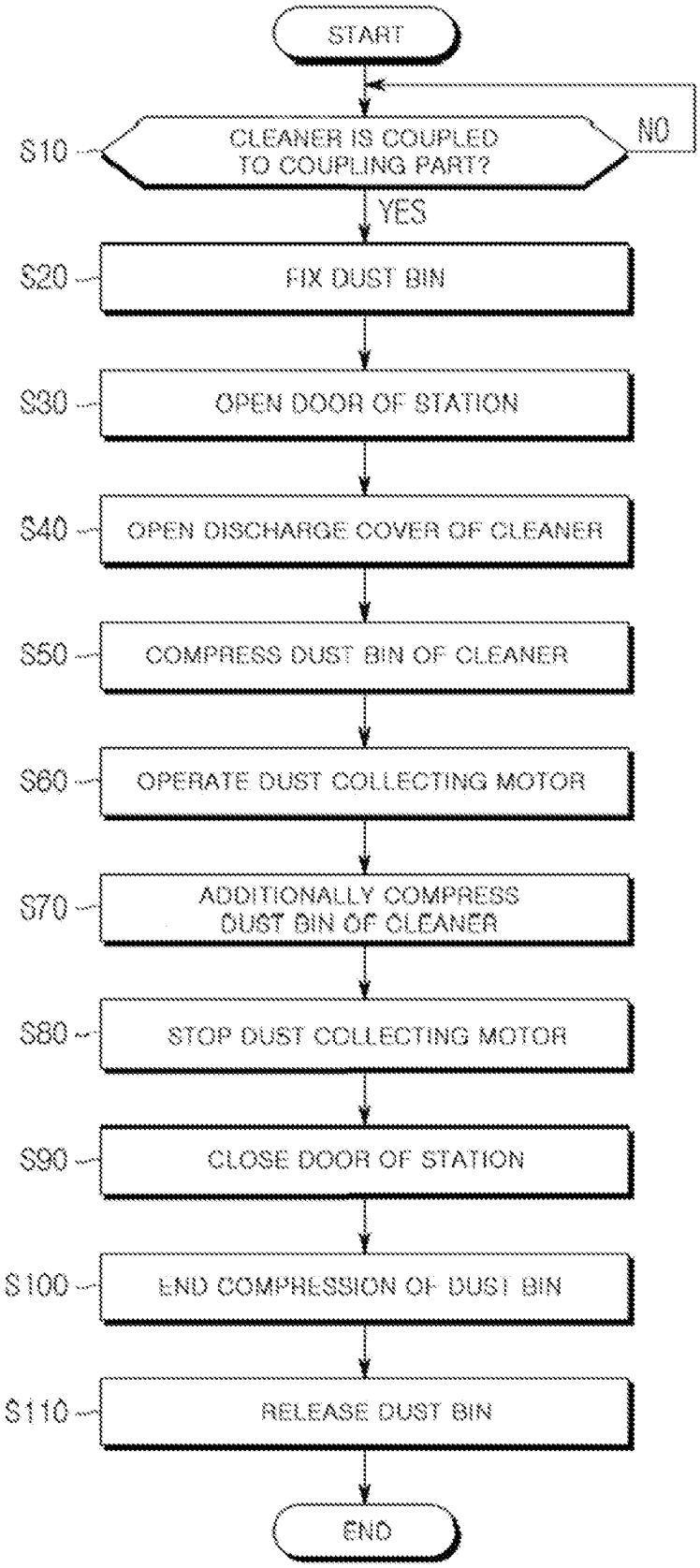

START
S10
CLEANER IS COUPLED TO COUPLING PART?
NO
YES
S20
FIX DUST BIN
S30
OPEN DOOR OF STATION
S40
OPEN DISCHARGE COVER OF CLEANER
S50
COMPRESS DUST BIN OF CLEANER
S60
OPERATE DUST COLLECTING MOTOR
S70
ADDITIONALLY COMPRESS DUST BIN OF CLEANER
S80
STOP DUST COLLECTING MOTOR
S90
CLOSE DOOR OF STATION
S100
END COMPRESSION OF DUST BIN
S110
RELEASE DUST BIN
END

FIG. 56

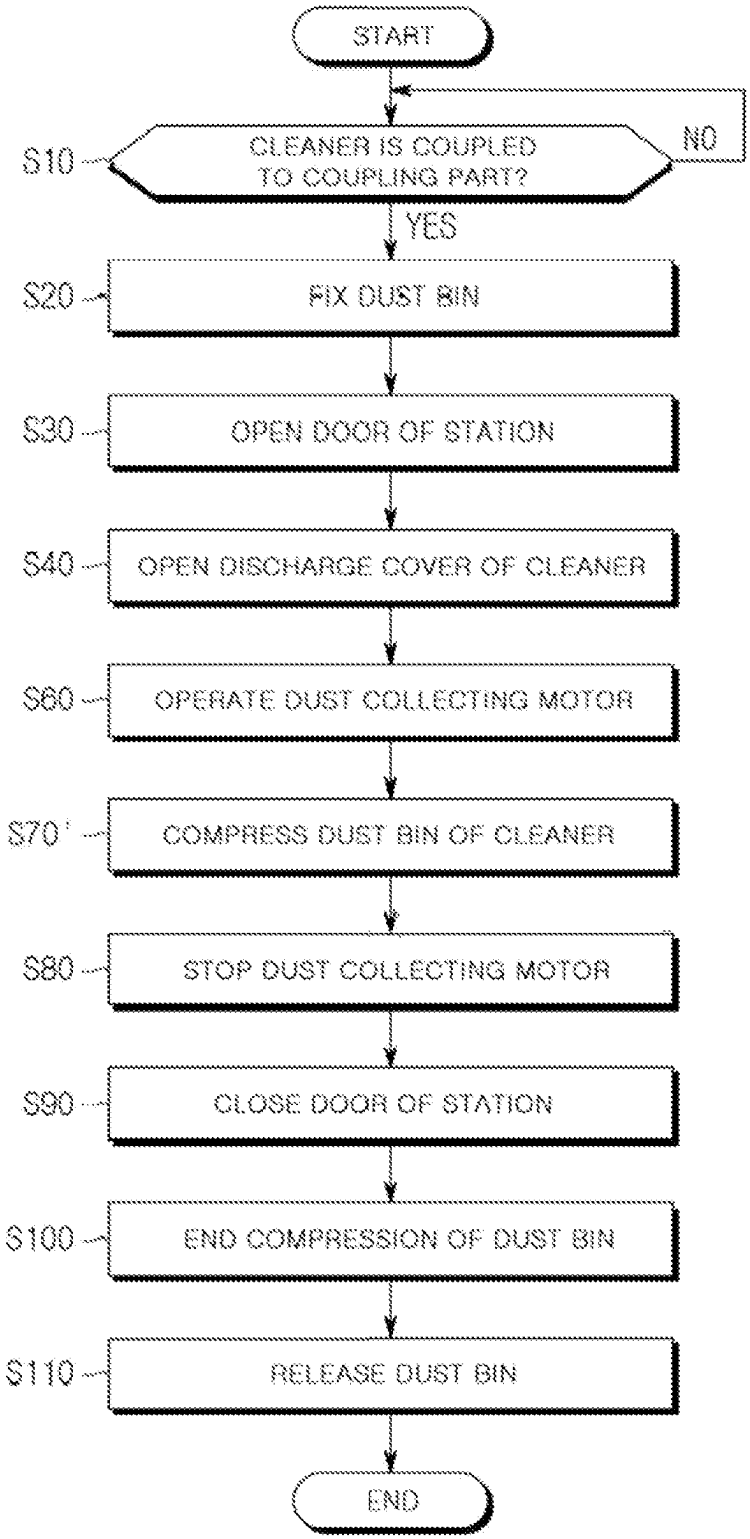
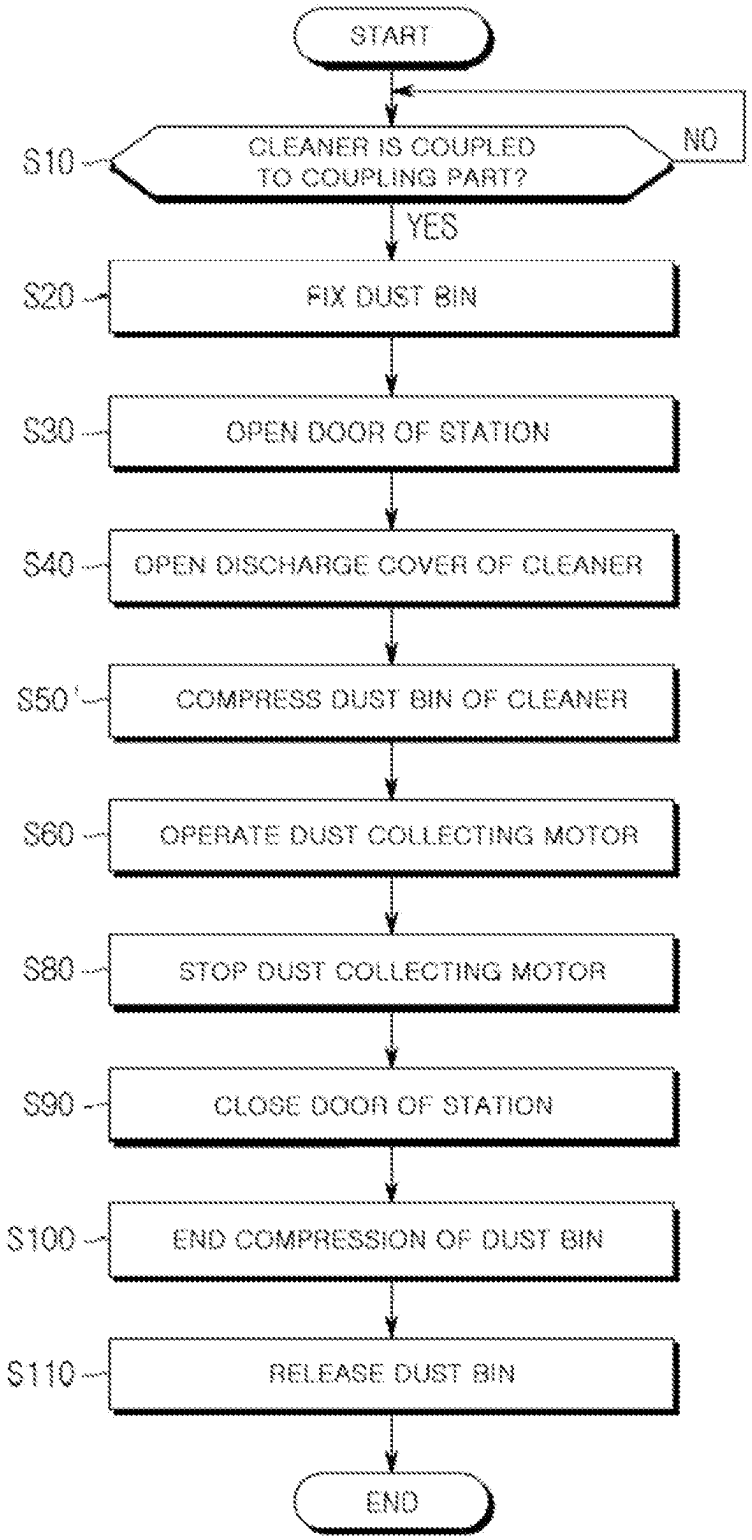

START
S10
CLEANER IS COUPLED TO COUPLING PART?
NO
YES
S20
FIX DUST BIN
S30
OPEN DOOR OF STATION
S40
OPEN DISCHARGE COVER OF CLEANER
S60
OPERATE DUST COLLECTING MOTOR
S70'
COMPRESS DUST BIN OF CLEANER
S80
STOP DUST COLLECTING MOTOR
S90
CLOSE DOOR OF STATION
S100
END COMPRESSION OF DUST BIN
S110
RELEASE DUST BIN
END

FIG. 57


START
S10
CLEANER IS COUPLED TO COUPLING PART?
NO
YES
S20
FIX DUST BIN
S30
OPEN DOOR OF STATION
S40
OPEN DISCHARGE COVER OF CLEANER
S50
COMPRESS DUST BIN OF CLEANER
S60
OPERATE DUST COLLECTING MOTOR
S80
STOP DUST COLLECTING MOTOR
S90
CLOSE DOOR OF STATION
S100
END COMPRESSION OF DUST BIN
S110
RELEASE DUST BIN
END

VACUUM CLEANER STATION, VACUUM CLEANER SYSTEM, AND METHOD FOR CONTROLLING VACUUM CLEANER STATION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 17/799,504, filed on Aug. 12, 2022, which is a National Stage application under 35 U.S.C. § 371 of International Application No. PCT/KR2021/002565, filed on Mar. 2, 2021, which claims the benefit of Korean Application No. 10-2020-0145692, filed Nov. 4, 2020, Korean Application No. 10-2020-0084782, filed Jul. 9, 2020, Korean Application No. 10-2020-0075901, filed on Jun. 22, 2020, and Korean Application No. 10-2020-0026803, filed Mar. 3, 2020. The disclosures of the prior applications are incorporated by reference in their entirety.

TECHNICAL FIELD

The present disclosure relates to a cleaner station, a cleaner system, and a method of controlling the cleaner station, and more particularly, to a cleaner, a cleaner station configured to suck dust, stored in the cleaner, into the cleaner station, a cleaner system, and a method of controlling the cleaner station.

BACKGROUND

In general, a cleaner refers to an electrical appliance that draws in small garbage or dust by sucking air using electricity and fills a dust bin provided in a product with the garbage or dust. Such a cleaner is generally called a vacuum cleaner.

The cleaners may be classified into a manual cleaner which is moved directly by a user to perform a cleaning operation, and an automatic cleaner which performs a cleaning operation while autonomously traveling. Depending on the shape of the cleaner, the manual cleaners may be classified into a canister cleaner, an upright cleaner, a handy cleaner, a stick cleaner, and the like.

The canister cleaners were widely used in the past as household cleaners. However, recently, there is an increasing tendency to use the handy cleaner and the stick cleaner in which a dust bin and a cleaner main body are integrally provided to improve convenience of use.

In the case of the canister cleaner, a main body and a suction port are connected by a rubber hose or pipe, and in some instances, the canister cleaner may be used in a state in which a brush is fitted into the suction port.

The handy cleaner (hand vacuum cleaner) has maximized portability and is light in weight. However, because the handy cleaner has a short length, there may be a limitation to a cleaning region. Therefore, the handy cleaner is used to clean a local place such as a desk, a sofa, or an interior of a vehicle.

A user may use the stick cleaner while standing and thus may perform a cleaning operation without bending his/her waist. Therefore, the stick cleaner is advantageous for the user to clean a wide region while moving in the region. The handy cleaner may be used to clean a narrow space, whereas the stick cleaner may be used to clean a wide space and also used to a high place that the user's hand cannot reach.

Recently, modularized stick cleaners are provided, such that types of cleaners are actively changed and used to clean various places.

In addition, recently, a robot cleaner, which autonomously performs a cleaning operation without a user's manipulation, is used. The robot cleaner automatically cleans a zone to be cleaned by sucking foreign substances such as dust from the floor while autonomously traveling in the zone to be cleaned.

To this end, the robot cleaner includes a distance sensor configured to detect a distance from an obstacle such as furniture, office supplies, or walls installed in the zone to be cleaned, and left and right wheels for moving the robot cleaner.

In this case, the left wheel and the right wheel are configured to be rotated by a left wheel motor and a right wheel motor, respectively, and the robot cleaner cleans the room while autonomously changing its direction by operating the left wheel motor and the right wheel motor.

However, because the handy cleaner, the stick cleaner, or the robot cleaner in the related art has a dust bin with a small capacity for storing collected dust, which inconveniences the user because the user needs to empty the dust bin frequently.

In addition, because the dust scatters during the process of emptying the dust bin, there is a problem in that the scattering dust has a harmful effect on the user's health.

In addition, if residual dust is not removed from the dust bin, there is a problem in that a suction force of the cleaner deteriorates.

In addition, if the residual dust is not removed from the dust bin, there is a problem in that the residual dust causes an offensive odor.

Meanwhile, Patent Document KR2020-0074054A discloses a vacuum cleaner and a docking station.

In the case of a cleaner station, a structure, which is docked to a dust collecting container, is disposed to be directed upward. In this case, a method of separating a dust bin from the cleaner and then coupling only the dust bin may be used. However, there is inconvenience in that the user needs to directly separate the dust bin from the cleaner.

In addition, in the above-mentioned vacuum cleaner, an axis of an extension tube, an axis of a suction port, and an axis of the dust collecting container are disposed in parallel with one another. In this case, even though the cleaner mounted with the dust collecting container may be coupled to the station, a flow path through which dust and air may flow needs to be bent at least two times in order to introduce the air and the dust into the station. For this reason, there is a problem in that the structure of the flow path is complicated and efficiency in collecting the dust deteriorates.

Meanwhile, Patent Document JP2017-189453 discloses a station device for removing dust from a hand stick cleaner.

In a vacuum cleaner, an axis of an extension tube, an axis of a suction port, and an axis of a dust bin are disposed in parallel with one another. In the station device, a structure to be coupled to the dust bin of the vacuum cleaner is disposed to be directed upward. That is, the vacuum cleaner is mounted on an upper portion of the station.

However, the dust bin is exposed to the outside when the vacuum cleaner is mounted on the station, which may cause discomfort to the user.

In addition, if external impact is applied in a state in which a main body of the vacuum cleaner is coupled to the upper portion of the station, the main body of the vacuum cleaner is likely to fall down.

Patent Document US 2020-0129025 A1 discloses a dust bin to be combined with a stick vacuum cleaner.

In the combination the dust bin and the vacuum cleaner of the patent document, the vacuum cleaner is disposed to be coupled to the dust bin.

The dust bin of the patent document has an upper surface to which the vacuum cleaner is coupled.

However, a height of the upper surface of the dust bin to which the vacuum cleaner is coupled is low with respect to the ground surface, which causes discomfort to the user because the user needs to bend his/her waist to couple the vacuum cleaner to the dust bin.

Further, there is a problem in that the user needs to directly assemble the vacuum cleaner and the dust bin.

In addition, there is a problem in that it is impossible to compress dust in the vacuum cleaner to remove the dust remaining in the cleaner.

Meanwhile, U.S. Pat. No. 10,595,692 B2 discloses a discharge station having a debris bin of a robot cleaner.

In the above-mentioned patent document, a station to which the robot cleaner is docked is provided, and the station has a flow path through which dust is sucked in a direction perpendicular to the ground surface. Further, a sensor is provided to sense docking between the robot cleaner and the station, and a motor operates to suck the dust from the robot cleaner during the docking process.

However, there is a problem in that the station of the above-mentioned patent document has no structure for coupling the stick cleaner. Further, the dust is sucked merely in a state in which the robot cleaner is coupled to a connector of the station, but there is no component for checking whether the cleaner is coupled, fixing the cleaner, and opening or closing the suction port.

Moreover, a height of the station according to the patent document is relatively low, whereas a dust collecting motor for sucking the dust from the robot cleaner is disposed at an upper side thereof.

Because of this configuration, even in a case in which the stick cleaner is mounted on the station, an overall center of gravity of the station on which the stick cleaner is mounted is concentrated on the upper side thereof. As a result, there is a problem in that the station may easily fall down and thus be broken down due to impact.

SUMMARY

The present disclosure has been made in an effort to solve the above-mentioned problems of the cleaner system in the related art, and an object of the present disclosure is to provide a cleaner station, a cleaner system, and a method of controlling the cleaner station, which are capable of eliminating inconvenience caused because a user needs to empty a dust bin all the time.

In addition, an object of the present disclosure is to provide a cleaner station, a cleaner system, and a method of controlling the cleaner station, which are capable of preventing dust from scattering when emptying a dust bin.

In addition, an object of the present disclosure is to provide a cleaner station, a cleaner system, and a method of controlling the cleaner station, in which when a cleaner is coupled to the cleaner station, the coupling of the cleaner may be detected, the cleaner may be automatically fixed, a suction port (door) of the cleaner station may be opened, and a cover of a dust bin of the cleaner may be opened.

In addition, an object of the present disclosure is to provide a cleaner station, a cleaner system, and a method of controlling the cleaner station, which are capable of removing dust in a dust bin without a user's separate manipulation.

In addition, an object of the present disclosure is to provide a cleaner station, a cleaner system, and a method of controlling the cleaner station, which are capable of removing an offensive odor caused by residual dust by preventing the residual dust from remaining in a dust bin.

In addition, an object of the present disclosure is to provide a cleaner station and a cleaner system, in which when a cleaner is coupled to the station, the cleaner and the station may be stably supported without falling down.

In addition, an object of the present disclosure is to provide a cleaner station and a cleaner system, in which a cleaner may be mounted in a state in which an extension tube and a cleaning module are mounted.

In addition, an object of the present disclosure is to provide a cleaner station and a cleaner system, which are capable of minimizing an occupied space on a horizontal plane even in a state in which a cleaner is mounted.

In addition, an object of the present disclosure is to provide a cleaner station and a cleaner system, which are capable of minimizing a loss of flow force for collecting dust.

In addition, an object of the present disclosure is to provide a cleaner station and a cleaner system, in which dust in a dust bin is invisible from the outside in a state in which a cleaner is mounted.

In addition, an object of the present disclosure is to provide a cleaner station and a cleaner system, which are capable of allowing a user to couple a cleaner to the station without bending his/her waist.

In addition, an object of the present disclosure is to provide a cleaner station and a cleaner system, which are capable of allowing a user to easily couple a cleaner to the cleaner station only by simply moving his/her wrist or forearm in a state in which the user grasps the cleaner.

In addition, an object of the present disclosure is to provide a cleaner station and a cleaner system, in which a stick cleaner and a robot cleaner may be coupled to the cleaner station at the same time, and as necessary, dust in a dust bin of the stick cleaner and dust in a dust bin of the robot cleaner may be selectively removed.

In order to achieve the above-mentioned objects, a cleaner system according to the present disclosure may include: a cleaner including: a suction part having a suction flow path through which air flows; a suction motor configured to generate a suction force for sucking the air along the suction part; a dust separating part having two or more cyclone parts configured to separate dust from the air introduced through the suction part; a dust bin configured to store the dust separated by the dust separating part; and a handle including a first extension portion extending toward the suction motor, a second extension portion extending toward the dust bin, and a grip portion connecting the first extension portion and the second extension portion; and a cleaner station including: a coupling part to which the dust bin is coupled; a dust collecting part into which the dust in the dust bin is collected; and a dust suction module having a dust collecting motor configured to generate a suction force for sucking the dust in the dust bin into the dust collecting part.

In this case, the cleaner system may include an imaginary plane including an imaginary suction flow path through line penetrating a suction flow path in a longitudinal direction and an imaginary suction motor axis defined by extending a rotation axis of a suction motor.

The plane may include an imaginary grip portion through line formed in a longitudinal direction of the grip portion and penetrating an inside of the grip portion.

The plane may include an imaginary dust collecting motor axis defined by extending a rotation axis of the dust collecting motor.

The plane may include an imaginary dust bin through line penetrating the dust bin in the longitudinal direction.

When the cleaner is coupled to the cleaner station, the plane may penetrate at least a part of the dust collecting motor.

The suction flow path through line may intersect the suction motor axis.

The suction flow path through line may intersect the imaginary grip portion through line formed in the longitudinal direction of the grip portion and penetrating the inside of the grip portion.

When the cleaner is coupled to the cleaner station, the suction motor axis may intersect an imaginary dust collecting motor axis defined by extending an axis of the dust collecting motor, and a height from a ground surface to an intersection point between the suction motor axis and the dust collecting motor axis may be equal to or less than a maximum height of the cleaner station.

The cleaner station may further include a flow path part having a flow path that allows an internal space of the dust bin and an internal space of the dust collecting part to communicate with each other when the cleaner is coupled to the cleaner station.

In this case, in the state in which the cleaner is coupled to the cleaner station, the imaginary dust bin through line penetrating the dust bin in the longitudinal direction and the imaginary dust collecting motor axis defined by extending the rotation axis of the dust collecting motor may intersect each other in the flow path part.

The flow path part may include: a first flow path configured to communicate with the internal space of the dust bin when the cleaner is coupled to the cleaner station; and a second flow path formed at a predetermined angle with respect to the first flow path and configured to allow the first flow path and the internal space of the dust collecting part to communicate with each other.

A length of the first flow path may be equal to or less than a length of the second flow path.

The cleaner station may further include a housing configured to define an external appearance of the cleaner station and accommodate the dust collecting part and the dust suction module.

The cleaner is coupled to the lateral surface of the housing. When the cleaner is coupled to the cleaner station, the imaginary grip portion through line penetrating the inside of the grip portion and extending in the longitudinal direction of the grip portion formed in a column shape may intersect the imaginary dust collecting motor axis defined by extending the axis of the dust collecting motor, and the intersection point between the grip portion through line and the dust collecting motor axis may be positioned in the housing.

The cleaner system according to the present disclosure may further include an imaginary plane including the grip portion through line and the dust collecting motor axis.

The plane may include the grip portion through line and the imaginary suction flow path through line penetrating the suction flow path in the longitudinal direction.

In the cleaner system according to the present disclosure, when the cleaner is coupled to the cleaner station, the grip portion through line intersects the suction flow path through line, and a height from the ground surface to the intersection point between the grip portion through line and the suction flow path through line may be equal to or less than a maximum height of the housing.

The plane may include the dust collecting motor axis, and the imaginary suction motor axis defined by extending the rotation axis of the suction motor.

When the cleaner is coupled to the cleaner station, the dust collecting motor axis may intersect the suction motor axis.

The plane may include the dust collecting motor axis and the dust bin through line.

When the cleaner is coupled to the cleaner station, the dust collecting motor axis may intersect the dust bin through line.

In the state in which the cleaner is coupled to the cleaner station, a shortest distance from the ground surface to the grip portion may be 60 cm or more.

An included angle between the suction motor axis and the perpendicular line to the ground surface may be 40 degrees or more and 95 degrees or less.

The included angle between the suction motor axis and the perpendicular line to the ground surface may be 43 degrees or more and 90 degrees or less.

The plane may include the suction flow path through line and the grip portion through line.

When the cleaner is coupled to the cleaner station, the plane may penetrate at least a part of the dust collecting motor, and an orthogonal projection of the suction motor axis to the plane may intersect the suction flow path through line.

The coupling part may be disposed vertically above the dust collecting motor, the dust collecting motor is heavier than the suction motor, a distance from the dust collecting motor to the coupling part may be longer than a distance from the suction motor to the coupling part.

The suction motor axis and the dust collecting motor axis may intersect each other.

When the cleaner is coupled to the cleaner station, the coupling part may be disposed between the imaginary suction flow path through line penetrating the suction flow path in the longitudinal direction and the imaginary dust collecting motor axis defined by extending the rotation axis of the dust collecting motor.

The cleaner station may further include a fixing member configured to move from the outside of the dust bin toward the dust bin in order to fix the dust bin.

When the cleaner is coupled to the cleaner station, the fixing member may be disposed between the suction flow path through line and the dust collecting motor axis.

The cleaner station may further include a cover opening unit configured to open a discharge cover of the dust bin.

When the cleaner is coupled to the cleaner station, the cover opening unit may be disposed between the suction flow path through line and the dust collecting motor axis.

When the cleaner is coupled to the cleaner station, the handle may be positioned to be farther from the ground surface than is the imaginary suction motor axis defined by extending the axis of the suction motor.

The cleaner may further include a battery configured to supply power to the suction motor.

When the cleaner is coupled to the cleaner station, the battery may be positioned to be farther from the ground surface than is the imaginary suction motor axis defined by extending the axis of the suction motor.

When the cleaner is coupled to the cleaner station, the included angle between the imaginary suction motor axis

defined by extending the axis of the suction motor and the imaginary dust collecting motor axis defined by extending the axis of the dust collecting motor may be 40 degrees or more and 95 degrees or less.

The included angle between the suction motor axis and the dust collecting motor axis may be 43 degrees or more and 90 degrees or less.

When the main body of the cleaner is coupled to the cleaner station, the longitudinal axis of the dust bin and the longitudinal axis of the cleaner station may intersect each other.

When the main body of the cleaner is coupled to the cleaner station, the flow axis of the dust separating part and the longitudinal axis of the cleaner station may intersect each other.

The dust bin may be separable from the main body of the cleaner, when the dust bin is coupled to the cleaner station, the longitudinal axis of the dust bin and the longitudinal axis of the cleaner station may intersect each other.

When the main body of the cleaner is coupled to the cleaner station, the rotation axis of the suction motor and the longitudinal axis of the cleaner station may intersect each other.

The rotation axis of the suction motor may be disposed in parallel with the longitudinal axis of the dust bin.

The rotation axis of the suction motor may be disposed in parallel with the flow axis of the dust separating part.

The main body of the cleaner may be moved in the direction intersecting the longitudinal direction of the suction part and coupled to the coupling part.

The direction intersecting the longitudinal direction of the suction part may be a direction perpendicular to the longitudinal direction of the suction part.

The direction intersecting the longitudinal direction of the suction part may be a direction parallel to the ground surface.

The main body of the cleaner may be moved in the direction intersecting the longitudinal direction of the suction part, moved in the longitudinal direction of the suction part, and then coupled to the coupling part.

The main body of the cleaner may be moved along the longitudinal axis of the cleaner station and coupled to the coupling part.

The main body of the cleaner may be moved along the longitudinal axis of the cleaner station, moved in the direction perpendicular to the longitudinal direction of the suction part, and then coupled to the coupling part.

The main body of the cleaner may be moved vertically downward and coupled to the coupling part.

In order to achieve the above-mentioned objects, a cleaner station according to the present disclosure may include: a housing; a coupling part disposed in the housing and including a coupling surface to which a first cleaner is coupled; a dust collecting part accommodated in the housing, disposed below the coupling part, and configured to capture dust in a dust bin of the first cleaner; a dust collecting motor accommodated in the housing, disposed below the dust collecting part, and configured to generate a suction force for sucking the dust in the dust bin; a fixing unit disposed on the coupling part and configured to fix the first cleaner; and a control unit configured to control the coupling part, the fixing unit, the door unit, the cover opening unit, the lever pulling unit, and the dust collecting motor.

In this case, the coupling part may further include a guide protrusion protruding from the coupling surface; and a coupling sensor disposed on the guide protrusion and configured to detect whether the first cleaner is coupled at an exact position.

When the first cleaner is coupled at the exact position, the coupling sensor may transmit a signal indicating that the first cleaner is coupled.

The fixing unit may include: a fixing member configured to move from the outside of the dust bin toward the dust bin in order to fix the dust bin when the first cleaner is coupled to the coupling part; and a fixing drive part configured to provide power for moving the fixing member.

The control unit may receive the signal, which indicates that the first cleaner is coupled, from the coupling sensor.

When the control unit receives the signal, which indicates that the cleaner is coupled, from the coupling sensor, the control unit may operate the fixing drive part so that the fixing member fixes the dust bin.

The fixing unit may further include a fixing detecting part capable of detecting a movement of the fixing member.

When the fixing detecting part detects that the fixing member is moved to the position at which the fixing member fixes the dust bin, the fixing detecting part may transmit a signal indicating that the dust bin is fixed.

The control unit may receive the signal, which indicates that the dust bin is fixed, from the fixing detecting part and stop the operation of the fixing drive part.

When at least a part of the cleaner is coupled at the exact position on the coupling part, the fixing drive part may operate to move the fixing member.

The cleaner station according to the present disclosure may further include a door unit including a door coupled to the coupling surface and configured to open or close a dust passage hole formed in the coupling surface so that outside air may be introduced into the housing.

The door unit may include: the door hingedly coupled to the coupling surface and configured to open or close the dust passage hole; and a door motor configured to provide power for rotating the door.

In this case, when the dust bin is fixed, the control unit may operate the door motor to open the dust passage hole.

When the dust bin is fixed, the door motor may operate to rotate the door and open the dust passage hole.

The door unit may further include a door opening/closing detecting part configured to detect whether the door is opened or closed.

When the door opening/closing detecting part detects that the door is opened, the door opening/closing detecting part may transmit a signal indicating that the door is opened.

On the basis of whether power is supplied to the battery of the first cleaner, the control unit may check whether the first cleaner is coupled.

The control unit may receive the signal, which indicates that the door is opened, and stop the operation of the door motor.

The cleaner station according to the present disclosure may further include a cover opening unit disposed on the coupling part and configured to open a discharge cover of the dust bin.

The cover opening unit may include: a push protrusion configured to move when the first cleaner is coupled; and a cover opening drive part configured to provide power for moving the push protrusion.

In this case, when the door is opened, the control unit may operate the cover opening drive part to open the discharge cover.

The cover opening unit may further include a cover opening detecting part configured to detect whether the discharge cover is opened.

When the cover opening detecting part detects that the discharge cover is opened, the cover opening detecting part may transmit a signal indicating that the discharge cover is opened.

The control unit may receive the signal, which indicates that the discharge cover is opened, and stop the operation of the cover opening drive part.

The cleaner station according to the present disclosure may further include a lever pulling unit accommodated in the housing and configured to stroke-move and rotate to pull a dust bin compression lever of the first cleaner.

The lever pulling unit may include a stroke drive motor disposed in the housing and configured to provide power for stroke-moving the lever pulling arm.

In this case, the control unit may operate the stroke drive motor to move the lever pulling arm to a height equal to or higher than a height of the dust bin compression lever.

The lever pulling unit may further include an arm movement detecting part configured to detect a movement of the lever pulling arm.

When the arm movement detecting part detects that the lever pulling arm is moved to the height equal to or higher than the height of the dust bin compression lever, the arm movement detecting part may transmit a signal indicating that the lever pulling arm is stroke-moved to a target position.

The control unit may receive the signal, which indicates that the lever pulling arm is stroke-moved to the target position, and stop the operation of the stroke drive motor.

Meanwhile, the lever pulling unit may further include a rotation drive motor configured to provide power for rotating the lever pulling arm.

In this case, when the lever pulling arm is moved to the height equal to or higher than the height of the dust bin compression lever, the control unit may operate the rotation drive motor to rotate the lever pulling arm to a position at which an end of the lever pulling arm may push the dust bin compression lever.

When the lever pulling arm is moved to the height equal to or higher than the height of the dust bin compression lever, the rotation drive motor may operate.

When the arm movement detecting part detects that the lever pulling arm is rotated to the position at which the lever pulling arm may push the dust bin compression lever, the arm movement detecting part may transmit a signal indicating that the lever pulling arm is rotated to a target position.

The control unit may receive the signal, which indicates that the lever pulling arm is rotated to the target position, and stop the operation of the rotation drive motor.

Meanwhile, when the lever pulling arm is moved to the position at which the end of the lever pulling arm may push the dust bin compression lever, the control unit may operate the stroke drive motor in a direction in which the lever pulling arm pulls the dust bin compression lever.

When the lever pulling arm is moved to the position at which the end of the lever pulling arm may push the dust bin compression lever, the stroke drive motor may operate.

When the arm movement detecting part detects that the lever pulling arm is moved to the target position when the compression lever is pulled, the arm movement detecting part may transmit a signal indicating that the lever pulling arm is pulled.

The control unit may receive the signal, which indicates that the lever pulling arm is pulled, and stop the operation of the stroke drive motor.

The control unit may operate the dust collecting motor and operate the stroke drive motor during the operation of the dust collecting motor so that the lever pulling arm pulls the dust bin compression lever at least once.

The stroke drive motor may be operated at least once during the operation of the dust collecting motor.

After the operation of the dust collecting motor is ended, the control unit may operate the door motor in a direction in which the door is closed.

The door motor may be operated after the operation of the dust collecting motor is ended.

After the operation of the dust collecting motor is ended, the control unit may operate the rotation drive motor to rotate and return the end of the lever pulling arm to the original position, and the control unit may operate the stroke drive motor to return the height of the lever pulling arm to the original position.

When the door is closed, the control unit may operate the fixing drive part so that the fixing member may release the dust bin.

The fixing drive part may operate when the door closes the dust passage hole.

In order to achieve the above-mentioned objects, a cleaner system according to the present disclosure may include: a cleaner comprising: a suction part; a suction motor configured to generate a suction force for sucking air along the suction part; a dust separating part configured to separate dust from the air introduced through the suction part; a dust bin configured to store the dust separated by the dust separating part; a discharge cover configured to selectively open or close a lower side of the dust bin; and a compression member configured to move in an internal space of the dust bin to compress the dust in the dust bin downward; and a cleaner station comprising: a coupling part to which the dust bin is coupled; a cover opening unit configured to separate the discharge cover from the dust bin; and a dust collecting part disposed below the coupling part.

In this case, when the discharge cover is separated from the dust bin, the dust in the dust bin may be captured into the dust collecting part by gravity.

In addition, when the discharge cover is separated from the dust bin, the compression member may move from the upper side to the lower side of the dust bin, thereby capturing the dust in the dust bin into the dust collecting part.

In addition, the cleaner may include a compression lever disposed outside the dust bin or the dust separating part and connected to the compression member.

In this case, when the compression lever is moved downward by an external force, the compression member may be moved from the upper side to the lower side of the dust bin to capture the dust in the dust bin into the dust collecting part.

In addition, the coupling part may include: a coupling surface formed at a predetermined angle with respect to the ground surface and configured such that a lower surface of the dust bin is coupled to the coupling surface; and a dust bin guide surface connected to the coupling surface and formed in a shape corresponding to an outer surface of the dust bin.

In addition, the cleaner station may include a first drive part configured to rotate the coupling surface.

In this case, when the dust bin is coupled to the coupling surface, the first drive part may rotate the coupling surface in parallel with the ground surface.

In addition, the cleaner may include: a hinge part configured to rotate the discharge cover with respect to the dust bin; and a coupling lever configured to couple the discharge cover to the dust bin.

In this case, the cover opening unit may selectively open or close the lower side of the dust bin by separating the coupling lever from the dust bin. In addition, the dust in the dust bin may be captured into the dust collecting part by impact that occurs when the discharge cover is separated from the dust bin.

In addition, the cleaner station may include: a coupling sensor configured to detect whether the dust bin is coupled to the coupling part; and a cover opening drive part configured to operate the cover opening unit when the dust bin is coupled to the coupling part.

In addition, the cleaner station may include: a door configured to couple the discharge cover, separated from the dust bin, to the dust bin; and a door motor configured to rotate the door to one side.

In addition, the cleaner station may include a first flow part configured to allow air to flow to the suction part.

In this case, the air flowing to the suction part may capture the dust in the dust bin into the dust collecting part.

In addition, the cleaner station may include: a sealing member configured to seal the suction part; and a second flow part configured to allow air to flow to the dust bin.

In this case, the air flowing to the dust bin may capture the dust in the dust bin into the dust collecting part.

In addition, the second flow part may include: a discharge part configured to discharge air, and a drive part configured to rotate the discharge part about a first shaft.

In addition, the cleaner station may include: the sealing member configured to seal the suction part; and a suction device configured to suck the dust in the dust bin to capture the dust into the dust collecting part.

In addition, the cleaner station may include a removing part configured to remove residual dust in the dust bin by moving in the dust bin.

In addition, the dust collecting part may include: a roll vinyl film configured to be spread by a load of the captured dust; and a joint part configured to cut and join the roll vinyl film.

In this case, the joint part may retract the roll vinyl film to a central region and join an upper portion of the roll vinyl film using a heating wire.

In order to achieve the above-mentioned objects, a cleaner station according to the present disclosure includes: a coupling part to which a dust bin is coupled; a cover opening unit configured to separate a discharge cover from the dust bin; and a dust collecting part disposed below the coupling part.

In this case, when the discharge cover is separated from the dust bin, the dust in the dust bin is captured into the dust collecting part by gravity.

In this case, the cleaner station may capture the dust from a cleaner including: a suction part; a suction motor configured to generate a suction force for sucking air along the suction part; a dust separating part configured to separate dust from the air introduced through the suction part; a dust bin configured to store the dust separated by the dust separating part; a discharge cover configured to selectively open or close a lower side of the dust bin; and a compression member configured to move in an internal space of the dust bin to compress the dust in the dust bin downward.

In addition, when the discharge cover is separated from the dust bin, the compression member may move from the upper side to the lower side of the dust bin, thereby capturing the dust in the dust bin into the dust collecting part.

In order to achieve the above-mentioned objects, a cleaner system according to the present disclosure may include: a first cleaner including: a suction part; a suction motor configured to generate a suction force for sucking air along the suction part; a dust separating part configured to separate dust from the air introduced through the suction part; a dust bin configured to store the dust separated by the dust separating part; and a discharge cover configured to selectively open or close a lower side of the dust bin; a second cleaner configured to travel in a movement space; and a cleaner station including: a coupling part to which the dust bin of the first cleaner is coupled; a cover opening unit configured to separate the discharge cover of the first cleaner from the dust bin; a dust collecting part disposed below the coupling part; a dust suction module connected to the dust collecting part; a first cleaner flow path part configured to connect the dust bin of the first cleaner to the dust collecting part; a second cleaner flow path part configured to connect the second cleaner to the dust collecting part; and a flow path switching valve configured to selectively open or close the first cleaner flow path part and the second cleaner flow path part.

In addition, the first cleaner may include a compression member configured to move in an internal space of the dust bin to compress the dust in the dust bin downward.

In addition, when the discharge cover is separated from the dust bin, the compression member may move from the upper side to the lower side of the dust bin, thereby capturing the dust in the dust bin into the dust collecting part.

In addition, when the discharge cover is separated from the dust bin, the dust in the dust bin may pass through the first cleaner flow path part and then be captured into the dust collecting part by gravity.

In order to achieve the above-mentioned objects, a method of controlling a cleaner station according to the present disclosure may include: a dust bin fixing step of holding and fixing, by a fixing member of the cleaner station, a dust bin of a first cleaner when the first cleaner is coupled to the cleaner station; a door opening step of opening a door of the cleaner station when the dust bin is fixed; a cover opening step of opening a discharge cover configured to open or close the dust bin when the door is opened; and a dust collecting step of collecting dust in the dust bin by operating a dust collecting motor of the cleaner station when the discharge cover is opened.

The method of controlling the cleaner station according to the present disclosure may further include a dust bin compressing step of compressing an inside of the dust bin when the discharge cover is opened.

The dust bin compressing step may include: a first compression preparing step of stroke-moving a lever pulling arm of the cleaner station to a height at which the lever pulling arm may push a dust bin compression lever of the first cleaner; a second compression preparing step of rotating the lever pulling arm to a position at which the lever pulling arm may push the dust bin compression lever; and a lever pulling step of pulling, by the lever pulling arm, the dust bin compression lever at least once after the second compression preparing step.

The method of controlling the cleaner station according to the present disclosure may further include a compression ending step of returning the lever pulling arm to an original position after the dust bin compressing step.

The compression ending step may include: a first returning step of rotating the lever pulling arm to the original

position; and a second returning step of stroke-moving the lever pulling arm to the original position.

The method of controlling the cleaner station according to the present disclosure may further include a coupling checking step of checking whether the first cleaner is coupled to a coupling part of the cleaner station.

The dust bin compressing step may be performed during the operation of the dust collecting motor.

The dust collecting step may be performed after the dust bin compressing step.

The method of controlling the cleaner station according to the present disclosure may further include a door closing step of closing the door after the dust collecting step.

The method of controlling the cleaner station according to the present disclosure may further include a release step of releasing the dust bin after the door closing step.

According to the cleaner station, the cleaner system, and the method of controlling the cleaner station according to the present disclosure, it is possible to eliminate the inconvenience caused because the user needs to empty the dust bin all the time.

In addition, since the dust in the dust bin is sucked into the station when emptying the dust bin, it is possible to prevent the dust from scattering.

In addition, it is possible to open the dust passing hole by detecting coupling of the cleaner without the user's separate manipulation and remove the dust in the dust bin in accordance with the operation of the dust collecting motor, and as a result, it is possible to provide convenience for the user.

In addition, a stick cleaner and a robot cleaner may be coupled to the cleaner station at the same time, and as necessary, the dust in the dust bin of the stick cleaner and the dust in the dust bin of the robot cleaner may be selectively removed.

In addition, when the cleaner is coupled to the cleaner station, the coupling of the cleaner may be detected, the cleaner may be automatically fixed, a suction port (door) of the cleaner station may be opened, and the cover of the dust bin of the cleaner may be opened.

In addition, when the cleaner station detects the coupling of the dust bin, the lever is pulled to compress the dust bin, such that the residual dust does not remain in the dust bin, and as a result, it is possible to increase the suction force of the cleaner.

Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin.

In addition, the cleaner is coupled to the lateral surface of the station, the dust collecting part is disposed below the coupling part, and the dust suction module is disposed below the dust collecting part, such that a horizontal space occupied by the cleaner station in the room may be minimized, and as a result, it is possible to improve space efficiency.

In addition, the cleaner is coupled to the station such that a center of gravity of the cleaner is disposed to pass through the space for maintaining the balance of the station, and as a result, it is possible to stably support the cleaner and the station while preventing the cleaner and the station from falling down.

In addition, the cleaner may be mounted on the cleaner station in the state in which the extension tube and the cleaning module are mounted.

In addition, it is possible to minimize an occupied space on a horizontal plane even in the state in which the cleaner is mounted on the cleaner station.

In addition, because the flow path, which communicates with the dust bin, is bent downward only once, it is possible to minimize a loss of flow force for collecting the dust.

In addition, the dust in the dust bin is invisible from the outside in the state in which the cleaner is mounted on the cleaner station.

In addition, the user may easily couple the cleaner to the station without bending his/her waist.

In addition, the user may couple the cleaner to the cleaner station only by simply moving his/her wrist or forearm.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view illustrating a cleaner system including a station, a first cleaner, and a second cleaner according to an embodiment of the present disclosure.

FIG. **2** is a schematic view illustrating a configuration of the cleaner system according to the embodiment of the present disclosure.

FIG. **3** is a view for explaining illustrating the first cleaner of the cleaner system according to the embodiment of the present disclosure.

FIG. **4** is a view for explaining a coupling part of the cleaner station according to the embodiment of the present disclosure.

FIG. **5** is a view for explaining an arrangement of a fixing unit, a door unit, a cover opening unit, and a lever pulling unit in the cleaner station according to the embodiment of the present disclosure.

FIG. **6** is an exploded perspective view for explaining the fixing unit of the cleaner station according to the embodiment of the present disclosure.

FIG. **7** is a view for explaining an arrangement of the first cleaner and the fixing unit in the cleaner station according to the embodiment of the present disclosure.

FIG. **8**A is a cross-sectional view for explaining the fixing unit of the cleaner station according to the embodiment of the present disclosure.

FIG. **8**B is a view for explaining a fixing unit according to another embodiment of the present disclosure.

FIG. **9** is a view for explaining a relationship between the first cleaner and the door unit in the cleaner station according to the embodiment of the present disclosure.

FIG. **10** is a view for explaining a lower side of a dust bin of the first cleaner according to the embodiment of the present disclosure.

FIG. **11** is a view for explaining a relationship between the first cleaner and the cover opening unit in the cleaner station according to the embodiment of the present disclosure.

FIG. **12** is a perspective view for explaining the cover opening unit of the cleaner station according to the embodiment of the present disclosure.

FIG. **13**A is a view for explaining a relationship between the first cleaner and the lever pulling unit in the cleaner station according to the embodiment of the present disclosure.

FIG. **13**B is a view for explaining a lever pulling unit according to another embodiment of the present disclosure.

FIG. **14** is a view for explaining a weight distribution using an imaginary plane penetrating the first cleaner in the cleaner system according to the embodiment of the present disclosure.

FIG. **15** is a view for explaining an imaginary plane and an orthogonal projection on the imaginary plane for expressing a weight distribution according to another embodiment of FIG. **14**.

FIG. **16** is a view for explaining a weight distribution, in a state in which the first cleaner and the cleaner station are coupled, using an imaginary line in the cleaner system according to the embodiment of the present disclosure.

FIGS. **17**A and **17**B are views for explaining a weight distribution in a state in which the first cleaner is coupled to the cleaner station at a predetermined angle.

FIG. **18** is a view for explaining an angle defined between an imaginary line and a ground surface and an angle defined between the imaginary line and a perpendicular line to the ground surface in a state in which the first cleaner is coupled to the cleaner station at a predetermined angle.

FIG. **19** is a view for explaining an arrangement for maintaining balance in a state in which the first cleaner and the cleaner station are coupled in the cleaner system according to the embodiment of the present disclosure.

FIG. **20** is a schematic view when viewing FIG. **19** in another direction.

FIG. **21** is a view for explaining an arrangement relationship between relatively heavy components in a state in which the first cleaner and the cleaner station according to the embodiment of the present disclosure are coupled.

FIGS. **22** and **23** are views for explaining a height at which a user conveniently couples the first cleaner to the cleaner station in the cleaner system according to the embodiment of the present disclosure.

FIG. **24** is a perspective view illustrating the cleaner system including a cleaner station according to a second embodiment of the present disclosure.

FIG. **25** is a cross-sectional view illustrating the cleaner system including the cleaner station according to the second embodiment of the present disclosure.

FIG. **26** is a perspective view illustrating the cleaner station according to the second embodiment of the present disclosure.

FIG. **27** is a perspective view illustrating a state in which a first door member illustrated in FIG. **26**.

FIGS. **28** and **29** are operational views illustrating a state in which a main body of the first cleaner is coupled to the cleaner station according to the second embodiment of the present disclosure.

FIG. **30** is a perspective view illustrating a coupling part of the cleaner station according to the second embodiment of the present disclosure.

FIG. **31** is a perspective view illustrating a state in which the main body of the first cleaner is coupled to the coupling part of the cleaner station according to the second embodiment of the present disclosure.

FIGS. **32** and **33** are operational views illustrating states in which the main body of the first cleaner is fixed to the coupling part of the cleaner station according to the second embodiment of the present disclosure.

FIG. **34** is a view illustrating a state in which a discharge cover of the first cleaner according to the present disclosure is opened or closed.

FIGS. **35** and **36** are operational views illustrating states in which the main body of the first cleaner coupled to the coupling part of the cleaner station according to the second embodiment of the present disclosure is rotated.

FIG. **37** is a cross-sectional view illustrating the cleaner system according to the second embodiment of the present disclosure.

FIGS. **38** and **39** are operational views illustrating a compression member of the first cleaner according to the present disclosure.

FIGS. **40** to **44** are cross-sectional views illustrating cleaner systems according to other embodiments of the present disclosure.

FIGS. **45** and **46** are views illustrating states in which the discharge cover of the first cleaner according to the second embodiment of the present disclosure is opened or closed.

FIGS. **47** and **48** are operational views a state in which a roll vinyl film is bonded in the cleaner station according to the second embodiment of the present disclosure.

FIG. **49** is a perspective view illustrating the cleaner station according to the second embodiment of the present disclosure.

FIG. **50** is a perspective view illustrating the cleaner system according to the second embodiment of the present disclosure.

FIG. **51** is a perspective view illustrating some components of the cleaner station according to the second embodiment of the present disclosure.

FIG. **52** is a perspective view illustrating the cleaner station according to the second embodiment of the present disclosure.

FIG. **53** is a block diagram for explaining a control configuration of the cleaner station according to the embodiment of the present disclosure.

FIG. **54** is a flowchart for explaining a first embodiment of a method of controlling the cleaner station according to the present disclosure.

FIG. **55** is a flowchart for explaining a second embodiment of the method of controlling the cleaner station according to the present disclosure.

FIG. **56** is a flowchart for explaining a third embodiment of the method of controlling the cleaner station according to the present disclosure.

FIG. **57** is a flowchart for explaining a fourth embodiment of the method of controlling the cleaner station according to the present disclosure.

DETAILED DESCRIPTION

Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

The present disclosure may be variously modified and may have various embodiments, and particular embodiments illustrated in the drawings will be specifically described below. The description of the embodiments is not intended to limit the present disclosure to the particular embodiments, but it should be interpreted that the present disclosure is to cover all modifications, equivalents and alternatives falling within the spirit and technical scope of the present disclosure.

The terminology used herein is used for the purpose of describing particular embodiments only and is not intended to limit the present disclosure. Singular expressions may include plural expressions unless clearly described as different meanings in the context.

Unless otherwise defined, all terms used herein, including technical or scientific terms, may have the same meaning as commonly understood by those skilled in the art to which the present disclosure pertains. The terms such as those defined in a commonly used dictionary may be interpreted as having meanings consistent with meanings in the context of related technologies and may not be interpreted as ideal or excessively formal meanings unless explicitly defined in the present application.

FIG. **1** is a perspective view illustrating a cleaner system including a cleaner station, a first cleaner, and a second

cleaner according to an embodiment of the present disclosure, and FIG. **2** is a schematic view illustrating a configuration of the cleaner system according to the embodiment of the present disclosure.

Referring to FIGS. **1** and **2**, a cleaner system **10** according to an embodiment of the present specification may include a cleaner station **100** and cleaners **200** and **300**. In this case, the cleaners **200** and **300** may include a first cleaner **200** and a second cleaner **300**. Meanwhile, the present embodiment may be carried out without some of the above-mentioned components and does not exclude additional components.

The cleaner system **10** may include the cleaner station **100**. The first cleaner **200** and the second cleaner **300** may be coupled to the cleaner station **100**. The first cleaner **200** may be coupled to a lateral surface of the cleaner station **100**. Specifically, a main body of the first cleaner **200** may be coupled to the lateral surface of the cleaner station **100**. The second cleaner **200** may be coupled to a lower portion of the cleaner station **100**. The cleaner station **100** may remove dust from a dust bin **220** of the first cleaner **200**. The cleaner station **100** may remove dust from a dust bin (not illustrated) of the second cleaner **300**.

Meanwhile, FIG. **3** is a view for explaining the first cleaner in a dust removing system according to the embodiment of the present disclosure, and FIG. **14** is a view for explaining a weight distribution of the first cleaner according to the embodiment of the present disclosure using an imaginary line and an imaginary plane.

First, a structure of the first cleaner **200** will be described below with reference to FIGS. **1** to **3**.

The first cleaner **200** may mean a cleaner configured to be manually operated by a user. For example, the first cleaner **200** may mean a handy cleaner or a stick cleaner.

The first cleaner **200** may be mounted on the cleaner station **100**. The first cleaner **200** may be supported by the cleaner station **100**. The first cleaner **200** may be coupled to the cleaner station **100**.

Meanwhile, in the embodiment of the present disclosure, directions may be defined on the basis of a state in which a bottom surface (lower surface) of the dust bin **220** and a bottom surface (lower surface) of a battery housing **230** are placed on a ground surface.

In this case, a forward direction may mean a direction in which a suction part **212** is disposed based on a suction motor **214**, and a rear direction may mean a direction in which a handle **216** is disposed. Further, on the basis of a state in which the suction part **212** is viewed from the suction motor **214**, a right direction may refer to a direction in which a component is disposed at the right, and a left direction may refer to a direction in which a component is disposed at the left. In addition, in the embodiment of the present disclosure, upper and lower sides may be defined in a direction perpendicular to the ground surface on the basis of the state in which the bottom surface (lower surface) of the dust bin **220** and the bottom surface (lower surface) of the battery housing **230** are placed on the ground surface.

The first cleaner **200** may include a main body **210**. The main body **210** may include a main body housing **211**, the suction part **212**, a dust separating part **213**, the suction motor **214**, an air discharge cover **215**, the handle **216**, and an operating part **218**.

The main body housing **211** may define an external appearance of the first cleaner **200**. The main body housing **211** may provide a space that may accommodate therein the suction motor **214** and a filter (not illustrated). The main body housing **211** may be formed in a shape similar to a cylindrical shape.

The suction part **212** may protrude outward from the main body housing **211**. For example, the suction part **212** may be formed in a cylindrical shape with an opened inside. The suction part **212** may be coupled to an extension tube **250**. The suction part **212** may be referred to as a flow path (hereinafter, referred to as a 'suction flow path') through which air containing dust may flow.

Meanwhile, in the present embodiment, an imaginary line may be defined to penetrate the inside of the suction part **212** having a cylindrical shape. That is, an imaginary suction flow path through line a**2** may be formed to penetrate the suction flow path in a longitudinal direction.

In this case, the suction flow path through line a**2** may be an imaginary line formed to be perpendicular to a plane and including a point on the plane made by cutting the suction part **212** in a radial direction and in the longitudinal direction (axial direction). For example, the suction flow path through line a**2** may be an imaginary line made by connecting origins of circles made by cutting the cylindrical suction part **212** in the radial direction and in the longitudinal direction (axial direction).

The dust separating part **213** may communicate with the suction part **212**. The dust separating part **213** may separate dust introduced into the dust separating part **213** through the suction part **212**. A space in the dust separating part **213** may communicate with a space in the dust bin **220**.

For example, the dust separating part **213** may have two or more cyclone parts capable of separating dust using a cyclone flow. Further, the space in the dust separating part **213** may communicate with the suction flow path. Therefore, the air and the dust, which are introduced through the suction part **212**, spirally flow along an inner circumferential surface of the dust separating part **213**. Therefore, the cyclone flow may be generated in the internal space of the dust separating part **213**.

Meanwhile, in the present embodiment, an imaginary cyclone line a**4** may be formed to extend in the upward/downward direction of the dust separating part **213** in which the cyclone flow is generated.

In this case, the cyclone line a**4** may be an imaginary line formed to be perpendicular to a plane and including a point on the plane made by cutting the dust separating part **213** in the radial direction.

The suction motor **214** may generate a suction force for sucking air. The suction motor **214** may be accommodated in the main body housing **211**. The suction motor **214** may generate the suction force by means of a rotation. For example, the suction motor **214** may be formed in a shape similar to a cylindrical shape.

Meanwhile, in the present embodiment, an imaginary suction motor axis a**1** may be formed by extending a rotation axis of the suction motor **214**.

The air discharge cover **215** may be disposed at one side in an axial direction of the main body housing **211**. A filter for filtering air may be accommodated in the air discharge cover **215**. For example, an HEPA filter may be accommodated in the air discharge cover **215**.

The air discharge cover **215** may have an air discharge port **215***a* for discharging the air introduced by the suction force of the suction motor **214**.

A flow guide may be disposed on the air discharge cover **215**. The flow guide may guide a flow of the air to be discharged through the air discharge port **215***a*.

The handle **216** may be grasped by the user. The handle **216** may be disposed at a rear side of the suction motor **214**. For example, the handle **216** may be formed in a shape similar to a cylindrical shape. Alternatively, the handle **216**

may be formed in a curved cylindrical shape. The handle **216** may be disposed at a predetermined angle with respect to the main body housing **211**, the suction motor **214**, or the dust separating part **213**.

The handle **216** may include a grip portion **216***a* formed in a column shape so that the user may grasp the grip portion **216***a*, a first extension portion **216***b* connected to one end in the longitudinal direction (axial direction) of the grip portion **216***a* and extending toward the suction motor **214**, and a second extension portion **216***c* connected to the other end in the longitudinal direction (axial direction) of the grip portion **216***a* and extending toward the dust bin **220**.

Meanwhile, in the present embodiment, an imaginary grip portion through line a**3** may be formed to extend in the longitudinal direction of the grip portion **216***a* (the axial direction of the column) and penetrate the grip portion **216***a*.

For example, the grip portion through line a**3** may be an imaginary line formed in the handle **216** having a cylindrical shape, that is, an imaginary line formed in parallel with at least a part of an outer surface (outer circumferential surface) of the grip portion **216***a*.

An upper surface of the handle **216** may define an external appearance of a part of an upper surface of the first cleaner **200**. Therefore, it is possible to prevent a component of the first cleaner **200** from coming into contact with the user's arm when the user grasps the handle **216**.

The first extension portion **216***b* may extend from the grip portion **216***a* toward the main body housing **211** or the suction motor **214**. At least a part of the first extension portion **216***b* may extend in a horizontal direction.

The second extension portion **216***c* may extend from the grip portion **216***a* toward the dust bin **220**. At least a part of the second extension portion **216***c* may extend in the horizontal direction.

The operating part **218** may be disposed on the handle **216**. The operating part **218** may be disposed on an inclined surface formed in an upper region of the handle **216**. The user may input an instruction to operate or stop the first cleaner **200** through the operating part **218**.

The first cleaner **200** may include the dust bin **220**. The dust bin **220** may communicate with the dust separating part **213**. The dust bin **220** may store the dust separated by the dust separating part **213**.

The dust bin **220** may include a dust bin main body **221**, a discharge cover **222**, a dust bin compression lever **223**, and a compression member (not illustrated).

The dust bin main body **221** may provide a space capable of storing the dust separated from the dust separating part **213**. For example, the dust bin main body **221** may be formed in a shape similar to a cylindrical shape.

Meanwhile, in the present embodiment, an imaginary dust bin through line a**5** may be formed to penetrate the inside (internal space) of the dust bin main body **221** and extend in the longitudinal direction of the dust bin main body **221** (that means the axial direction of the cylindrical dust bin main body **221**).

In this case, the dust bin through line a**5** may be an imaginary line formed to be perpendicular to a plane and including a point on the plane made by cutting the dust bin **220** in the radial direction and in the longitudinal direction (the axial direction of the cylindrical dust bin main body **221**).

For example, the dust bin through line a**5** may be an imaginary line formed to be perpendicular to circles and passing through origins of the circles made by cutting the dust bin **220** in the radial direction and in the longitudinal direction.

A part of a lower side (bottom side) of the dust bin main body **221** may be opened. In addition, a lower extension portion **221***a* may be formed at the lower side (bottom side) of the dust bin main body **221**. The lower extension portion **221***a* may be formed to block a part of the lower side of the dust bin main body **221**.

The dust bin **220** may include a discharge cover **222**. The discharge cover **222** may be disposed at a lower side of the dust bin **220**. The discharge cover **222** may selectively open or close the lower side of the dust bin **220** which is opened downward.

The discharge cover **222** may include a cover main body **222***a* and a hinge part **222***b*. The cover main body **222***a* may be formed to block a part of the lower side of the dust bin main body **221**. The cover main body **222***a* may be rotated downward about the hinge part **222***b*. The hinge part **222***b* may be disposed adjacent to the battery housing **230**. The discharge cover **222** may be coupled to the dust bin **220** by a hook engagement.

Meanwhile, the dust bin may further include a coupling lever **222***c*. The discharge cover **222** may be separated from the dust bin **220** by means of the coupling lever **222***c*. The coupling lever **222***c* may be disposed at a front side of the dust bin. Specifically, the coupling lever **222***c* may be disposed on an outer surface at the front side of the dust bin **220**. When external force is applied to the coupling lever **222***c*, the coupling lever **222***c* may elastically deform a hook extending from the cover main body **222***a* in order to release the hook engagement between the cover main body **222***a* and the dust bin main body **221**.

When the discharge cover **222** is closed, the lower side of the dust bin **220** may be blocked (sealed) by the discharge cover **222** and the lower extension portion **221***a*.

The dust bin **220** may further include the dust bin compression lever **223** and the compression member **224**.

Meanwhile, the first cleaner **100** according to the present embodiment has the dust bin compression lever **223** and the compression member **224**, but the dust bin compression lever **223** and the compression member **224** are not essential. The first cleaner **100** may be configured without having the dust bin compression lever **223** and the compression member **224** in accordance with embodiments.

The dust bin compression lever **223** may be disposed outside the dust bin **220** or the dust separating part **211**. The dust bin compression lever **223** may be disposed outside the dust bin **220** or the dust separating part **211** so as to be movable upward and downward. The dust bin compression lever **223** may be connected to the compression member (not illustrated). When the dust bin compression lever **223** is moved downward by external force, the compression member **224** may also be moved downward. Therefore, it is possible to provide convenience for the user. The compression member (not illustrated) and the dust bin compression lever **223** may return back to original positions by an elastic member (not illustrated). Specifically, when the external force applied to the dust bin compression lever **223** is eliminated, the elastic member may move the dust bin compression lever **223** and the compression member **224** upward.

The compression member **224** may be disposed in the dust bin main body **221**. The compression member may move in the internal space of the dust bin main body **221**. Specifically, the compression member may move upward and downward in the dust bin main body **221**. Therefore, the compression member may compress the dust in the dust bin main body **221**. In addition, when the discharge cover **222** is separated from the dust bin main body **221** and thus the

lower side of the dust bin **220** is opened, the compression member may move from an upper side of the dust bin **220** to the lower side of the of the dust bin **220**, thereby removing foreign substances such as residual dust in the dust bin **220**. Therefore, it is possible to improve the suction force of the cleaner by preventing the residual dust from remaining in the dust bin **220**. Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin **220** (see FIGS. **38** and **39**).

The first cleaner **200** may include the battery housing **230**. A battery **240** may be accommodated in the battery housing **230**. The battery housing **230** may be disposed at a lower side of the handle **216**. For example, the battery housing **230** may have a hexahedral shape opened at a lower side thereof. A rear surface of the battery housing **230** may be connected to the handle **216**.

The battery housing **230** may include an accommodation portion opened at a lower side thereof. The battery **230** may be attached or detached through the accommodation portion of the battery housing **220**.

The first cleaner **200** may include the battery **240**.

For example, the battery **240** may be separably coupled to the first cleaner **200**. The battery **240** may be separably coupled to the battery housing **230**. For example, the battery **240** may be inserted into the battery housing **230** from the lower side of the battery housing **230**. The above-mentioned configuration may improve portability of the first cleaner **200**.

Otherwise, the battery **240** may be integrally provided in the battery housing **230**. In this case, a lower surface of the battery **240** is not exposed to the outside.

The battery **240** may supply power to the suction motor **214** of the first cleaner **200**. The battery **240** may be disposed on a lower portion of the handle **216**. The battery **240** may be disposed at a rear side of the dust bin **220**. That is, the suction motor **214** and the battery **240** may be disposed so as not to overlap each other in the upward/downward direction and disposed at different disposition heights. On the basis of the handle **216**, the suction motor **214**, which is heavy in weight, is disposed at a front side of the handle **216**, and the battery **240**, which is heavy in weight, is disposed at the lower side of the handle **216**, such that an overall weight of the first cleaner **200** may be uniformly distributed. Therefore, it is possible to prevent stress from being applied to the user's wrist when the user grasps the handle **216** and performs a cleaning operation.

In a case in which the battery **240** is coupled to the battery housing **230** in accordance with the embodiment, the lower surface of the battery **240** may be exposed to the outside. Because the battery **240** may be placed on the floor when the first cleaner **200** is placed on the floor, the battery **240** may be immediately separated from the battery housing **230**. In addition, because the lower surface of the battery **240** is exposed to the outside and thus in direct contact with air outside the battery **240**, performance of cooling the battery **240** may be improved.

Meanwhile, in a case in which the battery **240** is fixed integrally to the battery housing **230**, the number of structures for attaching or detaching the battery **240** and the battery housing **230** may be reduced, and as a result, it is possible to reduce an overall size of the first cleaner **200** and a weight of the first cleaner **200**.

The first cleaner **200** may include the extension tube **250**. The extension tube **250** may communicate with a cleaning module **260**. The extension tube **250** may communicate with the main body **210**. The extension tube **250** may communicate with the suction part **214** of the main body **210**. The extension tube **250** may be formed in a long cylindrical shape.

The main body **210** may be connected to the extension tube **250**. The main body **210** may be connected to the cleaning module **260** through the extension tube **250**. The main body **210** may generate the suction force by means of the suction motor **214** and provide the suction force to the cleaning module **260** through the extension tube **250**. The outside dust may be introduced into the main body **210** through the cleaning module **260** and the extension tube **250**.

The first cleaner **200** may include the cleaning module **260**. The cleaning module **260** may communicate with the extension tube **260**. Therefore, the outside air may be introduced into the main body **210** of the first cleaner **200** via the cleaning module **260** and the extension tube **250** by the suction force in the main body **210** of the first cleaner **200**.

The dust in the dust bin **220** of the first cleaner **200** may be captured by a dust collecting part **170** of the cleaner station **100** by gravity and a suction force of a dust collecting motor **191**. Therefore, it is possible to remove the dust in the dust bin without the user's separate manipulation, thereby providing convenience for the user. In addition, it is possible to eliminate the inconvenience caused because the user needs to empty the dust bin all the time. In addition, it is possible to prevent the dust from scattering when emptying the dust bin.

The first cleaner **200** may be coupled to a lateral surface of a housing **110**. Specifically, the main body **210** of the first cleaner **200** may be mounted on a coupling part **120**. More specifically, the dust bin **220** and the battery housing **230** of the first cleaner **200** may be coupled to a coupling surface **121**, an outer circumferential surface of the dust bin main body **221** may be coupled to a dust bin guide surface **122**, and the suction part **212** may be coupled to a suction part guide surface **126** of the coupling part **120**. In this case, a central axis of the dust bin **220** may be disposed in a direction parallel to the ground surface, and the extension tube **250** may be disposed in a direction perpendicular to the ground surface (see FIG. **2**).

The cleaner system **10** may include the second cleaner **300**. The second cleaner **300** may mean a robot cleaner. The second cleaner **300** may automatically clean a zone to be cleaned by sucking foreign substances such as dust from the floor while autonomously traveling in the zone to be cleaned. The second cleaner **300**, that is, the robot cleaner may include a distance sensor configured to detect a distance from an obstacle such as furniture, office supplies, or walls installed in the zone to be cleaned, and left and right wheels for moving the robot cleaner. The second cleaner **300** may be coupled to the cleaner station **100**. The dust in the second cleaner **300** may be captured into the dust collecting part **170** through a second cleaner flow path part **182**.

Meanwhile, FIGS. **19** and **20** are views for explaining a state in which the first cleaner and the cleaner station are coupled in the cleaner system according to the embodiment of the present disclosure and for expanding balance maintenance according to the coupling between the first cleaner and the cleaner station.

The cleaner station **100** according to the present disclosure will be described below with reference to FIGS. **1**, **2**, **19**, and **20**.

The first cleaner **200** and the second cleaner **300** may be disposed on the cleaner station **100**. The first cleaner **200** may be coupled to the lateral surface of the cleaner station **100**. Specifically, the dust bin **220** of the first cleaner **200** may be coupled to the lateral surface of the cleaner station

100. The second cleaner 200 may be coupled to the lower portion of the cleaner station 100. The cleaner station 100 may remove the dust from the dust bin 220 of the first cleaner 200. The cleaner station 100 may remove the dust from the dust bin (not illustrated) of the second cleaner 300.

The cleaner station 100 may include the housing 110. The housing 110 may define an external appearance of the cleaner station 100. Specifically, the housing 110 may be formed in the form of a column including one or more outer wall surfaces. For example, the housing 110 may be formed in a shape similar to a quadrangular column.

The housing 110 may have a space capable of accommodating the dust collecting part 170 configured to store dust therein, and a dust suction module 190 configured to generate a flow force for collecting the dust from the dust collecting part 170.

The housing 110 may include a bottom surface 111 and an outer wall surface 112.

The bottom surface 111 may support a lower side in a gravitational direction of the dust suction module 190. That is, the bottom surface 111 may support a lower side of the dust collecting motor 191 of the dust suction module 190.

In this case, the bottom surface 111 may be disposed toward the ground surface. The bottom surface 111 may also be disposed in parallel with the ground surface or disposed to be inclined at a predetermined angle with respect to the ground surface. The above-mentioned configuration may be advantageous in stably supporting the dust collecting motor 191 and maintaining the balance of an overall weight even in a case in which the first cleaner 200 is coupled.

Meanwhile, according to the embodiment, the bottom surface 111 may further include ground surface support portions (not illustrated) in order to prevent the cleaner station 100 from falling down and increase an area being in contact with the ground surface to maintain the balance. For example, the ground surface support portion may have a plate shape extending from the bottom surface 111, and one or more frames may protrude and extend from the bottom surface 111 in a direction of the ground surface. In this case, the ground surface support portions may be disposed to be linearly symmetrical in order to maintain the left and right balance and the front and rear balance on the basis of a front surface on which the first cleaner 200 is mounted.

The outer wall surface 112 may mean a surface formed in the gravitational direction or a surface connected to the bottom surface 111. For example, the outer wall surface 112 may mean a surface connected to the bottom surface 111 so as to be perpendicular to the bottom surface 111. As another embodiment, the outer wall surface 112 may be disposed to be inclined at a predetermined angle with respect to the bottom surface 111.

The outer wall surface 112 may include at least one surface. For example, the outer wall surface 112 may include a first outer wall surface 112*a*, a second outer wall surface 112*b*, a third outer wall surface 112*c*, and a fourth outer wall surface 112*d*.

In this case, in the present embodiment, the first outer wall surface 112*a* may be disposed on the front surface of the cleaner station 100. In this case, the front surface may mean a surface on which the first cleaner 200 or the second cleaner 300 is coupled. Therefore, the first outer wall surface 112*a* may define an external appearance of the front surface of the cleaner station 100.

Meanwhile, the directions are defined as follows to understand the present embodiment. In the present embodiment, the directions may be defined in the state in which the first cleaner 200 is mounted on the cleaner station 100.

In this case, a surface including an extension line 212*a* of the suction part 212 may be referred to as the front surface (see FIG. 1). That is, in the state in which the first cleaner 200 is mounted on the cleaner station 100, a portion of the suction part 212 may be in contact with and coupled to the suction part guide surface 126, and the remaining portion of the suction part 212, which is not coupled to the suction part guide surface 126, may be disposed to be exposed to the outside from the first outer wall surface 112*a*. Therefore, the imaginary extension line 212*a* of the suction part 212 may be disposed on the first outer wall surface 112*a*, and the surface including the extension line 212*a* of the suction part 212 may be referred to as the front surface.

In another point of view, in a state in which a lever pulling arm 161 is coupled to the housing 110, a surface including a side through which the lever pulling arm 161 is exposed to the outside may be referred to as the front surface.

In still another point of view, in the state in which the first cleaner 200 is mounted on the cleaner station 100, an outer surface of the cleaner station 100, which is penetrated by the main body 210 of the first cleaner, may be referred to as the front surface.

Further, in the state in which the first cleaner 200 is mounted on the cleaner station 100, a direction in which the first cleaner 200 is exposed to the outside of the cleaner station 100 may be referred to as a forward direction.

In addition, in another point of view, in the state in which the first cleaner 200 is mounted on the cleaner station 100, a direction in which the suction motor 214 of the first cleaner 200 is disposed may be referred to as the forward direction. Further, a direction opposite to the direction in which the suction motor 214 is disposed on the cleaner station 100 may be referred to as a rearward direction.

In still another point of view, a direction in which an intersection point at which the grip portion through line a3 and the suction motor axis a1 intersect is disposed may be referred to as the forward direction on the basis of the cleaner station 100. Alternatively, a direction in which an intersection point P2 at which the grip portion through line a3 and the suction flow path through line a2 intersect is disposed may be referred to as the forward direction. Alternatively, a direction in which an intersection point P1 at which the suction motor axis a1 and the suction flow path through line a2 intersect is disposed may be referred to as the forward direction. Further, a direction opposite to the direction in which the intersection point is disposed may be referred to as the rearward direction on the basis of the cleaner station 100.

Further, on the basis of the internal space of the housing 110, a surface facing the front surface may be referred to as a rear surface of the cleaner station 100. Therefore, the rear surface may mean a direction in which the second outer wall surface 112*b* is formed.

Further, on the basis of the internal space of the housing 110, a left surface when viewing the front surface may be referred to as a left surface, and a right surface when viewing the front surface may be referred to as a right surface. Therefore, the left surface may mean a direction in which the third outer wall surface 112*c* is formed, and the right surface may mean a direction in which the fourth outer wall surface 112*d* is formed.

The first outer wall surface 112*a* may be formed in the form of a flat surface, or the first outer wall surface 112*a* may be formed in the form of a curved surface as a whole or formed to partially include a curved surface.

The first outer wall surface 112*a* may have an external appearance corresponding to the shape of the first cleaner

200. In detail, the coupling part 120 may be disposed in the first outer wall surface 112a. With this configuration, the first cleaner 200 may be coupled to the cleaner station 100 and supported by the cleaner station 100. The specific configuration of the coupling part 120 will be described below.

According to the embodiment, a lever pulling unit 160 may be disposed on the first outer wall surface 112a. Specifically, the lever pulling arm 161 of the lever pulling unit 160 may be mounted on the first outer wall surface 112a. For example, the first outer wall surface 112a may have an arm accommodating groove in which the lever pulling arm 161 may be accommodated. In this case, the arm accommodating groove may be formed to correspond to a shape of the lever pulling arm 161. Therefore, when the lever pulling arm 161 is mounted in the arm accommodating groove, the first outer wall surface 112a and an outer surface of the lever pulling arm 161 may define a continuous external shape, and the lever pulling arm 161 may be stroke-moved to protrude from the first outer wall surface 112a by the operation of the lever pulling unit 160.

Meanwhile, a structure for mounting various types of cleaning modules 290 used for the first cleaner 200 may be additionally provided on the first outer wall surface 112a.

In addition, a structure to which the second cleaner 300 may be coupled may be additionally provided on the first outer wall surface 112a. Therefore, the structure corresponding to the shape of the second cleaner 300 may be additionally provided on the first outer wall surface 112a.

Further, a cleaner bottom plate (not illustrated) to which the lower surface of the second cleaner 300 may be coupled may be additionally coupled to the first outer wall surface 112a. Meanwhile, as another embodiment, the cleaner bottom plate (not illustrated) may be shaped to be connected to the bottom surface 111.

In the present embodiment, the second outer wall surface 112b may be a surface facing the first outer wall surface 112a. That is, the second outer wall surface 112b may be disposed on the rear surface of the cleaner station 100. In this case, the rear surface may be a surface facing the surface to which the first cleaner 200 or the second cleaner 300 is coupled. Therefore, the second outer wall surface 112b may define an external appearance of the rear surface of the cleaner station 100.

For example, the second outer wall surface 112b may be formed in the form of a flat surface. With this configuration, the cleaner station 100 may be in close contact with a wall in a room, and the cleaner station 100 may be stably supported.

As another example, the structure for mounting various types of cleaning modules 260 used for the first cleaner 200 may be additionally provided on the second outer wall surface 112b.

In addition, the structure to which the second cleaner 300 may be coupled may be additionally provided on the second outer wall surface 112b. Therefore, the structure corresponding to the shape of the second cleaner 300 may be additionally provided on the second outer wall surface 112b.

Further, a cleaner bottom plate (not illustrated) to which the lower surface of the second cleaner 300 may be coupled may be additionally coupled to the second outer wall surface 112b. Meanwhile, as another embodiment, the cleaner bottom plate (not illustrated) may be shaped to be connected to the bottom surface 111. With this configuration, when the second cleaner 300 is coupled to the cleaner bottom plate (not illustrated), an overall center of gravity of the cleaner station 100 may be lowered, such that the cleaner station 100 may be stably supported.

In the present embodiment, the third outer wall surface 112c and the fourth outer wall surface 112d may mean surfaces that connect the first outer wall surface 112a and the second outer wall surface 112b. In this case, the third outer wall surface 112c may be disposed on the left surface of the station 100, and the fourth outer wall surface 112d may be disposed on the right surface of the cleaner station 100. Otherwise, the third outer wall surface 112c may be disposed on the right surface of the cleaner station 100, and the fourth outer wall surface 112d may be disposed on the left surface of the cleaner station 100.

The third outer wall surface 112c or the fourth outer wall surface 112d may be formed in the form of a flat surface, or the third outer wall surface 112c or the fourth outer wall surface 112d may be formed in the form of a curved surface as a whole or formed to partially include a curved surface.

Meanwhile, the structure for mounting various types of cleaning modules 260 used for the first cleaner 200 may be additionally provided on the third outer wall surface 112c or the fourth outer wall surface 112d.

In addition, the structure to which the second cleaner 300 may be coupled may be additionally provided on the third outer wall surface 112c or the fourth outer wall surface 112d. Therefore, the structure corresponding to the shape of the second cleaner 300 may be additionally provided on the third outer wall surface 112c or the fourth outer wall surface 112d.

Further, a cleaner bottom plate (not illustrated) to which the lower surface of the second cleaner 300 may be coupled may be additionally provided on the third outer wall surface 112c or the fourth outer wall surface 112d. Meanwhile, as another embodiment, the cleaner bottom plate (not illustrated) may be shaped to be connected to the bottom surface 111.

FIG. 4 is a view for explaining the coupling part of the cleaner station according to the embodiment of the present disclosure, and FIG. 5 is a view for explaining the arrangement of a fixing unit, a door unit, a cover opening unit, and the lever pulling unit in the cleaner station according to the embodiment of the present disclosure.

The coupling part 120 of the cleaner station 100 according to the present disclosure will be described below with reference to FIGS. 4 and 5.

The cleaner station 100 may include the coupling part 120 to which the first cleaner 200 is coupled. Specifically, the coupling part 120 may be disposed in the first outer wall surface 112a, and the main body 210, the dust bin 220, and the battery housing 230 of the first cleaner 200 may be coupled to the coupling part 120.

The coupling part 120 may include the coupling surface 121. The coupling surface 121 may be disposed on the lateral surface of the housing 110. For example, the coupling surface 121 may mean a surface formed in the form of a groove which is concave toward the inside of the cleaner station 100 from the first outer wall surface 112a. That is, the coupling surface 121 may mean a surface formed to have a stepped portion with respect to the first outer wall surface 112a.

The first cleaner 200 may be coupled to the coupling surface 121. For example, the coupling surface 121 may be in contact with the lower surface of the dust bin 220 and the lower surface of the battery housing 230 of the first cleaner 200. In this case, the lower surface may mean a surface directed toward the ground surface when the user uses the first cleaner 200 or places the first cleaner 200 on the ground surface.

In this case, the coupling between the coupling surface **121** and the dust bin **220** of the first cleaner **200** may mean physical coupling by which the first cleaner **200** and the cleaner station **100** are coupled and fixed to each other. This may be a premise of coupling of a flow path through which the dust bin **220** and a flow path part **180** communicate with each other and a fluid may flow.

Further, the coupling between the coupling surface **121** and the battery housing **230** of the first cleaner **200** may mean physical coupling by which the first cleaner **200** and the cleaner station **100** are coupled and fixed to each other. This may be a premise of electrical coupling by which the battery **240** and a charging part **128** are electrically connected to each other.

For example, an angle of the coupling surface **121** with respect to the ground surface may be a right angle. Therefore, it is possible to minimize a space of the cleaner station **100** when the first cleaner **200** is coupled to the coupling surface **121**.

As another example, the coupling surface **121** may be disposed to be inclined at a predetermined angle with respect to the ground surface. Therefore, the cleaner station **100** may be stably supported when the first cleaner **200** is coupled to the coupling surface **121**. In this case, the coupling surface **121** may be provided at an angle of 40 degrees or more and 95 degrees or less with respect to the ground surface. Particularly, the coupling surface **121** may be provided at an angle of 43 degrees or more and 90 degrees or less with respect to the ground surface. If the coupling surface **121** is provided at an angle of less than 40 degrees with respect to the ground surface, the user needs to bend his/her waist to couple the first cleaner **200** to the cleaner station **100**, which may cause discomfort to the user. If the coupling surface **121** is provided at an angle of more than 95 degrees with respect to the ground surface, the first cleaner **200** may be separated from the cleaner station **100** by its own weight.

The coupling surface **121** may have a dust passage hole **121***a* through which air outside the housing **110** may be introduced into the housing **110**. The dust passage hole **121***a* may be formed in the form of a hole corresponding to the shape of the dust bin **220** so that the dust in the dust bin **220** may be introduced into the dust collecting part **170**. The dust passage hole **121***a* may be formed to correspond to the shape of the discharge cover **222** of the dust bin **220**. The dust passage hole **121***a* may be formed to communicate with a first cleaner flow path part **181** to be described below.

The coupling part **120** may include the dust bin guide surface **122**. The dust bin guide surface **122** may be disposed on the first outer wall surface **112***a*. The dust bin guide surface **122** may be connected to the first outer wall surface **112***a*. In addition, the dust bin guide surface **122** may be connected to the coupling surface **121**.

The dust bin guide surface **122** may be formed in a shape corresponding to the outer surface of the dust bin **220**. A front outer surface of the dust bin **220** may be coupled to the dust bin guide surface **122**. Therefore, it is possible to provide convenience when coupling the first cleaner **200** to the coupling surface **121**.

The coupling part **120** may include guide protrusions **123**. The guide protrusions **123** may be disposed on the coupling surface **121**. The guide protrusions **123** may protrude upward from the coupling surface **121**. Two guide protrusions **123** may be disposed to be spaced apart from each other. A distance between the two guide protrusions **123**, which are spaced apart from each other, may correspond to a width of the battery housing **230** of the first cleaner **200**. Therefore, it is possible to provide convenience when coupling the first cleaner **200** to the coupling surface **121**.

The coupling part **120** may include sidewalls **124**. The sidewalls **124** may mean wall surfaces disposed on two lateral surfaces of the coupling surface **121** and may be perpendicularly connected to the coupling surface **121**. The sidewalls **124** may be connected to the first outer wall surface **112***a*. In addition, the sidewalls **124** may be connected to the dust bin guide surface **122**. That is, the sidewalls **124** may define surfaces connected to the dust bin guide surface **122**. Therefore, the first cleaner **200** may be stably accommodated.

The coupling part **120** may include a coupling sensor **125**. The coupling sensor **125** may detect whether the first cleaner **200** is physically coupled to the coupling part **120**.

The coupling sensor **125** may include a contact sensor. For example, the coupling sensor **125** may include a microswitch. In this case, the coupling sensor **125** may be disposed on the guide protrusion **123**. Therefore, when the battery housing **230** or the battery **240** of the first cleaner **200** is coupled between the pair of guide protrusions **123**, the battery housing **230** or the battery **240** comes into contact with the coupling sensor **125**, such that the coupling sensor **125** may detect that the first cleaner **200** is physically coupled to the cleaner station **100**.

Meanwhile, the coupling sensor **125** may include a non-contact sensor. For example, the coupling sensor **125** may include an infrared (IR) sensor. In this case, the coupling sensor **125** may be disposed on the sidewall **124**. Therefore, when the dust bin **220** or the main body **210** of the first cleaner **200** passes the sidewall **124** and then reaches the coupling surface **121**, the coupling sensor **125** may detect the presence of the dust bin **220** or the main body **210** and detect that the first cleaner **200** is physically coupled to the cleaner station **100**.

The coupling sensor **125** may face the dust bin **220** or the battery housing **230** of the first cleaner **200**.

The coupling sensor **125** may be a mean for determining whether the first cleaner **200** is coupled and power is applied to the battery **240** of the first cleaner **200**.

The coupling part **120** may include the suction part guide surface **126**. The suction part guide surface **126** may be disposed on the first outer wall surface **112***a*. The suction part guide surface **126** may be connected to the dust bin guide surface **122**. The suction part **212** may be coupled to the suction part guide surface **126**. A shape of the suction part guide surface **126** may correspond to the shape of the suction part **212**. Therefore, it is possible to provide convenience when coupling the main body **210** of the first cleaner **200** to the coupling surface **121**.

The coupling part **120** may include fixing member entrance holes **127**. The fixing member entrance hole **127** may be formed in the form of a long hole along the sidewall **124** so that a fixing member **131** may enter and exit the fixing member entrance hole **127**. For example, the fixing member entrance hole **127** may be a rectangular hole formed along the sidewall **124**. The fixing member **131** will be described below in detail.

With this configuration, when the user couples the first cleaner **200** to the coupling part **120** of the cleaner station **100**, the main body **210** of the first cleaner **200** may be stably disposed on the coupling part **120** by the dust bin guide surface **122**, the guide protrusions **123**, and the suction part guide surface **126**. Therefore, it is possible to provide convenience when coupling the dust bin **220** and the battery housing **230** of the first cleaner **200** to the coupling surface **121**.

Meanwhile, FIGS. **6** to **8**B are views for explaining a fixing unit of the cleaner station according to the embodiment of the present disclosure.

A fixing unit **130** according to the present disclosure will be described below with reference to FIGS. **4** to **8**B.

The cleaner station **100** according to the present disclosure may include the fixing unit **130**. The fixing unit **130** may be disposed on the sidewall **124**. In addition, the fixing unit **130** may be disposed on a back surface to the coupling surface **121**. The fixing unit **130** may fix the first cleaner **200** coupled to the coupling surface **121**. Specifically, the fixing unit **130** may fix the dust bin **220** and the battery housing **230** of the first cleaner **200** coupled to the coupling surface **121**.

The fixing unit **130** may include the fixing members **131** configured to fix the dust bin **220** and the battery housing **230** of the first cleaner **200**, and a fixing drive part **133** configured to operate the fixing members **131**. In addition, the fixing unit **130** may further include fixing part gears **134** configured to transmit power from the fixing drive part **133** to the fixing members **131**, and fixing part links **135** configured to convert rotational motions of the fixing part gears **134** into reciprocating motions of the fixing members **131**. Further, the fixing unit **13** may further include a fixing part housing **132** configured to accommodate the fixing drive part **133** and the fixing part gears **134**.

The fixing members **131** may be disposed on the sidewall **124** of the coupling part **120** and provided on the sidewall **124** so as to reciprocate in order to fix the dust bin **220**. Specifically, the fixing members **131** may be accommodated in the fixing member entrance holes **127**.

The fixing members **131** may be disposed at both sides of the coupling part **120**, respectively. For example, a pair of two fixing members **131** may be symmetrically disposed with respect to the coupling surface **121**.

Specifically, the fixing member **131** may include a link coupling portion **131***a*, a movable panel **131***b*, and a movable sealer **131***c*. In this case, the link coupling portion **131***a* may be disposed at one side of the movable panel **131***b*, and the movable sealer **131***c* may be disposed at the other side of the movable panel **131***b*.

The link coupling portion **131***a* is disposed at one side of the movable panel **131***b* and coupled to the fixing part link **135**. For example, the link coupling portion **131***a* may protrude in a cylindrical shape or a circular pin shape from a connection projection **131***bb* formed by bending and extending one end of the movable panel **131***b*. Therefore, the link coupling portion **131***a* may be rotatably inserted and coupled into one end of the fixing part link **135**.

The movable panel **131***b* may be connected to the link coupling portion **131***a* and provided to be reciprocally movable from the sidewall **124** toward the dust bin **220** by the operation of the fixing drive part **133**. For example, the movable panel **131***b* may be provided to be rectilinearly and reciprocally movable along a guide frame **131***d*.

Specifically, one side of the movable panel **131***b* may be disposed to be accommodated in a space in the first outer wall surface **112***a*, and the other side of the movable panel **131***b* may be disposed to be exposed from the sidewall **124**.

The movable panel **131***b* may include a panel main body **131***ba*, the connection projection **131***bb*, a first pressing portion **131***bc*, and a second pressing portion **131***bd*. For example, the panel main body **131***ba* may be formed in the form of a flat plate. In addition, the connection projection **131***bb* may be disposed at one end of the panel main body **131***ba*. Further, the first pressing portion **131***bc* may be formed at the other end of the panel main body **131***ba*.

The connection projection **131***bb* may be formed by bending and extending one end of the panel main body **131***ba* toward the fixing drive part **131**. The link coupling portion **131***a* may protrude and extend from the tip of the connection projection **131***bb*.

The connection projection **131***bb* may have a frame through hole that may be penetrated by the guide frame **131***d*. For example, the frame through hole may be formed in a shape similar to an 'I' shape.

The first pressing portion **131***bc* is formed at the other end of the panel main body **131***ba* and formed in a shape corresponding to the shape of the dust bin **220** in order to seal the dust bin **220**. For example, the first pressing portion **131***bc* may be formed in a shape capable of surrounding a cylindrical shape. That is, the first pressing portion **131***bc* may mean an end portion having a concave arc shape and formed at the other side of the panel main body **131***ba*.

The second pressing portion **131***bd* may be connected to the first pressing portion **131***bc* and formed in a shape corresponding to the shape of the battery housing **230** in order to seal the battery housing **230**. For example, the second pressing portion **131***bd* may be formed in a shape capable of pressing the battery housing **230**. That is, the second pressing portion **131***bd* may mean an end portion having a straight shape and formed at the other side of the panel main body **131***ba*.

The movable sealer **131***c* may be disposed on a tip in the reciprocation direction of the movable panel **131***b* and may seal the dust bin **220**. Specifically, the movable sealer **131***c* may be coupled to the first pressing portion **131***bc* and may seal a space between the dust bin **220** and the first pressing portion **131***bc* when the first pressing portion **131***bc* surrounds and presses the dust bin **220**. In addition, the movable sealer **131***c* may be coupled to the second pressing portion **131***bd* and may seal a space between the battery housing **230** and the second pressing portion **131***bd* when the second pressing portion **131***bd* surrounds and presses the battery housing **230**.

The fixing unit **130** may further include the guide frames **131***d* coupled to the housing **110** and configured to penetrate the movable panels **131***b* and guide the movements of the fixing members **131**. For example, the guide frame **131***d* may be a frame having an 'I' shape that penetrates the connection projection **131***bb*. With this configuration, the movable panel **131***b* may rectilinearly reciprocate along the guide frame **131***d*.

The fixing part housing **132** may be disposed in the housing **110**. For example, the fixing part housing **132** may be disposed on the back surface to the coupling surface **121**.

The fixing part housing **132** may have therein a space capable of accommodating the fixing part gears **134**. Further, the fixing part housing **132** may accommodate the fixing drive part **133**.

The fixing part housing **132** may include a first fixing part housing **132***a*, a second fixing part housing **132***b*, link guide holes **132***c*, and a motor accommodation portion **132***d*.

The first fixing part housing **132***a* and the second fixing part housing **132***b* are coupled to each other to define the space capable of accommodating the fixing part gears **134** therein.

For example, the first fixing part housing **132***a* may be disposed in a direction toward the outside of the cleaner station **100**, and the second fixing part housing **132***b* may be disposed in a direction toward the inside of the cleaner station **100**. That is, the first fixing part housing **132***a* may be disposed in a direction toward the coupling surface **121**,

and the second fixing part housing **132***b* may be disposed in a direction toward the second outer wall surface **112***b*.

The link guide holes **132***c* may be formed in the first fixing part housing **132***a*. The link guide holes **132***c* may mean holes formed to guide movement routes of the fixing part link **135**. For example, the link guide hole **132***c* may mean an arc-shaped hole formed in a circumferential direction about a rotary shaft of the fixing part gear **134**.

Two link guide holes **132***c* may be formed to guide the pair of fixing part links **135** for moving the pair of fixing members **132**. In addition, the two link guide holes **132***c* may be symmetrically formed.

The motor accommodation portion **132***d* may be provided to accommodate the fixing drive part **133**. For example, the motor accommodation portion **132***d* may protrude in a cylindrical shape from the first fixing part housing **132***a* in order to accommodate the fixing drive part **133** therein.

The fixing drive part **133** may provide power for moving the fixing members **131**. In the embodiment of the present disclosure, an example in which the fixing drive part **133** is an electric motor is described, but the present disclosure is not limited thereto.

Specifically, the fixing drive part **133** may rotate the fixing part gears **134** in a forward direction or a reverse direction. In this case, the forward direction may mean a direction in which the fixing member **131** is moved from the sidewall **124** to press the dust bin **220**. In addition, the reverse direction may mean a direction in which the fixing member **131** is moved to the inside of the sidewall **124** from a position at which the fixing member **131** presses the dust bin **220**. The forward direction may be opposite to the reverse direction.

The fixing part gears **134** may be coupled to the fixing drive part **133** and may move the fixing members **131** using power from the fixing drive part **133**.

The fixing part gears **134** may include a driving gear **134***a*, a connection gear **134***b*, a first link rotating gear **134***c*, and a second link rotating gear **134***d*.

A shaft of the fixing drive part **133** may be inserted and coupled into the driving gear **134***a*. For example, the shaft of the fixing drive part **133** may be inserted and fixedly coupled into the driving gear **134***a*. As another example, the driving gear **134***a* may be formed integrally with the shaft of the fixing drive part **133**.

The connection gear **134***b* may engage with the driving gear **134***a* and the first link rotating gear **134***c*.

The other end of the fixing part link **135** is rotatably coupled to the first link rotating gear **134***c*, and the first link rotating gear **134***c* may transmit rotational force transmitted from the driving gear **134***a* to the fixing part link **135**.

The first link rotating gear **134***c* may include a rotary shaft **134***ca*, a rotation surface **134***cb*, gear teeth **134***cc*, and a link fastening portion **134***cd*.

The rotary shaft **134***ca* may be coupled to and supported by the first fixing part housing **132***a* and the second fixing part housing **132***b*. The rotation surface **134***cb* may be formed in a circular plate shape having a predetermined thickness about the rotary shaft **134***ca*. The gear teeth **134***cc* may be formed on an outer circumferential surface of the rotation surface **134***cb* and may engage with the connection gear **134***b*. Further, the gear teeth **134***cc* may engage with the second link rotating gear **134***d*. With this configuration, the first link rotating gear **134***c* may receive power from the fixing drive part **133** through the driving gear **134***a* and the connection gear **134***b* and transmit the power to the second link rotating gear **134***d*.

The link fastening portion **134***cd* may protrude and extend in a cylindrical shape or a circular pin shape in an axial direction from the rotation surface **134***cb*. The link fastening portion **134***cd* may be rotatably coupled to the other end of the fixing part link **135**. For example, the link fastening portion **134***cd* may penetrate the link guide hole **132***c* and may be coupled to the other end of the fixing part link **135**. With this configuration, the first link rotating gear **134***c* may be rotated by power from the fixing drive part **133**, the fixing part link **135** may be rotated and rectilinearly moved by the rotation of the first link rotating gear **134***c*, and consequently, the fixing member **131** may be moved to fix or release the dust bin **220**.

The second link rotating gear **134***d* may engage with the first link rotating gear **134***c* and rotate in a direction opposite to the rotation direction of the first link rotating gear **134***c*.

The other end of the fixing part link **135** is rotatably coupled to the second link rotating gear **134***d*, and the second link rotating gear **134***d* may transmit the rotational force transmitted from the driving gear **134***a* to the fixing part link **135**.

The second link rotating gear **134***d* may include a rotary shaft **134***da*, a rotation surface **134***db*, gear teeth **134***dc*, and a link fastening portion **134***dd*.

The rotary shaft **134***da* may be coupled to and supported by the first fixing part housing **132***a* and the second fixing part housing **132***b*. The rotation surface **134***db* may be formed in a circular plate shape having a predetermined thickness about the rotary shaft **134***da*. The gear teeth **134***dc* may be formed on an outer circumferential surface of the rotation surface **134***db* and may engage with the first link rotating gear **134***c*. With this configuration, the second link rotating gear **134***d* may receive the power from the fixing drive part **133** through the driving gear **134***a*, the connection gear **134***b*, and the first link rotating gear **134***c*.

The link fastening portion **134***dd* may protrude and extend in a cylindrical shape or a circular pin shape in an axial direction from the rotation surface **134***db*. The link fastening portion **134***dd* may be rotatably coupled to the other end of the fixing part link **135**. For example, the link fastening portion **134***dd* may penetrate the link guide hole **132***c* and may be coupled to the other end of the fixing part link **135**. With this configuration, the second link rotating gear **134***d* may be rotated by power from the fixing drive part **133**, the fixing part link **135** may be rotated and rectilinearly moved by the rotation of the second link rotating gear **134***d*, and consequently, the fixing member **131** may be moved to fix or release the dust bin **220**.

The fixing part links **135** may link the fixing part gears **134** and the fixing members **131** and convert the rotations of the fixing part gears **134** into the reciprocation movements of the fixing members **131**.

One end of the fixing part link **135** may be coupled to the link coupling portion **131***a* of the fixing member **131**, and the other end of the fixing part link **135** may be coupled to the link fastening portion **134***cd* or **134***dd* of the fixing part gear **134**.

The fixing part link **135** may include a link main body **135***a*, a first link connecting portion **135***b*, and a second link connecting portion **135***c*.

For example, the link main body **135***a* may be formed in the form of a frame with a bent central portion. This is to improve efficiency in transmitting power by changing an angle at which a force is transmitted.

The first link connecting portion **135***b* may be disposed at one end of the link main body **135***a*, and the second link connecting portion **135***c* may be disposed at the other end of

the link main body **135***a*. The first link connecting portion **135***b* may be protrude in a cylindrical shape from one end of the link main body **135***a*. The first link connecting portion **135***b* may have a hole into which the link coupling portion **131***a* may be inserted and coupled. The second link connecting portion **135***c* may protrude in a cylindrical shape from the other end of the link main body **135***a*. In this case, a height by which the second link connecting portion **135***c* protrudes may be greater than a height by which the first link connecting portion **135***b* protrudes. This is to enable the link fastening portions **134***cd* and **134***dd* of the fixing part gears **134** to be accommodated in the link guide holes **132***c* and move along the link guide holes **132***c*, and to support the link fastening portions **134***cd* and **134***dd* when the link fastening portions **134***cd* and **134***dd* rotate. The second link connecting portion **135***c* may have a hole into which the link fastening portion **134***cd* or **134***dd* may be inserted and coupled.

A stationary sealer **136** may be disposed on the dust bin guide surface **122** so as to seal the dust bin **220** when the cleaner **200** is coupled. With this configuration, when the dust bin **220** of the cleaner **200** is coupled, the cleaner **200** may press the stationary sealer **136** by its own weight, such that the dust bin **220** and the dust bin guide surface **122** may be sealed.

The stationary sealer **136** may be disposed in an imaginary extension line of the movable sealer **131***c*. With this configuration, when the fixing drive part **133** operates and the fixing members **131** press the dust bin **220**, a circumference of the dust bin **220** at the same height may be sealed. That is, the stationary sealer **136** and the movable sealers **131***c* may seal outer circumferential surfaces of the dust bin **220** disposed on concentric circles.

According to the embodiment, the stationary sealer **136** may be disposed on the dust bin guide surface **122** and formed in the form of a bent line corresponding to an arrangement of a cover opening unit **150** to be described below.

Therefore, when the main body **210** of the first cleaner **200** is disposed on the coupling part **120**, the fixing unit **130** may fix the main body **210** of the first cleaner **200**. Specifically, when the coupling sensor **125** detects that the main body **210** of the first cleaner **200** is coupled to the coupling part **120** of the cleaner station **100**, the fixing drive part **133** may move the fixing members **131** to fix the main body **210** of the first cleaner **200**.

The fixing unit **130** may further include fixing detecting parts **137** capable of detecting the movements of the fixing members **131**.

The fixing detecting parts **137** may be provided in the housing **100** and may detect whether the dust bin **220** is fixed.

For example, the fixing detecting parts **137** may be disposed at both ends in a rotational region of the fixing part links **135**, respectively. That is, in the rotational region of the fixing part links **135**, a first fixing detecting part **137***a* may be disposed at an end portion in a direction in which the fixing members **131** are pushed toward the dust bin **220**. In addition, in the rotational region of the fixing part links **135**, a second fixing detecting part **137***b* may be disposed at an end portion in a direction in which the fixing members **131** are moved away from the dust bin **220**. Otherwise, as another example, the fixing detecting parts **137** may be disposed at both ends of a rectilinear movement region of the fixing members **131**, respectively.

Therefore, when the fixing part link **135** is moved to a predetermined position (hereinafter, also referred to as a 'dust bin fixing position FP**1**') at which the first fixing detecting part **137***a* is disposed or when the fixing member **131** is rectilinearly moved to a predetermined position, the fixing detecting part **137** may detect the movement and transmit a signal indicating that the dust bin **220** is fixed. In addition, when the fixing part link **135** is moved to a predetermined position (hereinafter, also referred to as a 'dust bin releasing position FP**2**') at which the second fixing detecting part **137***b* is disposed or when the fixing member **131** is rectilinearly moved to a predetermined position, the fixing detecting part **137** may detect the movement and transmit a signal indicating that the dust bin **220** is released.

The fixing detecting part **137** may include a contact sensor. For example, the fixing detecting part **137** may include a micro-switch.

Meanwhile, the fixing detecting part **137** may include a non-contact sensor. For example, the fixing detecting part **137** may include an infrared (IR) sensor.

A method of controlling the fixing unit **130** will be described below together with a description of a control unit **400** of the cleaner station **100** according to the present disclosure.

Meanwhile, FIG. **8**A illustrates another embodiment of a fixing unit **1130** of the cleaner station according to the present disclosure.

In order to avoid a repeated description, the contents related to the fixing unit **130** according to the embodiment of the present disclosure may be used to describe other components except for the components particularly mentioned in the present embodiment.

In the present embodiment, a fixing member **1131** may fix the dust bin **220** and the battery housing **230** by an upward/downward rectilinear movement of a fixing part frame **1135**.

That is, when the fixing part frame **1135** is rectilinearly moved upward by an operation of a fixing drive part **1133**, the fixing member **1131** is moved in the sidewall **124** toward the dust bin **220** by being guided by the fixing part frame **1135**.

In this case, fixing detecting parts **1137** may be disposed at both ends in a movement region of the fixing part frame **1135**, respectively. That is, a first fixing detecting part **1137***a* may be disposed at an upper end in the movement region of the fixing part frame **1135**. In addition, a second fixing detecting part **1137***b* may be disposed at a lower end in the movement region of the fixing part frame **1135**.

Therefore, when the fixing part frame **1135** is moved to a predetermined position (hereinafter, also referred to as the 'dust bin fixing position FP**1**') at which the first fixing detecting part **1137***a* is disposed, a sensor touch bar **1135***a* protruding from the fixing part frame **1135** pushes the first fixing detecting part **1137***a*, and the first fixing detecting part **1137***a* may transmit a signal indicating that the dust bin **220** is fixed. In addition, when the fixing part frame **1135** is moved to a predetermined position (hereinafter, also referred to as the 'dust bin releasing position FP**2**') at which the second fixing detecting part **1137***b* is disposed, the sensor touch bar **1135***a* pushes the second fixing detecting part **1137***b*, and the second fixing detecting part **1137***b* may transmit a signal indicating that the dust bin **220** is released.

Therefore, the amount of vibration and impact, which occur when the discharge cover **222** of the main body **210** of the fixed first cleaner **200** is separated from the dust bin **220**, is increased, and as a result, it is possible to improve efficiency in moving the dust stored in the dust bin **220** to the dust collecting part **170** of the cleaner station **100**. That is, it is possible to improve the suction force of the cleaner by preventing the residual dust from remaining in the dust bin.

Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin.

Meanwhile, FIG. **9** is a view for explaining a relationship between the first cleaner and the door unit in the cleaner station according to the embodiment of the present disclosure.

A door unit **140** according to the present disclosure will be described below with reference to FIGS. **4**, **5**, and **9**.

The cleaner station **100** according to the present disclosure may include the door unit **140**. The door unit **140** may be configured to open or close the dust passage hole **121***a*.

The door unit **140** may include a door **141**, a door motor **142**, and a door arm **143**.

The door **141** may be hingedly coupled to the coupling surface **121** and may open or close the dust passage hole **121***a*. The door **141** may include a door main body **141***a*, a hinge part **141***b*, and an arm coupling part **141***c*.

The door main body **141***a* may be formed in a shape capable of blocking the dust passage hole **121***a*. For example, the door main body **141***a* may be formed in a shape similar to a circular plate shape. On the basis of a state in which the door main body **141***a* blocks the dust passage hole **121***a*, the hinge part **141***b* may be disposed at an upper side of the door main body **141***a*, and the arm coupling part **141***c* may be disposed at a lower side of the door main body **141***a*.

The door main body **141***a* may be formed in a shape capable of sealing the dust passage hole **121***a*. For example, an outer surface of the door main body **141***a*, which is exposed to the outside of the cleaner station **100**, is formed to have a diameter corresponding to a diameter of the dust passage hole **121***a*, and an inner surface of the door main body **141***a*, which is disposed in the cleaner station **100**, is formed to have a diameter greater than the diameter of the dust passage hole **121***a*. In addition, a level difference may be defined between the outer surface and the inner surface. Meanwhile, one or more reinforcing ribs may protrude from the inner surface in order to connect the hinge part **141***b* and the arm coupling part **141***c* and reinforce a supporting force of the door main body **141***a*.

The hinge part **141***b* may be a means by which the door **141** is hingedly coupled to the coupling surface **121**. The hinge part **141***b* may be disposed at an upper end of the door main body **141***a* and coupled to the coupling surface **121**.

The arm coupling part **141***c* may be a means to which the door arm **143** is rotatably coupled. The arm coupling part **141***c* may be disposed at a lower side of the inner surface, and the door arm **143** may be rotatably coupled to the arm coupling part **141***c*.

With this configuration, when the door arm **143** pulls the door main body **141***a* in the state in which the door **141** closes the dust passage hole **121***a*, the door main body **141***a* is rotated about the hinge part **141***b* toward the inside of the cleaner station **100**, such that the dust passage hole **121***a* may be opened. Meanwhile, when the door arm **143** pushes the door main body **141***a* in the state in which the dust passage hole **121***a* is opened, the door main body **141***a* is rotated about the hinge part **141***b* toward the outside of the cleaner station **100**, such that the dust passage hole **121***a* may be closed.

The door motor **142** may provide power for rotating the door **141**. Specifically, the door motor **142** may rotate the door arm **143** in a forward direction or a reverse direction. In this case, the forward direction may mean a direction in which the door arm **143** pulls the door **141**. Therefore, when the door arm **143** is rotated in the forward direction, the dust passage hole **121***a* may be opened. In addition, the reverse direction may mean a direction in which the door arm **143** pushes the door **141**. Therefore, when the door arm **143** is rotated in the reverse direction, at least a part of the dust passage hole **121***a* may be closed. The forward direction may be opposite to the reverse direction.

The door arm **143** may connect the door **141** and the door motor **142** and open or close the door **141** using the power generated from the door motor **142**.

For example, the door arm **143** may include a first door arm **143***a* and a second door arm **143***b*. One end of the first door arm **143***a* may be coupled to the door motor **142**. The first door arm **143***a* may be rotated by the power of the door motor **142**. The other end of the first door arm **143***a* may be rotatably coupled to the second door arm **143***b*. The first door arm **143***a* may transmit a force transmitted from the door motor **142** to the second door arm **143***b*. One end of the second door arm **143***b* may be coupled to the first door arm **143***a*. The other end of the second door arm **143***b* may be coupled to the door **141**. The second door arm **143***b* may open or close the dust passage hole **121***a* by pushing or pulling the door **141**.

The door unit **140** may further include door opening/closing detecting parts **144**. The door opening/closing detecting parts **144** may be provided in the housing **100** and may detect whether the door **141** is in an opened state.

For example, the door opening/closing detecting parts **144** may be disposed at both ends in a rotation region of the door arm **143**, respectively. As another example, the door opening/closing detecting parts **144** may be disposed at both ends in a movement region of the door **141**, respectively.

Therefore, when the door arm **143** is moved to a predetermined opened position DP**1** or when the door **141** is opened to a predetermined position, the door opening/closing detecting parts **144** may detect that the door is opened. In addition, when the door arm **143** is moved to a predetermined closed position DP**2** or when the door **141** is moved to a predetermined position, the door opening/closing detecting parts **144** may detect that the door is closed.

The door opening/closing detecting parts **144** may transmit a signal indicating that the door is opened and transmit a signal indicating that the door is closed.

The door opening/closing detecting part **144** may include a contact sensor. For example, the door opening/closing detecting part **144** may include a micro-switch.

Meanwhile, the door opening/closing detecting part **144** may also include a non-contact sensor. For example, the door opening/closing detecting part **144** may include an infrared (IR) sensor.

With this configuration, the door unit **140** may selectively open or close at least a part of the coupling surface **121**, thereby allowing the outside of the first outer wall surface **112***a* to communicate with the first cleaner flow path part **181** and/or the dust collecting part **170**.

The door unit **140** may be opened when the discharge cover **222** of the first cleaner **200** is opened. In addition, when the door unit **140** is closed, the discharge cover **222** of the first cleaner **200** may also be closed.

When the dust in the dust bin **220** of the first cleaner **200** is removed, the door motor **142** may rotate the door **141**, thereby coupling the discharge cover **222** to the dust bin main body **221**. Specifically, the door motor **142** may rotate the door **141** to rotate the door **142** about the hinge part **141***b*, and the door **142** rotated about the hinge part **141***b* may push the discharge cover **222** toward the dust bin main body **221**.

FIG. **10** is a view for explaining the lower surface (bottom surface) of the dust bin of the first cleaner according to the

embodiment of the present disclosure, FIG. **11** is a view for explaining a relationship between the first cleaner and the cover opening unit in the cleaner station according to the embodiment of the present disclosure, and FIG. **12** is a perspective view for explaining the cover opening unit of the cleaner station according to the embodiment of the present disclosure.

The cover opening unit **150** according to the present disclosure will be described below with reference to FIGS. **4**, **5**, and **10** to **12**.

The cleaner station **100** according to the present disclosure may include the cover opening unit **150**. The cover opening unit **150** may be disposed on the coupling part **120** and may open the discharge cover **222** of the first cleaner **200**.

The cover opening unit **150** may include a push protrusion **151**, a cover opening drive part **152**, cover opening gears **153**, a support plate **154**, and a gear box **155**.

The push protrusion **151** may move to press the coupling lever **222***c* when the first cleaner **200** is coupled.

The push protrusion **151** may be disposed on the dust bin guide surface **122**. Specifically, a protrusion moving hole may be formed in the dust bin guide surface **122**, and the push protrusion **151** may be exposed to the outside by passing through the protrusion moving hole.

When the first cleaner **100** is coupled, the push protrusion **151** may be disposed at a position at which the push protrusion **151** may push the coupling lever **222***c*. That is, the coupling lever **222***c* may be disposed on the protrusion moving hole. In addition, the coupling lever **222***c* may be disposed in a movement region of the push protrusion **151**.

The push protrusion **151** may rectilinearly reciprocate to press the coupling lever **222***c*. Specifically, the push protrusion **151** may be coupled to the gear box **155**, such that the rectilinear movement of the push protrusion **151** may be guided. The push protrusion **151** may be coupled to the cover opening gears **153** and moved together with the cover opening gears **153** by the movements of the cover opening gears **153**.

For example, the push protrusion **151** may include a protrusion portion **151***a*, a protrusion support plate **151***b*, a connection portion **151***c*, a gear coupling block **151***d*, and guide frames **151***e*.

The protrusion portion **151***a* may be provided to push the coupling lever **222***c*. The protrusion portion **151***a* may be formed in a protrusion shape similar to a hook shape, a right-angled triangular shape, or a trapezoidal shape. The protrusion support plate **151***b* may be connected to the protrusion portion **151***a* and formed in the form of a flat plate for supporting the protrusion portion **151***a*.

The protrusion support plate **151***b* may be provided to be movable along an upper surface of the gear box **155**. The connection portion **151***c* may connect the protrusion support plate **151***b* and the gear coupling block **151***d*. The connection portion **151***c* may be formed to have a narrower width than the protrusion support plate **151***b* and the gear coupling block **151***d*.

The connection portion **151***c* may be disposed to penetrate a protrusion through hole **155***b* formed in the gear box **155**. The gear coupling block **151***d* may be coupled to the cover opening gears **153**. The gear coupling block **151***d* may be fixedly coupled to the cover opening gears **153** using a member such as a screw or a piece.

The gear coupling block **151***d* may be accommodated in the gear box **155** and may be rectilinearly reciprocated in the gear box **155** by the movement of the cover opening gears **153**. The guide frames **151***e* may protrude and extend from two lateral surfaces of the gear coupling block **151***d*, respectively. The guide frames **151***e* may be protrude and extend in a quadrangular column shape from the gear coupling block **151***d*.

The guide frame **151***e* may be disposed to penetrate a guide hole **155***c* formed in the gear box **155**. Therefore, when the gear coupling block **151***d* rectilinearly moves, the guide frame **151***e* may rectilinearly reciprocate along the guide hole **155***c*.

The cover opening drive part **152** may provide power for moving the push protrusion **151**. In the embodiment of the present disclosure, an example in which the cover opening drive part **152** is an electric motor is described, but the present disclosure is not limited thereto. Specifically, the cover opening drive part **152** may rotate a motor shaft **152***a* in a forward direction or a reverse direction. In this case, the forward direction may mean a direction in which the push protrusion **151** pushes the coupling lever **222***c*. In addition, the reverse direction may mean a direction in which the push protrusion **151**, which has pushed the coupling lever **222***c*, returns back to an original position. The forward direction may be opposite to the reverse direction.

The cover opening drive part **152** may be disposed outside the gear box **155**. The motor shaft **152***a* of the cover opening drive part **152** may penetrate a motor through hole **155***e* of the gear box **155** and may be coupled to the cover opening gears **153**. For example, the motor shaft **152***a* may be coupled to an opening driving gear **153***a* and rotated together with the opening driving gear **153***a*.

The cover opening gears **153** may be coupled to the cover opening drive part **152** and may move the push protrusion **151** using the power from the cover opening drive part **152**. Specifically, the cover opening gears **153** may be accommodated in the gear box **155**. The cover opening gears **153** may be coupled to the cover opening drive part **152** and supplied with the power. The cover opening gears **153** may be coupled to the push protrusion **151** to move the push protrusion **151**.

The cover opening gears **153** may include the opening driving gear **153***a* and an opening driven gear **153***b*. Specifically, the shaft **152***a* of the cover opening drive part **152** is inserted and coupled into the opening driving gear **153***a*, such that the opening driving gear **153***a* may receive rotational power from the cover opening drive part **152**.

The opening driven gear **153***b* may engage with the opening driving gear **153***a* and may be coupled to the gear coupling block **151***d* of the push protrusion **151**, thereby moving the push protrusion **151**. For example, the opening driven gear **153***b* may be formed in the form of a rack gear so as to engage with the opening driving gear **153***a* formed in the form of a pinion gear. The opening driven gear **153***b* may include a body portion **153***ba* coupled to the gear coupling block **151***d*. In addition, the opening driven gear **153***b* may include a gear portion **153***bb* formed at a lower side of the body portion **153***ba* and configured to engage with the opening driving gear **153***a*. Further, the opening driven gear **153***b* may include guide shafts **153***bc* protruding from the two lateral surfaces of the body portion **153***ba*. In addition, the opening driven gear **153***b* may include gear wheels **153***bd* into which the guide shafts **153***bc* are inserted and coupled, and the gear wheels **153***bd* may rollably move along guide rails **155***d* formed in an inner surface of the gear box **155**.

The support plate **154** may be provided to support one surface of the dust bin **220**. Specifically, the support plate **154** may extend from the coupling surface **121**. The support

plate **154** may protrude and extend toward a center of the dust passage hole **121***a* from the coupling surface **121**.

The support plate **154** may protrude and extend symmetrically from the coupling surface **121**, but the present disclosure is not limited thereto, and the support plate **154** may have various shapes capable of supporting the lower extension portion **221***a* of the first cleaner **200** or the lower surface of the dust bin **220**.

When the first cleaner **200** is coupled to the cleaner station **100**, the lower surface of the dust bin **220** may be disposed in the dust passage hole **121***a*, and the support plate **154** may support the lower surface of the dust bin **220**. The discharge cover **222** may be openably and closably provided at the lower side of the dust bin **220**, and the dust bin **220** may include the cylindrical dust bin main body **221** and the extending lower extension portion **221***a*. In this case, the support plate **154** may be in contact with the lower extension portion **221***a* and may support the lower extension portion **221***a*.

With this configuration, the push protrusion **151** may push the coupling lever **222***c* of the discharge cover **222** in the state in which the support plate **154** supports the lower extension portion **221***a*. Therefore, the discharge cover **222** may be opened, and the dust passage hole **121***a* and the inside of the dust bin **220** may communicate with each other. That is, as the discharge cover **222** is opened, the flow path part **180** and the inside of the dust bin **220** may communicate with each other, and the cleaner station **100** and the first cleaner **200** may be coupled to each other to enable a flow of a fluid (coupling of the flow path).

The gear box **155** may be coupled to the inner surface of the housing **110** and disposed at the lower side of the coupling part **120** in the gravitational direction, and the cover opening gears **153** may be accommodated in the gear box **155**. Specifically, the box main body **155***a* has a space capable of accommodating the cover opening gears **153**, and the protrusion through hole **155***b*, which is penetrated by the connection portion **151***c* of the push protrusion **151**, is formed in an upper surface of the box main body **155***a*. In addition, the guide hole **155***c* is formed in the form of a long hole in the lateral surface in a leftward/rightward direction of the box main body **155***a*, such that the guide frame **151***e* of the push protrusion **151** penetrates the guide hole **155***c*.

Meanwhile, the guide rails **155***d* may be formed on the inner surfaces at the lateral sides in the leftward/rightward direction of the box main body **155***a*. The guide rails **155***d* may support the opening driven gear **153***b* and guide the movement of the opening driven gear **153***b*.

The motor through hole **155***e* may be formed in one surface of the gear box **155**, and the shaft **152***a* of the cover opening drive part **152** may penetrate the motor through hole **155***e*. In addition, cover opening detecting parts **155***f* may be disposed on the lateral surface of the gear box **155**.

The cover opening detecting part **155***f* may include a contact sensor. For example, the cover opening detecting part **155***f* may include a micro-switch. Meanwhile, the cover opening detecting part **155***f* may also include a non-contact sensor. For example, the cover opening detecting part **155***f* may include an infrared (IR) sensor. Therefore, the cover opening detecting part **155***f* may detect a position of the guide frame **151***e*, thereby detecting a position of the push protrusion **151**.

The cover opening detecting parts **155***f* may be disposed at both ends of the guide hole **155***c* formed in the form of a long hole, respectively. Therefore, when the push protrusion **151** is moved to a position at which the push protrusion **151** may push the coupling lever **222***c* to open the discharge cover **222**, the guide frame **151***e* may be positioned at a predetermined cover opened point CP**1**, and the cover opening detecting part **155***f* may detect that the discharge cover **222** is opened. In addition, when the push protrusion **151** returns back to an original position, the guide frame **151***e* may be positioned at a predetermined cover non-opened point CP**2**, and the cover opening detecting part **155***f* may detect that the push protrusion **151** has returned back to the original position.

With this configuration, the cover opening unit **150** may selectively open or close the lower portion of the dust bin **220** by separating the coupling lever **222***c* from the dust bin **220**. In this case, the dust in the dust bin **220** may be captured into the dust collecting part **170** by the impact that occurs when the discharge cover **222** is separated from the dust bin **220**.

Therefore, in the case in which the main body **210** of the first cleaner **200** is fixed to the coupling part **120**, the cover opening drive part **152** may move the push protrusion **151** to separate the discharge cover **222** from the dust bin **220**. When the discharge cover **222** is separated from the dust bin **220**, the dust in the dust bin **220** may be captured into the dust collecting part **170**.

Accordingly, according to the present disclosure, the cover opening unit **150** may open the dust bin **220** even though the user separately opens the discharge cover **222** of the first cleaner, and as a result, it is possible to improve convenience.

In addition, since the discharge cover **222** is opened in the state in which the first cleaner **200** is coupled to the cleaner station **100**, it is possible to prevent the dust from scattering.

Meanwhile, FIG. **13**A is a view for explaining a relationship between the first cleaner and the lever pulling unit in the cleaner station according to the embodiment of the present disclosure.

The lever pulling unit **160** according to the present disclosure will be described below with reference to FIGS. **4**, **5**, **13**A and **13**B.

The cleaner station **100** according to the present disclosure may further include the lever pulling unit **160**. The lever pulling unit **160** may be disposed on the first outer wall surface **112***a* of the housing **110**. The lever pulling unit **160** may push the dust bin compression lever **223** of the first cleaner **200** to compress the dust in the dust bin **220**.

Meanwhile, in the present embodiment, the cleaner station **100** is described as having the lever pulling unit **160**, but the lever pulling unit **160** is not essential. The cleaner station **100** may be configured without having the lever pulling unit **160**.

The lever pulling unit **160** may include a lever pulling arm **161**, an arm gear **162**, a stroke drive motor **163**, a rotation drive motor **164**, and arm movement detecting parts **165**.

The lever pulling arm **161** is accommodated in the housing **110** and may be provided to be stroke-movable and rotatable. For example, the lever pulling arm **161** may be accommodated in an arm accommodating groove formed in the first outer wall surface **112***a*. In this case, when an imaginary cylindrical shape is defined with respect to a lower end of the arm accommodating groove, the dust bin compression lever **223** may be disposed in the imaginary cylindrical shape.

The lever pulling arm **161** may be provided to push the dust bin compression lever **223**. The lever pulling arm **161** may be formed to correspond to a shape of the arm accommodating groove. For example, the lever pulling arm **161** may be formed in a shape similar to an elongated bar.

One surface of the lever pulling arm **161** may be formed to define a continuous surface together with the first outer wall surface **112***a* in the state in which the lever pulling arm **161** is accommodated in the arm accommodating groove. The arm gear **162** may be coupled to one side of the other surface of the lever pulling arm **161**.

The arm gear **162** may be coupled to the lever pulling arm **161**, the stroke drive motor **163**, and the rotation drive motor **164**. For example, the arm gear **162** may be formed to be similar to a kind of shaft. One end of the shaft of the arm gear **162** may be fixedly coupled to the lever pulling arm **161**. The other end of the shaft of the arm gear **162** may be provided in the form of a worm wheel. Therefore, the other end of the shaft of the arm gear **162** is formed in the form of a worm gear and may engage with the rotation drive motor **164**. The shaft of the arm gear **162** may be formed in the form of a cylindrical worm. The shaft of the arm gear **162** may be formed in the form of a worm gear and may engage with the stroke drive motor **163**.

The stroke drive motor **163** may provide power for stroke-moving the lever pulling arm **161**. The stroke drive motor **163** may rotate in a forward direction or a reverse direction. In this case, the forward direction may mean a direction in which the lever pulling arm **161** is moved away from the housing **110** of the cleaner station **100**. In addition, the reverse direction may mean a direction in which the lever pulling arm **161** is pulled toward the cleaner station **100**. The forward direction may be opposite to the reverse direction.

The rotation drive motor **164** may provide power for rotating the lever pulling arm **161**. The rotation drive motor **164** may rotate in a forward direction or a reverse direction. In this case, the forward direction may mean a direction in which the lever pulling arm **161** rotates to a position at which the lever pulling arm **161** may push the dust bin compression lever **223**. In addition, the reverse direction may be a direction opposite to the forward direction.

The arm movement detecting parts **165** may be disposed in the housing **110**. The arm movement detecting parts **165** may be disposed on a movement route of the shaft of the arm gear **162**. The arm movement detecting parts **165** may be disposed at an initial position LP**1** of the shaft of the arm gear **162**, a maximum stroke movement position LP**2**, and a position LP**3** when the compression lever **223** is pulled, respectively.

The arm movement detecting part **165** may include a contact sensor. For example, the arm movement detecting part **165** may include a micro-switch. Meanwhile, the arm movement detecting part **165** may also include a non-contact sensor. For example, the arm movement detecting part **165** may include an infrared (IR) sensor. With this configuration, the arm movement detecting parts **165** may detect a stroke position of the arm gear **162**.

In addition, the arm movement detecting parts **165** may be disposed at the other end of the shaft of the arm gear **162**. The arm movement detecting parts **165** may be disposed at the other end of the arm gear **162** provided in the form of a worm wheel and may detect a rotation position. The arm movement detecting part **165** may include a contact sensor. For example, the arm movement detecting part **165** may include a micro-switch. Meanwhile, the arm movement detecting part **165** may also include a non-contact sensor. For example, the arm movement detecting part **165** may include an infrared (IR) sensor or a Hall sensor.

Therefore, the arm movement detecting part **165** may detect that the lever pulling arm **161** is positioned at the initial position. In addition, the arm movement detecting part **165** may detect that the lever pulling arm **161** has been moved maximally away from the housing **110**. In addition, the arm movement detecting part **165** may detect that the lever pulling arm **161** rotates to pull the compression lever **223**. In addition, the arm movement detecting part **165** may detect that the lever pulling arm **161** has pulled the compression lever **223**. In addition, the arm movement detecting part **165** may detect that the lever pulling arm **161** rotates to the original position after pulling the compression lever **223**.

Therefore, when the first cleaner **200** is coupled to the coupling part **120**, the compression member **224** may move downward as the lever pulling arm **161** stroke-moves, thereby compressing the dust in the dust bin **220**. In one embodiment of the present specification, the dust in the dust bin **220** may be captured primarily into the dust separating part **130** by gravity as the discharge cover **222** is separated from the dust bin **220**, and then the residual dust in the dust bin **220** may be captured secondarily into the dust separating part **130** by the compression member **224**. Otherwise, the compression member **224** may compress the dust in the dust bin **220** downward in the state in which the discharge cover **222** is coupled to the dust bin **220**, and then the discharge cover **222** may be separated from the dust bin **220**, such that the dust in the dust bin **220** may be captured into the dust separating part **130**.

Meanwhile, FIG. **13**B illustrates another embodiment of the lever pulling unit according to the present disclosure.

In order to avoid a repeated description, the contents related to the lever pulling unit **160** according to the embodiment of the present disclosure may be used to describe other components except for the components particularly mentioned in the present embodiment.

In the present embodiment, an arm gear **2162** and a shaft **2166** may be separately provided, and the arm gear **2162** and the shaft **2166** may be provided in parallel with each other. In addition, the shaft **2166** may be coupled to be stroke movable relative to the arm gear **2162**. That is, in order to connect the shaft **2166** to the arm gear **2162**, an internal screw thread may be formed on an inner surface of a connection portion of the shaft **2166**.

Therefore, when the arm gear **2162** is rotated by an operation of a stroke drive motor **2163**, the shaft **2166** may stroke-move along a screw thread of the arm gear **2162**.

Meanwhile, a lever pulling arm **2161** may be provided at one end of the shaft **2166**, a worm wheel **2166***a* may be provided at the other end of the shaft **2166**, and a rotation drive motor **2164** may engage with the worm wheel **2166***a*.

Therefore, when the rotation drive motor **2164** operates, the shaft **2166** may be rotated, and the lever pulling arm **2161** may be rotated.

Arm movement detecting parts **2165** may be disposed adjacent to the arm gear **2162** and arranged on a movement route of the shaft **2166**. The arm movement detecting parts **2165** may be disposed at an initial position LP**1** of the shaft **2166**, a maximum stroke movement position LP**2**, and a position LP**3** when the compression lever **223** is pulled, respectively.

That is, a first arm movement detecting part **2165***a* may be disposed at the initial position LP**1** of the shaft. In addition, a second arm movement detecting part **2165***b* may be disposed at the maximum stroke movement position LP**2**. In addition, a third arm movement detecting part **2165***c* may be disposed at the position LP**3** when the compression lever **223** is pulled.

The arm movement detecting part **2165** may include a contact sensor. For example, the arm movement detecting part **2165** may include a micro-switch. Meanwhile, the arm movement detecting part **2165** may also include a non-

contact sensor. For example, the arm movement detecting part **2165** may include an infrared (IR) sensor. With this configuration, the arm movement detecting parts **2165** may detect a stroke position of the shaft **2166**.

In addition, the arm movement detecting parts **2165** may include a fourth arm movement detecting part **2165***d* disposed at the other end **2166***a* of the shaft. The fourth arm movement detecting part **2165***d* may detect a rotation position of the shaft **2166**. The fourth arm movement detecting part **2165***d* may include a contact sensor. For example, the fourth arm movement detecting part **2165***d* may include a micro-switch. Meanwhile, the fourth arm movement detecting part **2165***d* may also include a non-contact sensor. For example, the fourth arm movement detecting part **2165***d* may include an infrared (IR) sensor or a Hall sensor.

Therefore, the first arm movement detecting part **2165***a* may detect that the lever pulling arm **2161** is positioned at the initial position LP**1**. In addition, the second arm movement detecting part **2165***b* may detect that the lever pulling arm **2161** has been moved maximally away from the housing **2110** (LP**2**). In addition, the fourth arm movement detecting part **2165***d* may detect that the lever pulling arm **2161** rotates to pull the compression lever **223**. In addition, the third arm movement detecting part **2165***d* may detect that the lever pulling arm **2161** has pulled the compression lever **223**. In addition, the fourth arm movement detecting part **2165***d* may detect that the lever pulling arm **2161** rotates to the original position after pulling the compression lever **223**.

Meanwhile, the dust collecting part **170** will be described below with reference to FIGS. **2** and **53**.

The cleaner station **100** may include the dust collecting part **170**. The dust collecting part **170** may be disposed in the housing **110**. The dust collecting part **170** may be disposed at a lower side in the gravitational direction of the coupling part **120**.

The dust collecting part **170** may include a roll vinyl film (not illustrated). The roll vinyl film may be fixed to the housing **110** and spread downward by a load of the dust falling from the dust bin **220**.

The cleaner station **100** may include a joint part (not illustrated). The joint part may be disposed in the housing **110**. The joint part may be disposed in an upper region of the dust collecting part **170**. The joint part may cut and join an upper region of the roll vinyl film in which the dust is captured. Specifically, the joint part may retract the roll vinyl film to a central region and join the upper region of the roll vinyl film using a heating wire. The joint part may include a first joint member (not illustrated) and a second joint member (not illustrated). The first joint member (not illustrated) may be moved in a first direction by a first joint drive part **174**, and the second joint member (not illustrated) may be moved in a second direction perpendicular to the first direction by a second joint drive part **175**.

With this configuration, the dust captured from the first cleaner **200** or the second cleaner **200** may be collected in the roll vinyl film, and the roll vinyl film may be automatically joined. Therefore, it is not necessary for the user to separately bind a bag in which the dust is captured, and as a result, it is possible to improve convenience for the user.

Meanwhile, the flow path part **180** will be described below with reference to FIGS. **2** and **16**.

The cleaner station **100** may include the flow path part **180**. The flow path part **180** may connect the first cleaner **200** or the second cleaner **300** to the dust collecting part **170**.

The flow path part **180** may include the first cleaner flow path part **181**, the second cleaner flow path part **182**, and a flow path switching valve **183**.

The first cleaner flow path part **181** may connect the dust bin **220** of the first cleaner **200** to the dust collecting part **170**. The first cleaner flow path part **181** may be disposed at a rear side of the coupling surface **121**. The first cleaner flow path part **181** may mean a space between the dust bin **220** of the first cleaner **200** and the dust collecting part **170**. The first cleaner flow path part **181** may be a space formed at a rear side of the dust passage hole **121***a*. The first cleaner flow path part **181** may be a flow path bent downward from the dust passage hole **121***a*, and the dust and the air may flow through the first cleaner flow path part **181**.

Specifically, the first cleaner flow path part **181** may include a first flow path **181***a* and a second flow path **181***b*. When the first cleaner **200** is coupled to the cleaner station **200** and the dust passage hole **121***a* is opened, the first flow path **181***a* communicates with the internal space of the dust bin **220**, and the second flow path **181***b* allows the first flow path **181***a* to communicate with the internal space of the dust collecting part **170**.

For example, the first flow path **181***a* may be disposed substantially in parallel with the suction motor axis a**1** or the dust bin through line a**5**. In this case, the suction motor axis a**1** or the dust bin through line a**5** may penetrate the first flow path **181**.

In addition, the second flow path **181***b* may be disposed in a direction parallel to a dust collecting motor axis C. With this configuration, it is possible to minimize a decrease in suction force of the dust collecting motor **181** in the first flow path **181***a* and the second flow path **181***b*.

In this case, the first flow path **181***a* may be provided at a predetermined angle with respect to the second flow path **181***b*. For example, an angle between the first flow path **181***a* and the second flow path **181***b* may be a right angle. With this configuration, it is possible to minimize an overall volume of the cleaner station **100**.

As another example, an angle between the first flow path **181***a* and the second flow path **181***b* may be an acute angle. This may mean that the first flow path **181***a* is directed upward in the gravitational direction, and the second flow path **181***b* is directed downward in the gravitational direction. That is, the air, which flows through the first flow path **181***a* and the second flow path **181***b* by the operation of the dust collecting motor **191**, may flow upward in the gravitational direction in the dust bin **220**, change in direction thereof, and then flow downward in the gravitational direction. This configuration has an effect of preventing the air containing the dust from flowing reversely when the dust collecting motor **191** does not operate.

As still another example, an angle between the first flow path **181***a* and the second flow path **181***b* may be an obtuse angle. In this case, there is an effect of reducing a loss in the flow path.

Meanwhile, a length of the first flow path **181***a* may be equal to or shorter than a length of the second flow path. With this configuration, the suction force of the dust collecting motor **191** may be transmitted to the space in the dust bin **220** even though the entire flow path for removing the dust is bent once.

The dust in the dust bin **220** of the first cleaner **200** may move to the dust collecting part **170** through the first cleaner flow path part **181**.

The second cleaner flow path part **182** may connect the second cleaner **300** to the dust collecting part **170**. The dust

in the second cleaner **300** may move to the dust collecting part **170** through the second cleaner flow path part **182**.

The flow path switching valve **183** may be disposed between the dust collecting part **170**, the first cleaner flow path part **181**, and the second cleaner flow path part **182**. The flow path switching valve **183** may selectively open or close the first cleaner flow path part **181** and the second cleaner flow path part **182** connected to the dust collecting part **170**. Therefore, it is possible to prevent a decrease in suction force caused when the plurality of flow paths **181** and **182** is opened.

For example, in a case in which only the first cleaner **200** is coupled to the cleaner station **100**, the flow path switching valve **183** may connect the first cleaner flow path part **181** to the dust collecting part **170** and disconnect the second cleaner flow path part **182** from the dust collecting part **170**.

As another example, in a case in which only the second cleaner **300** is coupled to the cleaner station **100**, the flow path switching valve **183** may disconnect the first cleaner flow path part **181** from the dust collecting part **170** and connect the second cleaner flow path part **182** to the dust collecting part **170**.

As still another example, in a case in which both the first cleaner **200** and the second cleaner **300** are coupled to the cleaner station **100**, the flow path switching valve **183** may connect the first cleaner flow path part **181** to the dust collecting part **170** and disconnect the second cleaner flow path part **182** from the dust collecting part **170** to remove the dust in the dust bin **220** of the first cleaner **200** first. Thereafter, the flow path switching valve **183** may disconnect the first cleaner flow path part **181** from the dust collecting part **170** and connect the second cleaner flow path part **182** to the dust collecting part **170** to remove the dust from the second cleaner **300**. Therefore, it is possible to improve convenience in respect to the use of the first cleaner **200** manually manipulated by the user.

Meanwhile, the dust suction module **190** will be described below with reference to FIGS. **2**, **16** to **20**, and **53**.

The cleaner station **100** may include the dust suction module **190**. The dust suction module **190** may include the dust collecting motor **191**, a first filter **192**, and a second filter (not illustrated).

The dust collecting motor **191** may be disposed below the dust collecting part **170**. The dust collecting motor **191** may generate the suction force in the first cleaner flow path part **181** and the second cleaner flow path part **182**. Therefore, the dust collecting motor **191** may provide the suction force capable of sucking the dust in the dust bin **220** of the first cleaner **200** and the dust in the second cleaner **300**.

The dust collecting motor **191** may generate the suction force by means of the rotation. For example, the dust collecting motor **191** may be formed in a shape similar to a cylindrical shape.

Meanwhile, in the present embodiment, an imaginary dust collecting motor axis C may be defined by extending the rotation axis of the dust collecting motor **191**.

The first filter **192** may be disposed between the dust collecting part **170** and the dust collecting motor **191**. The first filter **192** may be a prefilter.

The second filter (not illustrated) may be disposed between the dust collecting motor **191** and the outer wall surface **112**. The second filter (not illustrated) may be an HEPA filter.

The cleaner station **100** may include the charging part **128**. The charging part **128** may be disposed on the coupling part **120**. Specifically, the charging part **128** may be disposed on the coupling surface **121**. In this case, the charging part **128** may be positioned at a position facing a charging terminal provided on the battery **240** of the first cleaner **200**. The charging part **128** may be electrically connected to the first cleaner **200** coupled to the coupling part **120**. The charging part **128** may supply power to the battery of the first cleaner **200** coupled to the coupling part **120**. That is, when the first cleaner **200** is physically coupled to the coupling surface **121**, the charging part **128** may be electrically coupled to the first cleaner **200**.

In addition, the charging part **128** may include a lower charging part (not illustrated) disposed in a lower region of the housing **110**. The lower charging part may be electrically connected to the second cleaner **300** coupled to the lower region of the housing **110**. A second charger may supply power to the battery of the second cleaner **300** coupled to the lower region of the housing **110**.

The cleaner station **100** may include a lateral door (not illustrated). The lateral door may be disposed in the housing **110**. The lateral door may selectively expose the dust collecting part **170** to the outside. Therefore, the user may easily remove the dust collecting part **170** from the cleaner station **100**.

FIG. **24** is a perspective view illustrating a cleaner system including a cleaner station according to a second embodiment of the present disclosure, FIG. **25** is a cross-sectional view illustrating the cleaner system including the cleaner station according to the second embodiment of the present disclosure, FIG. **26** is a perspective view illustrating the cleaner station according to the second embodiment of the present disclosure, FIG. **27** is a perspective view illustrating a state in which a first door member illustrated in FIG. **26** is opened, FIGS. **28** and **29** are operational views illustrating states in which the main body of the first cleaner is coupled to the cleaner station according to the second embodiment of the present disclosure, FIG. **30** is a perspective view illustrating a coupling part of the cleaner station according to the second embodiment of the present disclosure, and FIG. **31** is a perspective view illustrating a state in which the main body of the first cleaner is coupled to the coupling part of the cleaner station according to the second embodiment of the present specification.

The cleaner system according to the second embodiment of the present disclosure will be described below with reference to FIGS. **24** to **31**.

The cleaner system according to the second embodiment of the present specification may include a cleaner station **3100** and the cleaners **200** and **300**. In this case, the cleaners **200** and **300** may include a first cleaner **200** and a second cleaner **300**.

Meanwhile, because the cleaners **200** and **300** according to the present embodiment are identical to the cleaners **200** and **300** according to the above-mentioned embodiment of the present disclosure, the same description may be applied.

Further, in order to avoid a repeated description, the contents related to the cleaner system **10** according to the embodiment of the present disclosure may be used to describe other components except for the components particularly mentioned in the present embodiment.

In the present embodiment, the first cleaner **200** may be coupled to an upper portion of the cleaner station **3100**. Specifically, the main body **210** of the first cleaner **200** may be coupled to the upper portion of the cleaner station **3100**.

The cleaner station **3100** may include a housing **3110**. In the present embodiment, the coupling part **3120**, to which the first cleaner **200** is coupled, may be disposed on an upper portion of the housing **3110**. The second cleaner **300** may be coupled to a lower portion of the housing **3110**. In the

present embodiment, an example in which the housing **3110** is formed in a hexahedral shape is described, but the present disclosure is not limited thereto, and the shape of the housing **3110** may be variously changed.

In the present embodiment, the housing **3110** may include a first door member **3114**. The first door member **3114** may be disposed at an upper side of the housing **3110**. The first door member **3114** may selectively expose the coupling part **3120**, which is disposed on the upper portion of the housing **3100**, to the outside. The first door member **3114** may be opened when the user approaches the cleaner station **3100**, and the first door member **3114** may be closed when the first cleaner **200** coupled to the cleaner station **3100** is separated from the cleaner station **3100**. Therefore, it is possible to prevent foreign substances such as dust from being introduced into the cleaner station **3100**.

In the present embodiment, the housing **3110** may include a first sensor part **3115**. The first sensor part **3115** may be disposed on the housing **3110**. The first sensor part **3115** may detect whether the user approaches the cleaner station **3100**. The first sensor part **3115** may include a non-contact sensor. For example, the first sensor part **3115** may be an infrared (IR) sensor. The first sensor part **3115** may include a contact sensor. For example, the first sensor part **3115** may include a micro-switch. In one embodiment of the present specification, an example in which the first sensor part **3115** is disposed on an upper surface of the housing **3110** is described, but the position of the first sensor part **3115** may be variously changed as long as the first sensor part **3115** may detect whether the user approaches the cleaner station **3100**.

In the present embodiment, the cleaner station **3100** may include the coupling part **3120**. The coupling part **3120** may be disposed on the upper portion of the cleaner station **3100**. The coupling part **3120** may be disposed on the upper portion of the housing **3110**. The coupling part **3120** may be selectively opened or closed by the first door member **3114**. The main body **210**, the dust bin **220**, and the battery housing **230** of the first cleaner **200** may be coupled to the coupling part **3120**.

The coupling part **3120** may include a coupling surface **3121**, a dust bin guide surface **3122**, a guide protrusion **3123**, a coupling sensor **3125**, and a suction part guide surface **3126**.

Meanwhile, unless described otherwise, the descriptions of the coupling surface **121**, the dust bin guide surface **122**, the guide protrusion **123**, the coupling sensor **125**, and the suction part guide surface **126** according to the above-mentioned embodiment of the present disclosure may be applied to the specific descriptions of the coupling surface **3121**, the dust bin guide surface **3122**, the guide protrusion **3123**, the coupling sensor **3125**, and the suction part guide surface **3126** in order to avoid the repeated description.

The coupling part **3120** may include the coupling surface **3121**. The coupling surface **3121** may be disposed on the upper surface of the housing **110**. The first cleaner **200** may be coupled to the coupling surface **3121**. Specifically, the main body **210**, the dust bin **220**, and the battery housing **230** of the first cleaner **200** may be coupled to the coupling surface **3121**.

The coupling surface **3121** may have a predetermined angle with respect to the ground surface. For example, an angle between the coupling surface **3121** and the ground surface may be an acute angle. Therefore, it is possible to provide convenience when coupling the main body **210** of the first cleaner **200** to the coupling surface **3121**. In this case, the coupling between the coupling surface **3121** and the main body **210** of the first cleaner **200** may mean physical coupling by which the first cleaner **200** and the cleaner station **3100** are coupled and fixed to each other.

The coupling part **3120** may include a first drive part (not illustrated). The first drive part may be disposed in the housing **3110**. The first drive part may rotate the coupling surface **3121**. When the dust bin **220** is coupled to the coupling surface **3121**, the first drive part may rotate the coupling surface **3121** in parallel with the ground surface. Therefore, it is possible to improve efficiency in capturing the dust into the dust bin **220** into the dust collecting part **3170** by means of a weight of the dust.

The coupling part **3120** may include the dust bin guide surface **3122**. The dust bin guide surface **3122** may be disposed on the upper portion of the housing **110**. The dust bin guide surface **3122** may be connected to the upper surface of the housing **3110**. The dust bin guide surface **3122** may be connected to the coupling surface **3121**. The dust bin guide surface **3122** may have a predetermined angle with respect to the ground surface. For example, an angle between the dust bin guide surface **3122** and the ground surface may be an obtuse angle.

The coupling part **3120** may include the coupling sensor **3125**. The coupling sensor **3125** may be disposed in the housing **3110**. The coupling sensor **3125** may detect whether the first cleaner **200** is physically coupled to the coupling part **3120**. The coupling sensor **3125** may face the main body **210** of the first cleaner **200**.

The coupling part **3120** may include the suction part guide surface **3126**. The suction part guide surface **3126** may be disposed on the upper portion of the housing **3110**. The suction part guide surface **3126** may be connected to the dust bin guide surface **3122**. The suction part **212** may be coupled to the suction part guide surface **3126**. The suction part guide surface **3126** may be formed in a shape corresponding to the shape of the suction part **212**. Therefore, it is possible to provide convenience when coupling the main body **210** of the first cleaner **200** to the coupling surface **3121**.

Meanwhile, FIGS. **32** and **33** are operational views illustrating states in which the main body of the first cleaner according to the embodiment of the present specification is fixed to the coupling part of the cleaner station.

Referring to FIGS. **32** and **33**, the cleaner station **3100** according to the present embodiment may include a fixing part **3130**. The fixing part **3130** may be disposed on the coupling surface **3121**. The fixing part **3130** may be disposed on the guide protrusion **3123**. The fixing part **3130** may fix the first cleaner **200** coupled to the coupling surface **3121**. Specifically, the fixing part **3130** may fix the main body **210** of the first cleaner **200** coupled to the coupling surface **3121**. The fixing part **3130** may include a fixing member **3131** configured to fix the main body **210** of the first cleaner **200**, and a fixing drive part **3132** configured to operate the fixing member **3131**. In the embodiment of the present disclosure, an example in which the fixing drive part **3132** moves the fixing member **3131** upward or downward is described. However, the shape of the fixing member **3131** and the type of the fixing drive part **3132** may be variously changed as long as the fixing member **3131** and the fixing drive part **3132** may fix the main body **210** of the first cleaner **200** to the coupling part **3120**.

The cleaner station **3100** of the present embodiment may include a door **3141**. The door **3141** may be disposed in the housing **3110**. The door **3141** may be disposed on the coupling surface **3121**. The door **3141** may selectively open or close at least a part of the coupling surface **3121**, thereby allowing the upper portion of the coupling part **3120** to

communicate with a first cleaner flow path part **3181** and/or a dust collecting part **3170**. The door **3141** may be opened together with the discharge cover **222** of the first cleaner **200** when the discharge cover **222** of the first cleaner **200** is opened. The door **3141** may rotate downward about a hinge part **3141***b*. The door **3141** may be closed by a door arm **3143** or a door motor **3142**. For example, the door **3141** may be rotated to one side by the door motor **3142**. The discharge cover **222** of the first cleaner **200** may be closed together with the door **3141** when the door **3141** is closed. Therefore, the dust bin **220** of the first cleaner **200** and the first cleaner flow path part **3181** may be coupled to implement a flow path through which a fluid may flow.

Meanwhile, FIG. **34** is a view illustrating a state in which the discharge cover of the first cleaner according to the second embodiment of the present specification is opened or closed.

Referring to FIG. **34**, the cleaner station **3100** may include a cover opening unit **3150**. The cover opening unit **3150** may be disposed on the upper portion of the coupling surface **3121**. The cover opening unit **3150** may be disposed adjacent to the dust bin guide surface **3122**. In the case in which the main body **210** of the first cleaner **200** is coupled to the coupling part **3120**, the cover opening unit **3150** may separate the discharge cover **222** from the dust bin **220**.

The cover opening unit **3150** may include a separation member **3151**, and a cover opening drive part **3152** configured to operate the separation member **3151**. In the case in which the dust bin **220** is coupled to the coupling part **3120**, the cover opening drive part **3152** may operate the separation member **3151**. Specifically, when the cover opening drive part **3152** moves the separation member **3151** downward, the separation member **3151** may separate the coupling lever **222***c* from the dust bin **220**, thereby selectively opening or closing the lower side of the dust bin **220**. In this case, the dust in the dust bin **220** may be moved downward and captured into the dust collecting part **3170** by the impact that occurs when the discharge cover **222** is separated from the dust bin **220**.

The cleaner station **3100** may include the dust collecting part **3170**.

In order to avoid a repeated description, the contents related to the dust collecting part **170** according to the embodiment of the present disclosure may be used to describe the dust collecting part **3170** according to the present embodiment except for the components particularly mentioned.

The dust collecting part **3170** may be disposed in the housing **3110**. The dust collecting part **3170** may be below the coupling part **3120**. Therefore, when the discharge cover **222** is separated from the dust bin **220**, the dust in the dust bin **220** may be captured into the dust collecting part **3170** by gravity.

In the present embodiment, the cleaner station **3100** may include a flow path part, and the flow path part may include the first cleaner flow path part **3181**, a second cleaner flow path part **3182**, and a flow path switching valve **3183**.

In order to avoid a repeated description, the contents related to the flow path part **180** according to the embodiment of the present disclosure may be used to describe the flow path part according to the present embodiment except for the components particularly mentioned.

The first cleaner flow path part **3181** may mean a straight region extending upward and downward. The dust in the dust bin **220** of the first cleaner **200** may move to the dust collecting part **3170** through the first cleaner flow path part **3181**.

Meanwhile, because the second cleaner flow path part **3182** and the flow path switching valve **3183** are identical in configuration and operation to the second cleaner flow path part **182** and the flow path switching valve **183** according to the embodiment of the present disclosure, the same description may be applied.

In the present embodiment, the cleaner station **3100** may include a dust suction module **3190**.

In order to avoid a repeated description, the contents related to the dust suction module **190** according to the embodiment of the present disclosure may be used to describe the dust suction module **3190** according to the present embodiment except for the components particularly mentioned.

The dust suction module **3190** may be disposed in the dust collecting part **3170**. Otherwise, the dust suction module **3190** may be disposed outside the dust collecting part **3170** and connected to the dust collecting part **3170**. The dust suction module **3190** may generate the suction force in the first cleaner flow path part **3181** and the second cleaner flow path part **3182**. Therefore, the dust suction module **3190** may provide the suction force capable of sucking the dust in the dust bin **220** of the first cleaner **200** and the dust in the second cleaner **300**.

Although not illustrated, in the present embodiment, the cleaner station **3100** may include a charging part. The charging part may include a first charger disposed on the coupling part **3120**, and a second charger disposed in a lower region of the housing **3110**. Therefore, the first cleaner **200** or the second cleaner **300** may be electrically coupled to the cleaner station **3100** through the charging part.

In the present embodiment, the cleaner station **3100** may include a lateral door (not illustrated). The lateral door may be disposed in the housing **3110**. Therefore, in the present embodiment, the user may also use the dust collecting part **3170** as a trash can, and as a result, it is possible to improve convenience for the user.

Referring to FIGS. **26** and **27**, when the user approaches the cleaner station **3100**, the first door member **114** may be moved upward, and the coupling part **3120** may be exposed upward. In this case, the first sensor part **3115** may detect whether the user approaches the cleaner station **3100**. Therefore, because the user need not separately open or close the first door member **3114**, it is possible to provide convenience for the user.

Referring to FIGS. **28** and **29**, when the user couples the first cleaner **200** to the coupling part **3120** of the cleaner station **3100**, the main body **210** and the dust bin **220** of the first cleaner **200** may be stably disposed on the coupling part **3120**. Therefore, it is possible to provide convenience when coupling the main body **210** and the dust bin **220** of the first cleaner **200** to the coupling surface **3121**.

Referring to FIGS. **31** and **33**, when the main body **210** of the first cleaner **200** is disposed on the coupling part **3120**, the fixing part **3130** may move the main body **210** of the first cleaner **200**. Specifically, when the coupling sensor **3125** detects that the main body **210** of the first cleaner **200** is coupled to the coupling part **3120** of the cleaner station **3100**, the fixing drive part **3132** may move the fixing member **3131** upward to fix the main body **210** of the first cleaner **200**.

Therefore, the amount of vibration and impact, which occur when the discharge cover **222** of the main body **210** of the fixed first cleaner **200** is separated from the dust bin **220**, is increased, and as a result, it is possible to improve efficiency in moving the dust stored in the dust bin **220** to the dust collecting part **3170** of the cleaner station **3100**. That is,

it is possible to improve the suction force of the cleaner by preventing the residual dust from remaining in the dust bin. Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin.

In the embodiment of the present disclosure, an example in which the fixing drive part **3132** is a solenoid actuator is described, but the present disclosure is not limited thereto, and the fixing drive part **3132** may be variously changed to an electromagnetic actuator or the like.

Referring to FIG. **34**, in the case in which the main body **210** of the first cleaner **200** is fixed to the coupling part **3120**, the cover opening drive part **3152** may move the separation member **3151** downward to separate the discharge cover **222** from the dust bin **220**. When the discharge cover **222** is separated from the dust bin **220**, the dust in the dust bin **220** may be captured into the dust collecting part **3170** by gravity and the load of the dust. In this case, the door **3141** is rotated downward by the weight of the discharge cover **222** separated from the dust bin **220**, such that the lower side of the dust bin **220** may communicate with the dust collecting part **3170**. Otherwise, one embodiment of the present specification may be carried out without the door **3141**.

Therefore, it is possible to remove the dust in the dust bin without the user's separate manipulation, thereby providing convenience for the user. In addition, it is possible to eliminate the inconvenience caused because the user needs to empty the dust bin all the time. In addition, it is possible to prevent the dust from scattering when emptying the dust bin.

In the embodiment of the present specification, an example in which the cover opening drive part **3152** is a solenoid actuator is described, but the present disclosure is not limited thereto, and the cover opening drive part **3152** may be variously changed to an electromagnetic actuator and the like.

Meanwhile, FIGS. **35** and **36** are operational views illustrating states in which the main body of the first cleaner coupled to the coupling part of the cleaner station according to the embodiment of the present specification rotates.

Referring to FIGS. **35** and **36**, when the main body **210** of the first cleaner **200** is fixed to the coupling part **3120**, the first drive part (not illustrated) may rotate the coupling surface **3121**. In this case, since the coupling surface **3121** is positioned in parallel with the ground surface, it is possible to improve efficiency in capturing the dust into the dust bin **220** into the dust collecting part **3170** by means of the weight of the dust.

Even in the case in which the coupling surface **3121** rotates, the cover opening drive part **3152** may separate the discharge cover **222** from the dust bin **220**, as illustrated in FIG. **11**. Otherwise, a separate protrusion may be formed on the inner surface of the coupling part. When the coupling surface **3121** is positioned in parallel with the ground surface, the protrusion formed on the inner surface of the coupling part may come into contact with the coupling lever **222***c* to separate the discharge cover **222** from the dust bin **220**.

FIG. **37** is a cross-sectional view illustrating the cleaner system according to the embodiment of the present specification.

Referring to FIG. **37**, the dust collecting part **3170** may include a roll vinyl film **3171**. The roll vinyl film **3171** may be fixed to the housing **110** and spread downward by the load of the dust falling from the dust bin **220**.

Meanwhile, FIGS. **47** and **48** are operational views illustrating states in which the roll vinyl film is joined in the cleaner station according to the second embodiment of the present specification.

Referring to FIGS. **47** and **48**, the cleaner station **3100** may include a joint part. The joint part may be disposed in the housing **3110**. The joint part may be disposed in an upper region of the dust collecting part **3170**. The joint part may cut and join the upper region of the roll vinyl film **3171** in which the dust is captured. Specifically, the joint part may retract the roll vinyl film **3171** to a central region and join the upper region of the roll vinyl film **3171** using a heating wire. The joint part may include a first joint member **3172** and a second joint member **3173**. The first joint member **3172** may be moved in a first direction by a first joint drive part **3174**, and the second joint member **3173** may be moved in a second direction perpendicular to the first direction by a second joint drive part **3175**.

Meanwhile, FIGS. **38** and **39** are operational views illustrating the compression part of the first cleaner according to the embodiment of the present specification.

Referring to FIGS. **38** and **39**, when the compression lever **223** moves downward, the compression member **224** moves downward to move the dust in the dust bin **220** downward. In the embodiment of the present specification, the dust in the dust bin **220** may be captured primarily into the dust collecting part **3170** by gravity as the discharge cover **222** is separated from the dust bin **220**, and then the residual dust in the dust bin **220** may be captured secondarily into the dust collecting part **3170** by the compression member **224**. Otherwise, the compression member **224** may compress the dust in the dust bin **220** downward in the state in which the discharge cover **222** is coupled to the dust bin **220**, and then the discharge cover **222** may be separated from the dust bin **220**, such that the dust in the dust bin **220** may be captured into the dust collecting part **3170**.

FIGS. **40** to **44** are views for explaining another embodiment of the cleaner system according to the second embodiment of the present disclosure.

Referring to FIG. **40**, the cleaner station **3100** according to another embodiment of the present specification may include a first flow part **3192**. The first flow part **3192** may allow air to flow to the suction part **212** of the first cleaner **200**. The air flowing to the suction part **212** of the first cleaner **200** may move the residual dust in the dust bin **220** downward to capture the residual dust into the dust collecting part **3170**. Therefore, it is possible to improve the suction force of the first cleaner **200** by preventing the residual dust from remaining in the dust bin **220**. Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin **220**.

Referring to FIG. **41**, the cleaner station **3100** according to another embodiment of the present specification may include a sealing member **3219** configured to seal the suction part **212** of the main body **210** of the first cleaner **200** coupled to the coupling part **3120**, and a suction device **3194** configured to suck the dust in the dust bin **220** to capture the dust into the dust collecting part **3170**. Therefore, it is possible to improve the suction force of the first cleaner **200** by preventing the residual dust from remaining in the dust bin **220**. Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin **220**.

Referring to FIG. **42**, the cleaner station **3100** according to another embodiment of the present specification may include the sealing member **3219** configured to seal the

suction part **212** of the main body **210** of the first cleaner **200** coupled to the coupling part **3120**, and a second flow part **3196** configured to allow air to flow to the dust bin **220**. It can be understood that the second flow part **3196** is identical to the first flow part **3192**. The second flow part **3196** may allow the air to flow into the dust bin **220** instead of the suction part **212**. The air introduced into the dust bin **220** of the first cleaner **200** may move the residual dust in the dust bin **220** downward to capture the residual dust into the dust collecting part **3170**. Therefore, it is possible to improve the suction force of the first cleaner **200** by preventing the residual dust from remaining in the dust bin **220**. Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin **220**.

The second flow part **3196** may include a discharge part **3196***b* configured to discharge air, and a drive part (not illustrated) configured to rotate the discharge part **3196***b* about the first shaft **3196***a*. The discharge part **3196***b* may rotate about the first shaft **3196***a* to allow the air to flow to various regions in the dust bin **220**, thereby efficiently removing the residual dust in the dust bin **220**.

Referring to FIGS. **43** and **44**, the cleaner station **3100** according to another embodiment of the present specification may include a removing part configured to remove the residual dust in the dust bin **220** by moving in the dust bin **220**.

The removing part may include a first removing member **3197**. The first removing member **3197** may rotate about the central region of the dust bin **220** to scrape down the residual dust in the dust bin **220**.

The removing part may include a second removing member **3198**. The second removing member **3198** may scrape down the residual dust in the dust bin **220** while moving from the upper side to the lower side of the dust bin **220**.

Therefore, it is possible to improve the suction force of the first cleaner **200** by preventing the residual dust from remaining in the dust bin **220**. Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin **220**.

Meanwhile, FIGS. **45** and **46** are views illustrating states in which the discharge cover of the first cleaner according to the second embodiment of the present specification is opened and closed.

Referring to FIGS. **45** and **46**, when the dust is removed from the dust bin **220** of the first cleaner **200**, the door motor **3142** may rotate the door **3141** to couple the discharge cover **222** to the dust bin **220**. Specifically, the door motor **3142** may rotate the door **3141** about the hinge part **3142***b* by rotating the door arm **3143**, and the door **3141** rotating about the hinge part **3142***b* may push the discharge cover **222** upward. In this case, the discharge cover **222** may be rotated about the hinge part **222***b*, and the coupling lever **222***c* may be coupled to the dust bin **220**.

Meanwhile, FIGS. **49** and **50** are perspective views for explaining an embodiment in which a mount is additionally provided on the cleaner station according to the second embodiment of the present specification.

Referring to FIGS. **49** and **50**, the cleaner station **3100** according to the embodiment of the present specification may include a mount **3500**. The mount **3500** may extend in the upward/downward direction. The mount **3500** may be separably coupled to the housing **3110**. Otherwise, the mount **3500** may be formed integrally with the housing **3110**. The first cleaner **200** may be mounted on the mount **3500**. The mount **3500** may support the first cleaner **200**.

The mount **3500** may include a main body part **3510**. The main body part **3510** may be disposed on a support part **3520**. The main body part **3510** may disposed on an upper portion of the support part **3520**. The main body part **3510** may be supported by the support part **3520**. The main body part **3510** may be separably coupled to the support part **3520**. The first cleaner **200** may be coupled to the main body part **3510**. The main body part **3510** may charge the battery **240** of the first cleaner **200**.

The mount **3500** may include the support part **3520**. The support part **3520** may be separably coupled to the housing **3110**. Otherwise, the support part **3520** may be formed integrally with the housing **3110**. The support part **3520** may support the main body part **3510**. In the embodiment of the present specification, an example in which the support part **3520** is provided on the lateral surface of the housing **3110** is described, but the present disclosure is not limited thereto, and the support part **3520** may be disposed on the upper surface of the housing **3110**. In addition, in the embodiment of the present specification, an example in which the support part **3520** is formed in a hexahedral shape extending in the upward/downward direction is described. However, the shape of the support part **3520** may be variously changed as long as the support part **3520** may support the main body part **3510**.

The mount **3500** may include a locking part **3530**. The locking part **3530** may be disposed on an upper portion of the main body part **3510**. The locking part **3530** may be coupled to the first cleaner **200** to stably fix the first cleaner **200**. The locking part **3530** may include a plurality of locking members provided to be spaced apart from one another in the horizontal direction. The main body **210** of the first cleaner **200** may be fitted into a space between the plurality of locking members from above. In this case, the outer surface of the main body **210** of the first cleaner **200** may be slidably coupled to an inner surface of the locking part **3530**. A sliding groove may be formed in the inner surface of the locking part **3530**, and a sliding protrusion, which is slidably coupled to the sliding groove of the locking part **3530**, may be formed on the outer surface of the main body **210** of the first cleaner **200**. On the contrary, a sliding protrusion may be formed on the inner surface of the locking part **3530**, and a sliding groove may be formed in the outer surface of the main body **210** of the first cleaner **200**.

Additional cleaning modules may be disposed on the mount **3500**. The additional cleaning modules may be detachably coupled to the mount **3500**. In general, the first cleaner **200** may have a variety of replaceable cleaning modules suitable for each application. Therefore, the additional cleaning module, which is not used, is stored by being coupled to the mount **3500**, and as a result, it is possible to reduce a risk of loss of the additional cleaning module. The additional cleaning module may be referred to as an 'accessory'.

Meanwhile, FIG. **51** is a perspective view for explaining some components of the cleaner station according to the second embodiment of the present specification.

Referring to FIG. **51**, the coupling part **3120** of the cleaner station **3100** according to the second embodiment of the present disclosure may be separated. Specifically, the coupling part **3120** and the first door member **3114** of the cleaner station **3100** may be separably coupled to the housing **3110**. When the coupling part **3120** is removed, the dust collecting part **3170** disposed in the housing **3110** may be exposed upward, and the user may use the cleaner station **3100** as a general trash can. In addition, when the dust collecting part **3170** is filled with the dust, the user may

easily remove and/or replace the dust collecting part **3170**, and as a result, it is possible to provide convenience for the user.

Meanwhile, FIG. **52** is a perspective view for explaining an embodiment in which the cleaner station according to the second embodiment of the present specification has a second door member.

Referring to FIG. **52**, the cleaner station **3100** according to the embodiment of the present specification may include a second door member **3116**. The second door member **3116** may be disposed at the lateral side of the cleaner station **3100**. The second door member **3116** may communicate with the dust collecting part **3170**. Specifically, when the second door member **3116** is opened, the dust collecting part **3170** may be exposed to the outside, and the user may use the cleaner station **3100** as a general trash can. In addition, when the dust collecting part **3170** is filled with the dust, the user may easily remove and/or replace the dust collecting part **3170**, and as a result, it is possible to provide convenience for the user.

Meanwhile, FIG. **53** is a block diagram for explaining a control configuration of the cleaner station according to the embodiment of the present disclosure.

The control configuration according to the present disclosure will be described below with reference to FIG. **53**.

The cleaner station **100** according to the embodiment of the present disclosure may further include a control unit **400** configured to control the coupling part **120**, the fixing unit **130**, the door unit **140**, the cover opening unit **150**, the lever pulling unit **160**, the dust collecting part **170**, the flow path part **180**, and the dust suction module **190**.

The control unit **400** may be disposed at the upper side in the housing **110**. For example, the control unit **400** may be disposed on the coupling part **120**. With this arrangement, the control unit **400**, the fixing unit **130**, the door unit **140**, the cover opening unit **150**, and the lever pulling unit **160** are disposed adjacent to one another, and as a result, response performance may be improved.

Otherwise, the control unit **400** may be disposed at the lower side in the housing **110**. For example, the control unit **400** may be disposed in the dust suction module **190**. With this arrangement, the control unit **400** may be disposed adjacent to the relatively heavy dust collecting motor **191** and disposed adjacent to the ground surface, such that the control unit **400** may be stably supported. As a result, it is possible to prevent damage to the control unit **400** even though external impact is applied to the control unit **400**.

The control unit **400** may include a printed circuit board, and elements mounted on the printed circuit board.

When the coupling sensor **125** detects the coupling of the first cleaner **200**, the coupling sensor **125** may transmit a signal indicating that the first cleaner **200** is coupled to the coupling part **120**. In this case, the control unit **400** may receive the signal from the coupling sensor **125** and determine that the first cleaner **200** is physically coupled to the coupling part **120**.

In addition, when the charging part **128** supplies power to the battery **240** of the first cleaner **200**, the control unit **400** may determine that the first cleaner **200** is electrically coupled to the coupling part **120**.

Therefore, when the control unit **400** determines that the first cleaner **200** is physically and electrically coupled to the coupling part **120**, the control unit **400** may determine that the first cleaner **200** is coupled to the cleaner station **120**.

When the control unit **400** determines that the first cleaner **200** is coupled to the coupling part **120**, the control unit **400** may operate the fixing drive part **133** to fix the first cleaner **200**.

When the fixing members **131** or the fixing part links **135** are moved to the predetermined fixing point FP**1**, the fixing detecting part **137** may transmit a signal indicating that the first cleaner **200** is fixed. The control unit **400** may receive the signal, which indicates that the first cleaner **200** is fixed, from the fixing detecting part **137** and determine that the first cleaner **200** is fixed. When the control unit **400** determines that the first cleaner **200** is fixed, the control unit **400** may stop the operation of the fixing drive part **133**.

Meanwhile, when the operation of emptying the dust bin **200** is ended, the control unit **400** may rotate the fixing drive part **133** in the reverse direction to release the first cleaner **200**.

When the control unit **400** determines that the first cleaner **200** is fixed to the coupling part **120**, the control unit **400** may operate the door motor **142** to open the door **141** of the cleaner station **100**.

When the door **141** or the door arm **143** reaches the predetermined opened position DP**1**, the door opening/closing detecting part **144** may transmit a signal indicating that the door **141** is opened. The control unit **400** may receive the signal, which indicates that the door **141** is opened, from the door opening/closing detecting part **137** and determine that the door **141** is opened. When the control unit **400** determines that the door **141** is opened, the control unit **400** may stop the operation of the door motor **142**.

Meanwhile, when the operation of emptying the dust bin **200** is ended, the control unit **400** may rotate the door motor **142** in the reverse direction to close the door **141**.

When the control unit **400** determines that the door **141** is opened, the control unit **400** may operate the cover opening drive part **152** to open the discharge cover **222** of the first cleaner **200**. As a result, the dust passage hole **121***a* may communicate with the inside of the dust bin **220**. Therefore, the cleaner station **100** and the first cleaner **200** may be coupled to each other to enable a flow of a fluid (coupling of the flow path).

When the guide frame **151***e* reaches the predetermined opened position CP**1**, the cover opening detecting part **155***f* may transmit a signal indicating that the discharge cover **222** is opened. The control unit **400** may receive the signal, which indicates that the discharge cover **222** is opened, from the cover opening detecting part **155***f* and determine that the discharge cover **222** is opened. When the control unit **400** determines that the discharge cover **222** is opened, the control unit **400** may stop the operation of the cover opening drive part **152**.

The control unit **400** may operate the stroke drive motor **163** and the rotation drive motor **164** to control the lever pulling arm **161** so that the lever pulling arm **161** may pull the dust bin compression lever **223**.

When the arm movement detecting part **165** detects that the arm gear **162** reaches the maximum stroke movement position LP**2**, the arm movement detecting part **165** may transmit a signal, and the control unit **400** may receive the signal from the arm movement detecting part **165** and stop the operation of the stroke drive motor **163**.

When the arm movement detecting part **165** detects that the arm gear **162** is rotated to the position at which the arm gear **162** may pull the compression lever **223**, the arm movement detecting part **165** may transmit a signal, and the

control unit **400** may receive the signal from the arm movement detecting part **165** and stop the operation of the rotation drive motor **164**.

In addition, the control unit **400** may operate the stroke drive motor **163** in the reverse direction to pull the lever pulling arm **161**.

In this case, when the arm movement detecting part **165** detects that the arm gear **162** reaches the position LP**3** when the compression lever **223** is pulled, the arm movement detecting part **165** may transmit a signal, and the control unit **400** may receive the signal from the arm movement detecting part **165** and stop the operation of the stroke drive motor **163**.

Meanwhile, when the operation of emptying the dust bin **200** is ended, the control unit **400** may rotate the stroke drive motor **163** and the rotation drive motor **164** in the reverse direction to return the lever pulling arm **161** to the original position.

The control unit **400** may operate the first joint drive part **174** and the second joint drive part **175** to join the roll vinyl film (not illustrated).

The control unit **400** may control the flow path switching valve **183** of the flow path part **180**. For example, the control unit **400** may selectively open or close the first cleaner flow path part **181** and the second cleaner flow path part **182**.

The control unit **400** may operate the dust collecting motor **191** to suck the dust in the dust bin **220**.

The control unit **400** may operate a display unit **500** to display a dust bin emptied situation and a charged situation of the first cleaner **200** or the second cleaner **300**.

A specific control process of the control unit **400** over time will be described below.

Meanwhile, the cleaner station **100** according to the present disclosure may include the display unit **500**.

The display unit **500** may be disposed on the housing **110**, disposed on a separate display device, or disposed on a terminal such as a mobile phone.

The display unit **500** may be configured to include at least any one of a display panel capable of outputting letters and/or figures and a speaker capable of outputting voice signals and sound. The user may easily ascertain a situation of a currently performed process, a residual time, and the like on the basis of information outputted through the display unit **500**.

Meanwhile, FIG. **14** is a view for explaining a weight distribution using an imaginary plane penetrating the first cleaner in the cleaner system according to the embodiment of the present disclosure, FIG. **15** is a view for explaining an imaginary plane and an orthogonal projection on the imaginary plane for expressing a weight distribution according to another embodiment, FIG. **16** is a view for explaining a weight distribution, in a state in which the first cleaner and the cleaner station are coupled, using an imaginary line, FIGS. **17**A to **18** are views for explaining an angle defined between an imaginary line and a ground surface and an angle defined between the imaginary line and a perpendicular line to the ground surface in a state in which the first cleaner is coupled to the cleaner station at a predetermined angle, FIG. **19** is a view for explaining an arrangement for maintaining the balance in a state in which the first cleaner and the cleaner station are coupled, FIG. **20** is a schematic view when viewing FIG. **19** in another direction, and FIG. **21** is a view for explaining an arrangement relationship between relatively heavy components in a state in which the first cleaner and the cleaner station are coupled.

The overall weight distribution and the maintenance of balance in the state in which the first cleaner **200** is mounted on the cleaner station **100** will be described below with reference to FIGS. **14** to **21**.

In the present disclosure, the first cleaner **200** may be mounted on the outer wall surface **112** of the cleaner station **100**. For example, the dust bin **220** and the battery housing **230** of the first cleaner **200** may be coupled to the coupling surface **121** of the cleaner station **100**. That is, the first cleaner **200** may be mounted on the first outer wall surface **112***a*.

In this case, the suction motor axis a**1** may be defined to be perpendicular to the first outer wall surface **112***a*. That is, the suction motor axis a**1** may be defined in parallel with the ground surface. The suction motor axis a**1** may be defined on a plane perpendicular to the ground surface. In addition, the suction motor axis a**1** may be defined on a plane that perpendicularly intersects the first outer wall surface **112***a*.

Meanwhile, as another embodiment, the suction motor axis a**1** may be defined in parallel with the first outer wall surface **112***a*. The suction motor axis a**1** may be defined in the gravitational direction. That is, the suction motor axis a**1** may be defined to be perpendicular to the ground surface. In addition, the suction motor axis a**1** may be defined on the plane that perpendicularly intersects the first outer wall surface **112***a*.

The suction flow path through line a**2** may be defined in parallel with the first outer wall surface **112***a*. The suction flow path through line a**2** may be defined in the gravitational direction. That is, the suction flow path through line a**2** may be defined to be perpendicular to the ground surface. In addition, the suction flow path through line a**2** may be defined on the plane that perpendicularly intersects the first outer wall surface **112***a*.

The grip portion through line a**3** may be defined to be inclined at a predetermined angle with respect to the first outer wall surface **112***a*. In addition, the grip portion through line a**3** may be defined to be inclined at a predetermined angle with respect to the ground surface. The grip portion through line a**3** may be defined on the plane that perpendicularly intersects the first outer wall surface **112***a*.

The cyclone line a**4** may be defined to be perpendicular to the first outer wall surface **112***a*. That is, the cyclone line a**4** may be defined in parallel with the ground surface. The cyclone line a**4** may be defined on the plane perpendicular to the ground surface. In addition, the cyclone line a**4** may be defined on the plane that perpendicularly intersects the first outer wall surface **112***a*.

Meanwhile, as another embodiment, the cyclone line a**4** may be defined in parallel with the first outer wall surface **112***a*. The cyclone line a**4** may be defined in the gravitational direction. That is, the cyclone line a**4** may be defined to be perpendicular to the ground surface. In addition, the cyclone line a**4** may be defined on the plane that perpendicularly intersects the first outer wall surface **112***a*.

The dust bin through line a**5** may be defined to be perpendicular to the first outer wall surface **112***a*. That is, the dust bin through line a**5** may be defined in parallel with the ground surface. The dust bin through line a**5** may be defined on the plane perpendicular to the ground surface. In addition, the dust bin through line a**5** may be defined on the plane that perpendicularly intersects the first outer wall surface **112***a*.

Meanwhile, as another embodiment, the dust bin through line a**5** may be defined in parallel with the first outer wall surface **112***a*. The dust bin through line a**5** may be defined in the gravitational direction. That is, the dust bin through

line a5 may be defined to be perpendicular to the ground surface. In addition, the dust bin through line a5 may be defined on the plane that perpendicularly intersects the first outer wall surface 112*a*.

The dust collecting motor axis C may be defined to be perpendicular to the ground surface. The dust collecting motor axis C may be defined in parallel with at least any one of the first outer wall surface 112*a*, the second outer wall surface 112*b*, the third outer wall surface 112*c*, and the fourth outer wall surface 112*d*.

The relationships between the suction motor axis a1, the suction flow path through line a2, the grip portion through line a3, the cyclone line a4, the dust bin through line a5, and the dust collecting motor axis C in the cleaner system according to the embodiment of the present disclosure will be described below.

In the embodiment of the present disclosure, the suction motor axis a1 may be disposed between the suction part 212 and the handle 216. In addition, the cyclone line a4 may be disposed between the suction part 212 and the handle 216. The dust bin through line a5 may be disposed between the suction part 212 and the handle 216.

The suction motor axis a1 may be disposed at a predetermined angle with respect to the suction flow path through line a2 or the grip portion through line a3. Therefore, the suction motor axis a1 may intersect the suction flow path through line a2 or the grip portion through line a3.

In this case, the intersection point P1 may be present between the suction motor axis a1 and the suction flow path through line a2. For example, the suction motor axis a1 may perpendicularly intersect the suction flow path through line a2.

In addition, the intersection point may be present between the suction motor axis a1 and the grip portion through line a3. For example, the intersection point between the suction motor axis a1 and the grip portion through line a3 may be disposed to be farther from the cleaner station 100 than is the intersection point P1 between the suction motor axis a1 and the suction flow path through line a2.

The suction motor axis a1 may be defined coaxially with the cyclone line a4 or the dust bin through line a5. With this configuration, there is an effect of reducing a loss of flow path.

Although not illustrated, the suction motor axis a1 may be defined to be parallel to the cyclone line a4 or the dust bin through line a5 and spaced apart from the cyclone line a4 or the dust bin through line a5 at a predetermined interval. That is, the rotation axis of the suction motor 214 may be disposed in parallel with a longitudinal axis of the dust bin 220 or a flow axis of the dust separating part 213. As still another example, the suction motor axis a1 may be defined to be perpendicular to the cyclone line a4 or the dust bin through line a5.

When the first cleaner 200 is coupled to the cleaner station 100, the suction motor axis a1 may intersect a longitudinal axis of the cleaner station 100. That is, the rotation axis of the suction motor 214 may intersect the longitudinal axis of the cleaner station 100. In this case, the intersection point between the rotation axis of the suction motor 214 and the longitudinal axis of the cleaner station 100 may be positioned in the housing 110, and more particularly, positioned in the flow path part 180.

When the first cleaner 200 is coupled to the cleaner station 100, the suction motor axis a1 may intersect the dust collecting motor axis C. In this case, an intersection point P5 may be present between the suction motor axis a1 and the dust collecting motor axis C. The intersection point P5 between the suction motor axis a1 and the dust collecting motor axis C may be positioned in the housing 110, and more particularly, positioned in the flow path part 180.

In this case, a height of the intersection point P5 between the suction motor axis a1 and the dust collecting motor axis C from the ground surface may be equal to or less than a maximum height of the cleaner station 100.

In addition, the height of the intersection point P5 between the suction motor axis a1 and the dust collecting motor axis C from the ground surface may be equal to a height of an intersection point P4 between the suction flow path through line a2 and the dust bin through line a5.

Further, the height of the intersection point P5 between the suction motor axis a1 and the dust collecting motor axis C from the ground surface may be equal to a height of the intersection point P1 between the suction flow path through line a2 and the suction motor axis a1.

With this configuration, the first cleaner 200 may be stably supported on the cleaner station 100 in the state in which the first cleaner 200 is coupled to the cleaner station 100, and a loss of flow path may be reduced during the operation of emptying the dust bin 220.

In the state in which the first cleaner 200 and the cleaner station 100 are coupled, the suction motor axis a1 may intersect the dust collecting motor axis C at a predetermined angle. For example, an included angle θ1 between the suction motor axis a1 and the dust collecting motor axis C may be 40 degrees or more and 95 degrees or less, and particularly, 43 degrees or more and 90 degrees or less. If the included angle is less than 40 degrees, the user needs to bend his/her waist to couple the first cleaner 200 to the cleaner station 100, which may cause discomfort to the user. If the included angle is more than 95 degrees, the first cleaner 200 may be separated from the cleaner station 100 by the weight of the first cleaner 200.

In this case, the included angle may mean an angle defined as the suction motor axis a1 and the dust collecting motor axis C intersect each other, that is, an included angle defined between the suction motor axis a1 and the dust collecting motor axis C. For example, the included angle may mean an angle between the dust collecting motor axis C and the suction motor axis a1, in which when the intersection point P5 between the suction motor axis a1 and the dust collecting motor axis C is defined as a vertex, the dust collecting motor axis C is farther from the ground surface than is the intersection point P5, and the suction motor axis a1 is defined in the direction of the suction motor 214 based on the intersection point P5 (see FIGS. 16 to 17B).

In addition, in the state in which the first cleaner 200 and the cleaner station 100 are coupled, the suction motor axis a1 may intersect the perpendicular line V to the ground surface at a predetermined angle. For example, an included angle θ2 between the suction motor axis a1 and the perpendicular line V to the ground surface may be 40 degrees or more and 95 degrees or less, and particularly, 43 degrees or more and 90 degrees or less. If the included angle is less than 40 degrees, the user needs to bend his/her waist to couple the first cleaner 200 to the cleaner station 100, which may cause discomfort to the user. If the included angle is more than 95 degrees, the first cleaner 200 may be separated from the cleaner station 100 by the weight of the first cleaner 200.

In this case, the included angle may mean an angle defined as the suction motor axis a1 and the perpendicular line V to the ground surface intersect each other, that is, an included angle between the suction motor axis a1 and the perpendicular line V to the ground surface. For example, the

included angle may mean an angle between the perpendicular line V to the ground surface and the suction motor axis a1, in which when an intersection point P7 between the suction motor axis a1 and the perpendicular line to the ground surface is defined as a vertex, the perpendicular line V is farther from the ground surface than is the intersection point P7, and the suction motor axis a1 is defined in the direction of the suction motor **214** based on the intersection point P7 (see FIG. **18**).

In addition, in the state in which the first cleaner **200** and the cleaner station **100** are coupled, the suction motor axis a1 may intersect the ground surface B at a predetermined angle.

For example, an included angle θ3 between the suction motor axis a1 and the ground surface B may be −5 degrees or more and 50 degrees or less, and particularly, 0 degree or more and 47 degrees or less. In this case, the included angle may be an acute angle. In this case, the negative angle may mean the included angle between the suction motor axis a1 and the ground surface when the intersection point P1 between the suction motor axis a1 and the suction flow path through line a2 is positioned to be close to the ground surface based on the intersection point P5 between the suction motor axis a1 and the dust collecting motor axis C (see FIG. **18**).

Meanwhile, when the first cleaner **200** is coupled to the cleaner station **100**, the handle **216** may be disposed to be farther from the ground surface than is the suction motor axis a1. With this configuration, when the user grasps the handle **216**, the relatively heavy suction motor **214** is positioned at the lower side in the gravitational direction, and the user may couple or separate the first cleaner **200** to/from the cleaner station **100** only by simply moving the first cleaner **200** in the direction parallel to the ground surface. As a result, it is possible to provide convenience for the user.

In addition, when the first cleaner **200** is coupled to the cleaner station **100**, the battery **240** may be disposed to be farther from the ground surface than is the suction motor axis a1. With this configuration, the first cleaner **200** may be stably supported on the cleaner station **100**.

The suction flow path through line a2 may intersect the suction flow path axis a1, the grip portion through line a3, the cyclone line a4, or the dust bin through line a5.

For example, the suction flow path through line a2 may perpendicularly intersect the suction flow path axis a1. In this case, the intersection point P1 may be defined between the suction motor axis a1 and the suction flow path through line a2.

In addition, the suction flow path through line a2 and the grip portion through line a3 may intersect each other at a predetermined angle. Further, the intersection point P2 may be defined between the suction flow path through line a2 and the grip portion through line a3.

In addition, the suction flow path through line a2 may perpendicularly intersect the cyclone line a4. In this case, an intersection point P3 may be present between the suction flow path through line a2 and the cyclone line a4.

In addition, the suction flow path through line a2 may perpendicularly intersect the dust bin through line a5. In this case, the intersection point P4 may be present between the suction flow path through line a2 and the dust bin through line a5.

When the first cleaner **200** is coupled to the cleaner station **100**, the suction flow path through line a2 may be defined in parallel with the dust collecting motor axis C. With this configuration, it is possible to minimize an occupied space on a horizontal plane in the state in which the first cleaner **200** is coupled to the cleaner station **100**.

In this case, the coupling part **120** may be disposed between the suction flow path through line a2 and the dust collecting motor axis C. The fixing member **131** may be disposed between the suction flow path through line a2 and the dust collecting motor axis C. The cover opening unit **150** may be between the suction flow path through line a2 and the dust collecting motor axis C. With this configuration, the user may couple or separate the first cleaner **200** to/from the cleaner station **100**, fix the dust bin **220**, and open the dust bin **220** only by simply moving the first cleaner **200** in the direction parallel to the ground surface. As a result, it is possible to provide convenience for the user.

Meanwhile, as another example, the suction flow path through line a2 may be disposed at a predetermined angle with respect to the dust collecting motor axis C. In this case, an included angle between the suction flow path through line a2 and the dust collecting motor axis C may be 50 degrees or less. If the included angle between the suction flow path through line a2 and the dust collecting motor axis C is more than 50 degrees, the user needs to bend his/her waist to couple the first cleaner **200** to the cleaner station **100**, which may cause discomfort to the user.

The grip portion through line a3 may intersect the suction flow path axis a1, the suction flow path through line a2, the cyclone line a4, or the dust bin through line a5.

When the first cleaner **200** is coupled to the cleaner station **100**, a height of the intersection point P2 between the grip portion through line a3 and the suction flow path through line a2 from the ground surface may be equal to or less than a maximum height of the housing **110**. With this configuration, it is possible to minimize an overall volume in the state in which the first cleaner **200** is coupled to the cleaner station **100**.

The grip portion through line a3 may intersect the dust collecting motor axis C at a predetermined angle. In this case, an intersection point P6 between the grip portion through line a3 and the dust collecting motor axis C may be positioned in the housing **110**. This configuration is advantageous in that the user may couple the first cleaner **200** to the cleaner station **100** only by simply pushing his/her arm toward the lateral side of the cleaner station **100** in the state in which the user grasps the first cleaner **200**. In addition, since the dust collecting motor **191**, which is relatively heavy in weight, is accommodated in the housing **110**, it is possible to prevent the cleaner station **100** from swaying even though the user strongly pushes the first cleaner **200** into the cleaner station **100**.

The cyclone line a4 may be defined coaxially with the suction motor axis a1 or the dust bin through line a5. With this configuration, there is an effect of reducing a loss of flow path during a cleaning process.

Although not illustrated, as another example, the cyclone line a4 may be defined to be parallel to the suction motor axis a1 or the dust bin through line a5 or spaced apart from the suction motor axis a1 or the dust bin through line a5 at a predetermined interval. As still another example, the cyclone line a4 may be defined to be perpendicular to the suction motor axis a1 or the dust bin through line a5.

When the first cleaner **200** is coupled to the cleaner station **100**, the cyclone line a4 may intersect the longitudinal axis of the cleaner station **100**. That is, the flow axis of the dust separating part **213** may intersect the longitudinal axis of the cleaner station **100**. In this case, the intersection point between the flow axis of the dust separating part **213** and the

longitudinal axis of the cleaner station **100** may be positioned in the housing **110**, and more particularly, positioned in the flow path part **180**.

When the first cleaner **200** is coupled to the cleaner station **100**, the cyclone line a**4** may intersect the dust collecting motor axis C. In this case, the intersection point P**5** may be present between the cyclone line a**4** and the dust collecting motor axis C. The intersection point P**5** between the cyclone line a**4** and the dust collecting motor axis C may be positioned in the housing **110**, and more particularly, positioned in the flow path part **180**. With this configuration, the first cleaner **200** may be stably supported on the cleaner station **100** in the state in which the first cleaner **200** is coupled to the cleaner station **100**, and a loss of flow path may be reduced during the operation of emptying the dust bin **220**.

The cyclone line a**4** may intersect the dust collecting motor axis C at a predetermined angle. For example, an included angle between the cyclone line a**4** and the dust collecting motor axis C may be 40 degrees or more and 95 degrees or less, and particularly, 43 degrees or more and 90 degrees or less. If the included angle is less than 40 degrees, the user needs to bend his/her waist to couple the first cleaner **200** to the cleaner station **100**, which may cause discomfort to the user. If the included angle is more than 95 degrees, the first cleaner **200** may be separated from the cleaner station **100** by the weight of the first cleaner **200**.

The dust bin through line a**5** may be defined coaxially with the suction motor axis a**1** or the cyclone line a**4**. With this configuration, there is an effect of reducing a loss of flow path during a cleaning process.

Although not illustrated, as another example, the dust bin through line a**5** may be defined to be parallel to the suction motor axis a**1** or the cyclone line a**4** and spaced apart from the suction motor axis a**1** or the cyclone line a**4** at a predetermined interval. As still another example, the dust bin through line a**5** may be defined to be perpendicular to the suction motor axis a**1** or the cyclone line a**4**.

When the first cleaner **200** is coupled to the cleaner station **100**, the dust bin through line a**5** may intersect the longitudinal axis of the cleaner station **100**. That is, the longitudinal axis of the dust bin **220** may intersect the longitudinal axis of the cleaner station **100**. In this case, an intersection point between the longitudinal axis of the dust bin **220** and the longitudinal axis of the cleaner station **100** may be positioned in the housing **110**, and more particularly, positioned in the flow path part **180**.

The dust bin through line a**5** may intersect the dust collecting motor axis C at a predetermined angle. For example, an included angle between the dust bin through line a**5** and the dust collecting motor axis C may be 40 degrees or more and 95 degrees or less, and particularly, 43 degrees or more and 90 degrees or less. If the included angle is less than 40 degrees, the user needs to bend his/her waist to couple the first cleaner **200** to the cleaner station **100**, which may cause discomfort to the user. If the included angle is more than 95 degrees, the first cleaner **200** may be separated from the cleaner station **100** by the weight of the first cleaner **200**.

Meanwhile, when the first cleaner **200** is coupled to the cleaner station **100**, the handle **216** may be disposed to be farther from the ground surface than is the dust bin through line a**5**. With this configuration, when the user grasps the handle **216**, the user may couple or separate the first cleaner **200** to/from the cleaner station **100** only by simply moving the first cleaner **200** in the direction parallel to the ground surface. As a result, it is possible to provide convenience for the user.

In addition, when the first cleaner **200** is coupled to the cleaner station **100**, the battery **240** may be disposed to be farther from the ground surface than is the dust bin through line a**5**. In this configuration, because the battery **240** pushes the main body **210** of the first cleaner **200** by means of the weight of the battery **240**, the first cleaner **200** may be stably supported on the cleaner station **100**.

Meanwhile, in the present embodiment, an imaginary plane S**1** may be defined in a direction of a long axis connecting the front side and the rear side of the first cleaner **100**, and an overall weight of the first cleaner **100** may be concentrated on the plane S**1**.

Specifically, the imaginary plane S**1** may include at least two of the suction motor axis a**1**, the suction flow path through line a**2**, the grip portion through line a**3**, the cyclone line a**4**, the dust bin through line a**5**, and the dust collecting motor axis C. That is, the plane S**1** may be an imaginary plane defined by connecting two imaginary straight lines and may include an imaginary plane defined by expanding and extending the two imaginary straight lines.

For example, the plane S**1** may include the suction motor axis a**1** and the suction flow path through line a**2**. Alternatively, the plane S**1** may include the suction motor axis a**1** and the grip portion through line a**3**. Alternatively, the plane S**1** may include the cyclone line a**4** and the suction flow path through line a**2**. Alternatively, the plane S**1** may include the cyclone line a**4** and the grip portion through line a**3**. Alternatively, the plane S**1** may include the dust bin through line a**5** and the suction flow path through line a**2**. Alternatively, the plane S**1** may include the dust bin through line a**5** and the grip portion through line a**3**. Alternatively, the plane S**1** may include the suction flow path through line a**2** and the grip portion through line a**3**. In addition, the plane S**1** may include the dust collecting motor axis C and the suction motor axis a**1**. In addition, the plane S**1** may include the dust collecting motor axis C and the suction flow path through line a**2**. In addition, the plane S**1** may include the dust collecting motor axis C and the grip portion through line a**3**. In addition, the plane S**1** may include the dust collecting motor axis C and the cyclone line a**4**. In addition, the plane S**1** may include the dust collecting motor axis C and the dust bin through line a**5**.

Meanwhile, FIG. **15** illustrates an embodiment in which some of the suction motor axis a**1**, the suction flow path through line a**2**, the grip portion through line a**3**, the cyclone line a**4**, the dust bin through line a**5**, and the dust collecting motor axis C are parallel to the plane S**1**.

In this case, the plane S**1** may include at least two of the suction motor axis a**1**, the suction flow path through line a**2**, the grip portion through line a**3**, the cyclone line a**4**, the dust bin through line a**5**, and the dust collecting motor axis C, and an imaginary line, which is not included in the plane S**1**, may be parallel to the plane S**1**. Further, the imaginary line, which is not included in the plane S**1**, may have an orthogonal projection to the plane S**1**, and the orthogonal projection may intersect the imaginary line included in the plane S**1**.

For example, as illustrated in FIG. **15**, the plane S**1** may include the suction flow path through line a**2** and the grip portion through line a**3**, and the suction motor axis a**1**, the cyclone line a**4**, or the dust bin through line a**5** may be parallel to the plane S**1**. Further, an orthogonal projection a**1'** of the suction motor axis, an orthogonal projection a**4'** of the cyclone line, or an orthogonal projection a**5'** of the dust bin through line may intersect the suction flow path through line

a2. That is, an intersection point P1' may be present between the orthogonal projection a1' of the suction motor axis and the suction flow path through line a2. In addition, an intersection point P3' may be present between the orthogonal projection a4' of the cyclone line and the suction flow path through line a2. In addition, an intersection point P4' may be present between the orthogonal projection a5' of the dust bin through line and the suction flow path through line a2.

Although not illustrated, as another example, the plane S1 may include the suction motor axis a1 and the dust collecting motor axis C, and the suction flow path through line a2 may be parallel to the plane S1. Further, the orthogonal projection of the suction flow path through line a2 may intersect the suction motor axis a1. That is, an intersection point may be present between the orthogonal projection of the suction flow path through line a2 and the suction motor axis a1.

An imaginary extension surface of the plane S1 may penetrate the first cleaner **200**.

For example, the imaginary extension surface of the plane S1 may penetrate the suction part **212**. Alternatively, the imaginary extension surface of the plane S1 may penetrate the dust separating part **213**. Alternatively, the imaginary extension surface of the plane S1 may penetrate the suction motor **214**. Alternatively, the imaginary extension surface of the plane S1 may penetrate the handle **216**. Alternatively, the imaginary extension surface of the plane S1 may penetrate the dust bin **220**.

In addition, when the first cleaner **200** is mounted on the cleaner station **200**, the imaginary extension surface of the plane S1 may penetrate at least a part of the cleaner station **100**.

Therefore, when the first cleaner **200** is mounted on the cleaner station **200**, the plane S1 may penetrate (pass through) the housing **110**.

Specifically, when the first cleaner **200** is mounted on the cleaner station **200**, the plane S1 may penetrate the bottom surface **111**.

For example, the plane S1 may pass through the bottom surface **111** to bisect the bottom surface **111**. That is, the bottom surface **111**, which is formed to be similar to a quadrangle, may be a surface that is symmetric with respect to a centerline. The imaginary line formed by the bottom surface **111** and the plane S1 intersecting each other may be coincident with the centerline of the bottom surface **111**. With this configuration, the overall weight of the first cleaner **200** may be concentrated on the center of the bottom surface **111**, and the cleaner station **100** may maintain the balance in the state in which the first cleaner **200** is mounted on the cleaner station **100**.

The plane S1 may perpendicularly intersect the first outer wall surface **112***a*. That is, the plane S1 may pass through the first outer wall surface **112***a* and the second outer wall surface **112***b*. For example, the plane S1 may be an imaginary plane that bisects the first outer wall surface **112***a* and the second outer wall surface **112***b* of the cleaner station **100**. Therefore, the housing **110** may be symmetrically divided by the plane S1. In addition, the plane S1 may pass through the coupling surface **121** to bisect the coupling surface **121**.

The imaginary extension surface of the plane S1 may penetrate the dust collecting motor **191**. In this case, the overall load of the first cleaner **100** is concentrated on the region in which the dust collecting motor **191** is disposed. In this case, the dust collecting motor **191** is heavier in weight than the first cleaner **100**, and the dust collecting motor **191** is disposed to be closer to the ground surface than is the main body **110** of the first cleaner **100**. As a result, an overall center of gravity of an assembly of the first cleaner **100** and the cleaner station **200** may be lowered, thereby maintaining the balance.

The imaginary extension surface of the plane S1 may penetrate the flow path part **180**. In this case, it is possible to minimize a loss of the air flow path connected from the dust bin **220** to dust collecting part **170**.

Meanwhile, the imaginary extension surface of the plane S1 may pass through the bottom surface **111** in an asymmetric manner or may not penetrate the dust collecting motor **191**. However, even in this case, the first cleaner **200** according to the present disclosure is supported by the coupling part **120** and the housing **110**, such that the overall load of the first cleaner **220** is concentrated in the region of the bottom surface **111**. In this case, since the dust collecting motor **191** is also provided in the housing **110**, the load of the dust collecting motor **191** is also concentrated in the region of the bottom surface **111**. In this case, the load of the first cleaner **220** is applied to one side of the bottom surface **111**, and the load of the dust collecting motor **191** is applied to the other side of the bottom surface **111**, such that the overall weight of the assembly of the first cleaner **200** and the cleaner station **100** is concentrated in the region of the bottom surface **111**. Therefore, the cleaner station **100** may maintain the balance in the state in which the first cleaner **200** is mounted on the cleaner station **100**.

With this configuration, the overall weight of the first cleaner **200** may be concentrated toward the bottom surface **111**, and the cleaner station **100** may maintain the balance in the state in which the first cleaner **200** is mounted on the cleaner station **100**.

Meanwhile, in the cleaner station **100** according to the present disclosure, the dust collecting part **170** is disposed at the lower side in the gravitational direction of the coupling part **120** on which the first cleaner is mounted, and the dust suction module **190** is disposed at the lower side in the gravitational direction of the dust collecting part **170**. That is, the dust collecting part **170** may be disposed to be closer to the ground surface than is the coupling part **120**, and the dust suction module **190** may be disposed to be closer to the ground surface than is the dust collecting part **170**.

The most part of the internal space of the cleaner station **100** is occupied by the flow path part **180**, which is a space through which the air flows, and by the dust collecting part by which relatively light dust is captured. Further, the fixing unit **130**, the door unit **140**, the cover opening unit **150**, and the lever pulling unit **160** are disposed at the upper side in the cleaner station **100** (the side positioned in the direction away from the ground surface). In addition, the dust collecting motor **191** of the suction module **190** is disposed at the lower side in the cleaner station **100** (the side positioned in the direction close to the ground surface). In this case, in the cleaner station **100**, the dust collecting motor **191** may be heaviest in weight.

Therefore, the overall weight of the cleaner station **100** may be concentrated on the lower side at which the dust collecting motor **191** is disposed.

Further, when the first cleaner **200** is mounted on the cleaner station **200**, the imaginary plane S1 may pass through the axis of the dust collecting motor **191**. In this case, the overall weight may be concentrated on the plane S1 in the state in which the first cleaner **200** is mounted on the cleaner station **200**.

Therefore, the cleaner station **100** may maintain the balance in the state in which the first cleaner **200** is mounted on the cleaner station **100**.

Meanwhile, the weight at the upper side of the cleaner station **100** (the side positioned in the direction away from the ground surface) may be concentrated on the rear side (the side positioned in the direction close to the second outer wall surface **112***b*). The coupling part **120** disposed at the upper side of the cleaner station **100** is formed to be concave rearward from the first outer wall surface **112***a* disposed at the front side. In this case, the fixing unit **130**, the door unit **140**, the cover opening unit **150**, and the lever pulling unit **160** are disposed to be close to the inside of the coupling surface **121**. Therefore, the fixing unit **130**, the door unit **140**, the cover opening unit **150**, and the lever pulling unit **160** are concentratedly disposed in the space between the coupling surface **121** and the second outer wall surface **112***b*. Consequently, the fixing unit **130**, the door unit **140**, the cover opening unit **150**, and the lever pulling unit **160** are disposed concentratedly at the rear side of the cleaner station **100**.

Meanwhile, in the present embodiment, an imaginary balance maintaining space R**1** may perpendicularly extend from the ground surface and penetrate the dust collecting part **170** and the dust suction module **190**. For example, the balance maintaining space R**1** may be an imaginary space perpendicularly extending from the ground surface, and the dust collecting motor **191** at least may be accommodated in the balance maintaining space R**1**. That is, the balance maintaining space R**1** may be an imaginary cylindrical shape space that accommodates the dust collecting motor **191** therein.

Therefore, the overall weight of the components disposed in the balance maintaining space R**1** may be concentrated on the dust suction module **190**. In this case, since the dust suction module **190** is disposed to be close to the ground surface, the cleaner station **100** may stably maintain the balance, like a roly-poly toy.

With this configuration, in the present disclosure, the cleaner station **100** may stably maintain the balance in the state in which the first cleaner **200** is mounted on the cleaner station **100**.

That is, when the first cleaner **200** is mounted on the cleaner station **100**, the imaginary extension surface of the plane S**1** penetrates the balance maintaining space R**1**. Therefore, the first cleaner **200** according to the present disclosure may maintain the balance in the leftward/rightward direction in the state in which the first cleaner **200** is mounted on the cleaner station **100**.

When the first cleaner **200** is mounted on the cleaner station **100**, the battery **240** of the first cleaner **200**, which is relatively heavy in weight, is accommodated in the coupling part **120** of the cleaner station **100**. Further, the suction motor **214** of the first cleaner **200**, which is relatively heavy in weight, is disposed to be spaced apart from the battery **240** at a predetermined interval d.

Meanwhile, one or more of the fixing unit **130**, the door unit **140**, the cover opening unit **150**, and the lever pulling unit **160** (hereinafter, referred to as a 'station operating unit') are disposed in the space between the coupling part **120** and the second outer wall surface **112***b*. Further, the dust collecting part **170** and the dust suction module **190** are disposed to be closer to the ground surface than are the battery **240** and the station operating unit.

In order to assist in understanding the present disclosure, the arrangement of a weight m**1** of the suction motor **214**, a weight m**2** of the battery **240**, a weight m**3** of the station operating unit, and a weight M of the dust collecting motor **191** will be described below (see FIG. **21**).

Based on the premise that the battery **240** is fixed to the coupling part **120**, a force, which is inclined forward, may be applied to the cleaner station **100** by the weight m**1** of the suction motor **214**.

In this case, a force, which is inclined rearward, may be applied to the coupling surface **121**, to which the battery **240** is fixed, by the weight m**3** of the station operating unit.

Consequently, the overall weight may be concentrated on the inside of the housing **110** in the state in which the battery **240**, the suction motor **214**, and the station operating unit are coupled to one another.

Therefore, based on the battery **240** and the coupling surface **121**, the weight m**1** of the suction motor **214** and the weight m**3** of the station operating unit may be balanced.

Meanwhile, in the present disclosure, a distance from the dust collecting motor **191** to the coupling part **120** may be longer than a distance from the suction motor **214** to the coupling part **120**, thereby maintaining the balance of the cleaner station **100**.

That is, the suction motor **214** may be disposed to be spaced apart from the coupling part **120** in the horizontal direction at a predetermined distance d, and the coupling part **120** may be disposed vertically above the dust collecting motor **191** so as to be spaced apart from the dust collecting motor **191** at a predetermined distance h. In this case, the distance h from the dust collecting motor **191** to the coupling part **120** may be longer than the distance d from the suction motor **214** to the coupling part **120**.

Specifically, a force, which pushes downward the coupling surface **121** to which the battery **240** is fixed, may be applied to the coupling surface **121** by the weight M of the dust collecting motor **191**. In this case, the distance h (also referred to as a height) between the dust collecting motor **191** and the battery **240** is longer than the distance d between the battery **240** and the suction motor **214**. In addition, the weight M of the dust collecting motor **191** is greater than the weight m**1** of the suction motor **214**.

Therefore, the weight m**1** of the suction motor **214** and the torque generated by the distance d between the battery **240** and the suction motor **214** are significantly smaller than the weight M of the dust collecting motor **191** and the torque generated by the distance h between the dust collecting motor **191** and the battery **240**. Therefore, the cleaner station **100** is not inclined by the weight m**1** of the suction motor **214**.

Therefore, according to the present disclosure, the balance may be stably maintained even though the first cleaner **200** is mounted on the cleaner station **100**.

Meanwhile, the arrangement of the first cleaner **200**, the first cleaner flow path part **181**, the dust collecting part **170**, and the dust suction module **190** in the state in which the first cleaner **200** is coupled to the cleaner station **100** will be described below with reference to FIG. **16**.

When the first cleaner **200** is mounted on the cleaner station **100**, the axis, which penetrates, in the longitudinal direction, the dust bin **220** formed in a cylindrical shape, may be disposed in parallel with the ground surface. Further, the dust bin **220** may be disposed to be perpendicular to the first outer wall surface **112***a* and the coupling surface **121**. That is, the dust bin through line a**5** may be disposed to be perpendicular to the first outer wall surface **112***a* and the coupling surface **121** and disposed in parallel with the ground surface. In addition, the dust bin through line a**5** may be disposed to be perpendicular to the dust collecting motor axis C.

Further, when the first cleaner **200** is mounted on the cleaner station **100**, the extension tube **250** may be disposed

in the direction perpendicular to the ground surface. Further, the extension tube **250** may be disposed in parallel with the first outer wall surface **112***a*. That is, the suction flow path through line a**2** may be disposed in parallel with the first outer wall surface **112***a* and disposed to be perpendicular to the ground surface. In addition, the suction flow path through line a**2** may be disposed in parallel with the dust collecting motor axis C.

Meanwhile, when the first cleaner **200** is mounted on the cleaner station **100**, at least a part of the outer circumferential surface of the dust bin **220** may be surrounded by the dust bin guide surface **122**. The first flow path **181***a* may be disposed at the rear side of the dust bin **220**, and the internal space of the dust bin **220** may communicate with the first flow path **181***a* when the dust bin **220** is opened. Further, the second flow path **181***b* may be bent downward from the first flow path **181***a* (toward the ground surface). In addition, the dust collecting part **170** may be disposed to be closer to the ground surface than is the second flow path **181***b*. Further, the dust suction module **190** may be disposed to be closer to the ground surface than is the dust collecting part **170**.

Therefore, according to the present disclosure, the first cleaner **200** may be mounted on the cleaner station **100** in the state in which the extension tube **250** and the cleaning module **260** are mounted. Further, it is possible to minimize an occupied space on the horizontal plane even in the state in which the first cleaner **200** is mounted on the cleaner station **100**.

In addition, according to the present disclosure, since the first cleaner flow path part **181**, which communicates with the dust bin **220**, is bent only once, it is possible to minimize a loss of flow force for collecting the dust.

Further, according to the present disclosure, in the state in which the first cleaner **200** is mounted on the cleaner station **100**, the outer circumferential surface of the dust bin **220** is surrounded by the dust bin guide surface **122**, and the dust bin **220** is accommodated in the coupling part **120**. As a result, the dust in the dust bin is invisible from the outside.

Meanwhile, FIGS. **22** and **23** are views for explaining a height at which the user conveniently couples the first cleaner to the cleaner station in the cleaner system according to the embodiment of the present disclosure.

First, a process of coupling the first cleaner **200** to the cleaner station **100** will be described below.

In general, the user may couple the first cleaner **200** to the cleaner station **100** by grasping the handle **216** and then moving the first cleaner **200**. In this case, a direction in which the user's hand grasps the handle **216** may be opposite to a direction in which the user grasps the handle **216** of the first cleaner **200** in order to perform the cleaning operation. Specifically, when the user's palm surrounds the outer circumferential surface of the grip portion **216***a* in order to couple the first cleaner **200** to the cleaner station **100**, the user's thumb or index finger may be disposed at the rear side of the grip portion **216***a* (the side positioned in the direction close to the second extension portion **216***c*), and the user's little finger may be disposed at front side of the grip portion **216***a* (the side positioned in the direction close to the first extension portion **216***b*).

As described above, the user grasps the handle **216** and then moves the first cleaner **200** to a position close to the cleaner station **100**, and the user finally moves his/her arm or wrist to couple the first cleaner **200** to the coupling part **120** of the cleaner station **100**.

In this case, in the embodiment of the present disclosure, the first cleaner **200** may be moved in the direction intersecting the longitudinal direction of the suction part **212** and coupled to the coupling part **120** of the cleaner station **100**.

Specifically, in the embodiment of the present disclosure, the first cleaner **200** (or the main body **210**) may be moved along the longitudinal axis of the dust bin **220** and coupled to the coupling part **120** of the cleaner station **100**. In addition, the first cleaner **200** (or the main body **210**) may be moved in the direction perpendicular to the longitudinal direction of the suction part **212** and coupled to the coupling part **120** of the cleaner station **100**. In addition, the first cleaner **200** (or the main body **210**) may be moved in the direction perpendicular to the longitudinal direction of the suction part **212**, moved in the longitudinal direction of the suction part **212**, and then coupled to the coupling part **120**. In addition, the first cleaner **200** (or the main body **210**) may be moved along the longitudinal axis of the cleaner station **100** and coupled to the coupling part **120**. In addition, the first cleaner **200** (or the main body **210**) may be moved along the longitudinal axis of the cleaner station **100**, moved in the direction perpendicular to the longitudinal direction of the suction part **212**, and then coupled to the coupling part **120**.

For example, in the case in which the cleaner station **100** stands perpendicularly to the ground surface and the coupling part **120** is provided at the lateral side of the cleaner station **100** (the side provided in the direction perpendicular to the ground surface) (i.e., in the case in which the coupling surface **121** is provided in the direction perpendicular to the ground surface), the first cleaner **200** may be moved in the direction parallel to the ground surface and coupled to the coupling part **120**.

Meanwhile, the user may also release the first cleaner **200** in the state in which the user pushes the first cleaner **200** into the coupling part **120**. In this case, the first cleaner **200** may be moved in the direction parallel to the ground surface and then coupled to the coupling part **120** by being moved vertically downward.

As another example, in the case in which the coupling surface **121** of the coupling part **120** is provided to be inclined at a predetermined angle with respect to the ground surface, the user moves the first cleaner **200** in the direction parallel to the ground surface and then moves the first cleaner **200** to the position vertically above the coupling part **120**, and then the user may couple the first cleaner **200** to the coupling part **120** by moving, vertically downward, his/her hand grasping the first cleaner **200**. In this case, the first cleaner **200** may be moved in the direction parallel to the ground surface and then coupled to the coupling part **120** by being moved vertically downward.

As still another example, in the case in which the coupling surface **121** of the coupling part **120** is provided in the direction parallel to the ground surface, the user may lift up the first cleaner **200** to the position vertically above the coupling part **120** and then move the first cleaner **200** downward to couple the first cleaner **200** to the coupling part **120**. In this case, the first cleaner **200** may be moved vertically downward and coupled to the coupling part **120**.

A position of the coupling part **120** at which the user may couple the first cleaner **200** to the cleaner station **100** without bending his/her waist will be described with reference to FIGS. **16**, **22**, and **23**.

As illustrated in FIGS. **22** and **23**, in order for the user to couple the first cleaner **200** to the cleaner station **100** without bending his/her waist, a height of each of the dust bin **220** and the battery housing **230** may be similar to a height of the coupling part **120** in a state in which the user stands while grasping the handle **216** of the first cleaner **200**. In this case, the user may couple the first cleaner **200** to the cleaner

station **100** by moving the first cleaner **200** horizontally or further adding a simple operation of moving his/her wrist or forearm.

Therefore, a lowest height at which the user may couple the first cleaner **200** to the cleaner station **100** without bending his/her waist may mean a height from the ground surface to a lower end of the palm based on a state in which the user stands with his/her arm lowered downward.

For example, a height of the cleaner station **100** to which the grip portion **216***a* of the first cleaner **200** is coupled may be 60 cm or more from the ground surface. In addition, a height of the guide protrusion **123** corresponding to the positions of the grip portion **216***a* and the battery housing **230** may be 60 cm or more from the ground surface.

Specifically, the following table shows the data related to average dimensions of human bodies. Referring to the table, a height F from the ground surface to the central portion of the palm may be a value obtained by subtracting a height A of the outer portion of the shoulder by a length B of the upper arm, a length C of the forearm, and a length D of the palm (F=A−(B+C+D)).

TABLE 1

Unit: cm

Gender	Age	Average A	Average B	Average C	Average D	Calculation F
Female	~20	129.6	31.9	23.2	9.66	64.84
	20~29	130.9	32.0	23.0	9.69	66.21
	30~39	130.6	31.7	22.9	9.75	66.25
	40~49	128.1	31.5	22.4	9.68	64.52
	50~59	126.1	31.4	22.6	9.67	62.43
	60~	124.2	31.3	22.3	9.71	60.89

Gender	Age	Average A	Average B	Average C	Average D	A − B
Male	~20	139.9	33.9	25.1	10.34	106
	20~29	141.6	34.1	25.4	10.52	107.5
	30~39	141.3	33.7	25.2	10.47	107.6
	40~49	139.1	33.3	24.5	10.30	106.2
	50~59	137.3	32.8	24.4	10.21	104.5
	60~	135.0	32.4	23.9	10.17	102.6

In this case, the lowest height at which the user may couple the first cleaner **200** to the cleaner station **100** without bending his/her waist is about 60.89 cm which is obtained by using the dimensions of the bodies of the women over 60 years old who have the lowest average height among the adults. In this case, in consideration of a diameter of the grip portion **216***a* and the like, a height of the cleaner station **100** to which the grip portion **216***a* is coupled may be at least 60 cm or more from the ground surface.

Therefore, in the state in which the first cleaner **200** is coupled to the cleaner station **100**, a shortest distance from the ground surface to the grip portion **216***a* may be 60 cm or more.

Meanwhile, in the case in which the user may couple the first cleaner **200** to the cleaner station **100** only using his/her forearm or wrist without rotating his/her upper arm, the user does not put a relatively large effort. As a result, it is possible to provide convenience for the user.

Therefore, a maximum height at which the user may conveniently couple the first cleaner **200** to the cleaner station **100** may mean a height from the ground surface to the elbow (the lower end of the upper arm) based on the state in which the user stands with his/her arm lowered downward.

For example, a height of the cleaner station **100** to which the grip portion **216***a* of the first cleaner **200** is coupled may be 108 cm or less from the ground surface. In addition, a height of the guide protrusion **123** corresponding to the positions of the grip portion **216***a* and the battery housing **230** may be 108 cm or less from the ground surface.

Specifically, the height from the ground surface to the elbow may be a value (A−B) obtained by subtracting the height A of the outer portion of the shoulder by the length B of the upper arm.

In this case, the height from the ground surface to the elbow is about 107.6 cm which is obtained by using the dimension of the body of the man in his 30s who has the largest height from the ground surface to the elbow among the adults. In this case, in consideration of the diameter of the grip portion **216***a* and the like, a maximum height of the cleaner station **100** to which the grip portion **216***a* is coupled may be 108 cm or less from the ground surface.

Therefore, in the state in which the first cleaner **200** is coupled to the cleaner station **100**, a shortest distance from the ground surface to the grip portion **216***a* may be 108 cm or less.

With this configuration, the user may comfortably couple the first cleaner **200** to the cleaner station **100** without bending his/her waist.

Meanwhile, FIG. **54** is a flowchart for explaining a first embodiment of a method of controlling the cleaner station according to the present disclosure.

The first embodiment of the method of controlling the cleaner station according to the present disclosure will be described below with reference to FIGS. **4** to **54**.

A method of controlling a cleaner station according to the present embodiment includes a coupling checking step S**10**, a dust bin fixing step S**20**, a door opening step S**30**, a cover opening step S**40**, a dust collecting step S**60**, a dust collection ending step S**80**, a door closing step S**90**, and a release step S**110**.

In the coupling checking step S**10**, whether the first cleaner **200** is coupled to the coupling part **120** of the cleaner station **100** may be checked.

Specifically, in the coupling checking step S**10**, when the first cleaner **200** is coupled to the cleaner station **100**, the coupling sensor **125** disposed on the guide protrusion **123** may come into contact with the battery housing **230**, and the coupling sensor **125** may transmit a signal indicating that the first cleaner **200** is coupled to the coupling part **120**. Alternatively, the coupling sensor **125** of a non-contact sensor type disposed on the sidewall **124** may detect the presence of the dust bin **220**, and the coupling sensor **125** may transmit a signal indicating that the first cleaner **200** is coupled to the coupling part **120**. Further, in the case in which the coupling sensor **125** is disposed on the dust bin guide surface **122**, the dust bin **220** may push the coupling sensor **125** by means of the weight of the dust bin **220**, the coupling sensor **125** may detect that the first cleaner **200** is coupled, and the coupling sensor **125** may transmit a signal indicating that the first cleaner **200** is coupled to the coupling part **120**.

Therefore, in the coupling checking step S**10**, the control unit **400** may receive the signal generated by the coupling sensor **125** and determine that the first cleaner **200** is physically coupled to the coupling part **120**.

Meanwhile, in the coupling checking step S**10** according to the present disclosure, the control unit **400** may determine that the first cleaner **200** is electrically coupled to the cleaner station **100** on the basis of whether the charging part **128**

supplies power to the battery **240** of the first cleaner **200**, thereby checking whether the first cleaner **200** is coupled at the exact position.

Therefore, in the coupling checking step S**10**, the control unit **400** may receive the signal, which indicates that the first cleaner **200** is coupled, from the coupling sensor **125**, and check whether the charging part **128** supplies power to the battery **240**, thereby checking whether the first cleaner **200** is coupled to the coupling part **120** of the cleaner station **100**.

In the dust bin fixing step S**20**, when the first cleaner **200** is coupled to the cleaner station **100**, the fixing member **130** may hold and fix the dust bin **220**.

Specifically, when the control unit **400** receives the signal, which indicates that the first cleaner **200** is coupled, from the coupling sensor **125**, the control unit **400** may operate the fixing drive part **133** in the forward direction so that the fixing member **131** fixes the dust bin **220**.

In this case, when the fixing member **131** or the fixing part link **135** is moved to the dust bin fixing position FP**1**, the first fixing detecting part **137***a* may transmit a signal indicating that the first cleaner **200** is fixed.

Therefore, the control unit **400** may receive the signal, which indicates that the first cleaner **200** is fixed, from the first fixing detecting part **137***a* and determine that the first cleaner **200** is fixed.

When the control unit **400** determines that the first cleaner **200** is fixed, the control unit **400** may stop the operation of the fixing drive part **133**.

In the door opening step S**30**, when the dust bin **220** is fixed, the door **141** may be opened.

Specifically, when the control unit **400** receives the signal, which indicates that the dust bin **220** is fixed, from the first fixing detecting part **137***a*, the control unit **400** may operate the door motor **142** in the forward direction to open the dust passage hole **121***a*.

In this case, when the door arm **143** is moved to the opened position DP**1** at which the first door opening/closing detecting part **144***a* is disposed, the first door opening/closing detecting part **144***a* may transmit a signal indicating that the door **141** is opened.

Therefore, the control unit **400** may receive the signal, which indicates that the door **141** is opened, from the first door opening/closing detecting part **144***a* and determine that the door **141** is opened.

When the control unit **400** determines that the door **141** is opened, the control unit **400** may stop the operation of the door motor **142**.

In the cover opening step S**40**, when the door **141** is opened, the discharge cover **222** may be opened.

For example, when the control unit **400** receives the signal, which indicates that the door **141** is opened, from the first door opening/closing detecting part **144***a*, the control unit **400** may operate the cover opening drive part **152** in the forward direction to open the discharge cover **222**. That is, the discharge cover **222** may be separated from the dust bin main body **221**.

As another example, the control unit **400** may operate the cover opening drive part **152** first with a predetermined time interval before operating the door motor **142** in consideration of the time it takes to move the push protrusion **151** and press the coupling lever **222***c*. Even in this case, the discharge cover **222** is opened after the door **141** begins to be opened. With this configuration, it is possible to minimize the time it takes to open both the door **141** and the discharge cover **222**.

When the guide frame **151***e* reaches the predetermined cover opened position CP**1** at which the first cover opening detecting part **155***fa* is disposed, the cover opening detecting part **155***f* may transmit a signal indicating that the discharge cover **222** is opened.

In this case, the control unit **400** may receive the signal, which indicates that the discharge cover **222** is opened, from the first cover opening detecting part **155***fa* and determine that the discharge cover **222** is opened.

When the control unit **400** determines that the discharge cover **222** is opened, the control unit **400** may stop the operation of the cover opening drive part **152**.

The control unit **400** may perform the dust collecting step S**60** after the cover opening step S**40**.

Specifically, in the dust collecting step S**60**, when the discharge cover **222** is opened, the dust collecting motor **191** may operate to collect the dust from the dust bin **220**.

For example, when the control unit **400** receives the signal, which indicates that the discharge cover **222** is opened, from the first cover opening detecting part **155***fa*, the control unit **400** may operate the dust collecting motor **191**.

As another example, the control unit **400** may operate the dust collecting motor **191** when a preset time has elapsed after receiving the signal, which indicates that the first cleaner **200** is coupled to the cleaner station **100**, from the coupling sensor **125**.

In the dust collecting step S**60**, the dust in the dust bin **220** may pass through the dust passage hole **121***a* and the first cleaner flow path part **181** and then be collected in the dust collecting part **170**. Therefore, the user may remove the dust in the dust bin **220** without a separate manipulation, and as a result, it is possible to provide convenience for the user.

In the dust collection ending step S**80**, the operation of the dust collecting motor **191** may be ended when the dust collecting motor **191** operates for a predetermined time.

Specifically, the control unit **400** may be embedded with a timer (not illustrated), and the operation of the dust collecting motor **191** may be ended when the control unit **400** determines that a predetermined time has elapsed.

In this case, the operating time of the dust collecting motor **191** may be preset, or the user may input the operating time through an input part (not illustrated). Alternatively, the control unit **400** may automatically set the operating time by detecting the amount of dust in the dust bin **220** using a sensor or the like.

In the door closing step S**90**, the door **141** may be closed after the dust collection ending step S**80**.

Specifically, after the control unit **400** stops the operation of the dust collecting motor **191**, the control unit **400** may operate the door motor **142** in the reverse direction to close at least a part of the dust passage hole **121***a*.

In this case, the discharge cover **222** supported by the door **141** may be rotated by the door **141** and fastened to the dust bin main body **221**, such that the lower side of the dust bin main body **221** may be closed.

In this case, when the door arm **143** is moved to the closed position DP**2** at which the second door opening/closing detecting part **144***b* is disposed, the second door opening/closing detecting part **144***b* may transmit a signal indicating that the door **141** is closed.

Therefore, the control unit **400** may receive the signal, which indicates that the door **141** is closed, from the second door opening/closing detecting part **144***b* and determine that the door **141** is closed.

When the control unit **400** determines that the door **141** is closed, the control unit **400** may stop the operation of the door motor **142**.

In the release step S110, when the door 141 is closed, the fixing drive part 133 may be operated, such that the fixing member 131 may release the dust bin 220.

Specifically, when the control unit 400 receives the signal, which indicates that the arm gear reaches the initial position LP1, from the arm movement detecting part 165 or 2165, the control unit 400 may operate the fixing drive part 133 in the reverse direction to release the dust bin 220.

In this case, when the fixing member 131 or the fixing part link 135 is moved to the dust bin releasing position FP2, the second fixing detecting part 137*b* may transmit a signal indicating that the first cleaner 200 is released.

Therefore, the control unit 400 may receive the signal, which indicates that the first cleaner 200 is released, from the second fixing detecting part 137*b* and determine that the first cleaner 200 is released.

When the control unit 400 determines that the first cleaner 200 is released, the control unit 400 may stop the operation of the fixing drive part 133.

Meanwhile, FIG. 55 is a flowchart for explaining a second embodiment of the method of controlling the cleaner station according to the present disclosure.

The second embodiment of the method of controlling the cleaner station according to the present disclosure will be described below with reference to FIGS. 4 to 55.

The method of controlling the cleaner station according to the second embodiment of the present disclosure includes the coupling checking step S10, the dust bin fixing step S20, the door opening step S30, the cover opening step S40, a dust bin compressing step S50, the dust collecting step S60, an additional dust bin compressing step S70, the dust collection ending step S80, the door closing step S90, a compression ending step S100, and the release step S110.

In order to avoid a repeated description, the contents related to the method of controlling the cleaner station according to the first embodiment of the present disclosure may be used to describe the coupling checking step S10, the dust bin fixing step S20, the door opening step S30, the cover opening step S40, the dust collection ending step S80, the door closing step S90, and the release step S110 according to the second embodiment.

In the dust bin compressing step S50, when the discharge cover 222 is opened, the inside of the dust bin 220 may be compressed.

The dust bin compressing step S50 may include a first compression preparing step S51, a second compression preparing step S52, and a lever pulling step S53.

In the first compression preparing step S51, the lever pulling arm 161 or 2161 may be stroke-moved to the height at which the lever pulling arm 161 or 2161 may push the dust bin compression lever 223.

Specifically, when the control unit 400 receives the signal, which indicates that the discharge cover 222 is opened, from the first cover opening detecting part 155*fa*, the control unit 400 may operate the stroke drive motor 163 or 2163 to move the lever pulling arm 161 or 2161 to a height equal to or higher than the height of the dust bin compression lever 223.

When the arm movement detecting part 165 or 2165 detects that the lever pulling arm 163 or 2163 is moved to the height equal to or higher than the height of the dust bin compression lever 223, the arm movement detecting part 165 or 2165 may transmit a signal indicating that the lever pulling arm 163 or 2163 is stroke-moved to the target position. That is, the arm movement detecting part 165 or 2165 may transmit the signal when the arm movement detecting part 165 or 2165 detects that the arm gear 162 or the shaft 2166 reaches the maximum stroke movement position LP2. The control unit 400 may receive the signal from the arm movement detecting part 165 or 2165 and stop the operation of the stroke drive motor 163 or 2163.

In the second compression preparing step S52, the lever pulling arm 161 or 2161 may be rotated to the position at which the lever pulling arm 161 or 2161 may push the dust bin compression lever 223.

Specifically, when the control unit 400 receives the signal, which indicates that the lever pulling arm 163 or 2163 is moved to the height equal to or higher than the height of the dust bin compression lever 223, from the arm movement detecting part 165 or 2165, the control unit 400 may operate the rotation drive motor 164 or 2164 to move the lever pulling arm 161 or 2161 to the position at which the lever pulling arm 161 or 2161 may push the dust bin compression lever 223.

When the arm movement detecting part 165 or 2165 detects that the arm gear 162 or the shaft 2166 is rotated to the position at which the arm gear 162 or the shaft 2166 may pull the compression lever 223, the arm movement detecting part 165 or 2165 may transmit a signal indicating that the lever pulling arm 163 or 2163 is rotated to the target position. The control unit 400 may receive the signal from the arm movement detecting part 165 or 2165 and stop the operation of the rotation drive motor 164 or 2164.

In the lever pulling step S53, the lever pulling arm 161 or 2161 may pull the dust bin compression lever 223 at least once.

Specifically, after the second compression preparing step S52, the control unit 400 may operate the stroke drive motor 163 or 2163 in the reverse direction to pull the lever pulling arm 161 or 2161.

In this case, when the arm movement detecting part 165 or 2165 detects that the arm gear 162 or the shaft 2166 reaches the position LP3 when the compression lever 223 is pulled, the arm movement detecting part 165 or 2165 may transmit a signal indicating that the compression lever 223 is pulled. The control unit 400 may receive the signal from the arm movement detecting part 165 or 2165 and stop the operation of the stroke drive motor 163 or 2163.

In the dust bin compressing step S50, the dust in the dust bin 220 is compressed in advance before the dust collecting motor 191 operates, and as a result, there is an effect of preventing residual dust remaining in the dust bin 220 and improving efficiency in collecting the dust in the dust collecting motor 191.

In the dust collecting step S60, when the discharge cover 222 is opened and the inside of the dust bin 220 is compressed, the dust collecting motor 191 may operate to collect the dust from the dust bin 220.

Specifically, when the control unit 400 receives the signal, which indicates that the discharge cover 222 is opened, from the first cover opening detecting part 155*fa* and receives the signal, which indicates that the compression lever 223 is pulled, from the arm movement detecting part 165 or 2165, the control unit 400 may operate the dust collecting motor 191.

In the dust collecting step S60, the dust in the dust bin 220 may pass through the dust passage hole 121*a* and the first cleaner flow path part 181 and then be collected in the dust collecting part 170. Therefore, the user may remove the dust in the dust bin 220 without a separate manipulation, and as a result, it is possible to provide convenience for the user.

In the additional dust bin compressing step S70, the inside of the dust bin 220 may be compressed during the operation of the dust collecting motor 191.

Specifically, after the lever pulling step S53, the control unit 400 may operate the stroke drive motor 163 or 2163 in the forward direction to move the lever pulling arm 161 or 2161 to the height LP2 before the dust bin compression lever 223 is pulled. In this case, the dust bin compression lever 223 is also returned to the original position by an elastic member (not illustrated).

That is, the arm movement detecting part 165 or 2165 may transmit the signal when the arm gear 162 or the shaft 2166 reaches the maximum stroke movement position LP2 again. The control unit 400 may receive the signal from the arm movement detecting part 165 or 2165 and stop the forward operation of the stroke drive motor 163 or 2163.

Thereafter, immediately after the dust collecting motor 191 operates or when a predetermined time has elapsed after the operation of the dust collecting motor 191, the control unit 400 may operate the stroke drive motor 163 or 2163 in the reverse direction to pull the dust bin compression lever 223.

Meanwhile, the additional dust bin compressing step S70 may be performed at least once. In this case, the number of times the additional dust bin compressing step S70 is performed may be preset, or the user may input the number of times through an input part (not illustrated). Alternatively, the control unit 400 may automatically set the number of times by detecting the amount of dust in the dust bin 220 using a sensor or the like.

In the additional dust bin compressing step S70, since the dust in the dust bin 220 is compressed during the operation of the dust collecting motor 191, there is an effect of removing the dust remaining even during the operation of the dust collecting motor 191.

In the compression ending step S100, the lever pulling arm may be returned back to the original position after the door closing step S90.

The compression ending step S100 may include a first returning step S101 and a second returning step S102.

In the first returning step S101, the lever pulling arm 163 or 2163 may be rotated to the original position.

Specifically, when the control unit 400 receives the signal, which indicates that the door 141 is closed, from the second door opening/closing detecting part 144*b*, the control unit 400 may operate the rotation drive motor 164 or 2164 in the reverse direction to move the lever pulling arm 161 or 2161 to the original position.

When the arm movement detecting part 165 or 2165 detects that the arm gear 162 or the shaft 2166 rotates the compression lever 223 to the original position, the arm movement detecting part 165 or 2165 may transmit a signal indicating that the lever pulling arm 163 or 2163 is rotated to the target position. The control unit 400 may receive the signal from the arm movement detecting part 165 or 2165 and stop the operation of the rotation drive motor 164 or 2164.

In the second returning step S102, the lever pulling arm 163 or 2163 may be stroke-moved to the original position.

Specifically, when the control unit 400 receives the signal indicating that the lever pulling arm 163 or 2163 is rotated to the target position, the control unit 400 may operate the stroke drive motor 163 or 2163 in the reverse direction to move the lever pulling arm 161 or 2161 to the original position (the position LP1 at which the lever pulling arm 161 or 2161 is coupled to the housing 110).

When the arm movement detecting part 165 or 2165 detects that the lever pulling arm 163 or 2163 is moved to the original position, the arm movement detecting part 165 or 2165 may transmit a signal indicating that the lever pulling arm 163 or 2163 is stroke-moved to the target position. That is, the arm movement detecting part 165 or 2165 may transmit the signal when the arm movement detecting part 165 or 2165 detects that the arm gear 162 or the shaft 2166 reaches the initial position LP1. The control unit 400 may receive the signal from the arm movement detecting part 165 or 2165 and stop the operation of the stroke drive motor 163 or 2163.

Meanwhile, FIG. 56 is a flowchart for explaining a third embodiment of the method of controlling the cleaner station according to the present disclosure.

The third embodiment of the method of controlling the cleaner station according to the present disclosure will be described below with reference to FIGS. 5 to 56.

The method of controlling the cleaner station according to the present embodiment includes the coupling checking step S10, the dust bin fixing step S20, the door opening step S30, the cover opening step S40, the dust collecting step S60, a dust bin compressing step S70', the dust collection ending step S80, the door closing step S90, the compression ending step S100, and the release step S110.

In order to avoid a repeated description, the contents related to the method of controlling the cleaner station according to the second embodiment of the present disclosure may be used to describe the coupling checking step S10, the dust bin fixing step S20, the door opening step S30, the cover opening step S40, the dust collection ending step S80, the door closing step S90, the compression ending step S100, and the release step S110 according to the third embodiment.

In the present embodiment, the dust collecting step S60 may be performed after the cover opening step S40.

Specifically, in the dust collecting step S60, when the discharge cover 222 is opened, the dust collecting motor 191 may operate to collect the dust from the dust bin 220.

Specifically, when the control unit 400 receives the signal, which indicates that the discharge cover 222 is opened, from the first cover opening detecting part 155*fa*, the control unit 400 may operate the dust collecting motor 191.

In the dust collecting step S60, the dust in the dust bin 220 may pass through the dust passage hole 121*a* and the first flow path 181 and then be collected in the dust collecting part 170. Therefore, the user may remove the dust in the dust bin 220 without a separate manipulation, and as a result, it is possible to provide convenience for the user.

In addition, in the dust bin compressing step S70' according to the present embodiment, the dust bin 220 may be compressed during the operation of the dust collecting motor 191.

The dust bin compressing step S70' may include a first compression preparing step S71', a second compression preparing step S72', a lever pulling step S73', and an additional pulling step S74'.

In this case, the first compression preparing step S71' and the second compression preparing step S72' may be performed after the operation of the dust collecting motor 191 or performed before the operation of the dust collecting motor 191.

In the first compression preparing step S71', the lever pulling arm 161 or 2161 may be stroke-moved to the height at which the lever pulling arm 161 or 2161 may push the dust bin compression lever 223.

Specifically, the control unit 400 may operate the stroke drive motor 163 or 2163 to move the lever pulling arm 161 or 2161 to a height equal to or higher than the height of the dust bin compression lever 223.

When the arm movement detecting part **165** or **2165** detects that the lever pulling arm **163** or **2163** is moved to the height equal to or higher than the height of the dust bin compression lever **223**, the arm movement detecting part **165** or **2165** may transmit a signal indicating that the lever pulling arm **163** or **2163** is stroke-moved to the target position. That is, the arm movement detecting part **165** or **2165** may transmit the signal when the arm movement detecting part **165** or **2165** detects that the arm gear **162** or the shaft **2166** reaches the maximum stroke movement position LP**2**. The control unit **400** may receive the signal from the arm movement detecting part **165** or **2165** and stop the operation of the stroke drive motor **163** or **2163**.

In the second compression preparing step S**72'**, the lever pulling arm **161** or **2161** may be rotated to the position at which the lever pulling arm **161** or **2161** may push the dust bin compression lever **223**.

Specifically, when the control unit **400** receives the signal, which indicates that the lever pulling arm **163** or **2163** is moved to the height equal to or higher than the height of the dust bin compression lever **223**, from the arm movement detecting part **165** or **2165**, the control unit **400** may operate the rotation drive motor **164** or **2164** to move the lever pulling arm **161** or **2161** to the position at which the lever pulling arm **161** or **2161** may push the dust bin compression lever **223**.

When the arm movement detecting part **165** or **2165** detects that the arm gear **162** or the shaft **2166** is rotated to the position at which the arm gear **162** or the shaft **2166** may pull the compression lever **223**, the arm movement detecting part **165** or **2165** may transmit a signal indicating that the lever pulling arm **163** or **2163** is rotated to the target position. The control unit **400** may receive the signal from the arm movement detecting part **165** or **2165** and stop the operation of the rotation drive motor **164** or **2164**.

In the lever pulling step S**73'**, the lever pulling arm **161** or **2161** may pull the dust bin compression lever **223** at least once.

Specifically, after the second compression preparing step S**72'**, the control unit **400** may operate the stroke drive motor **163** or **2163** in the reverse direction to pull the lever pulling arm **161** or **2161**.

In this case, when the arm movement detecting part **165** or **2165** detects that the arm gear **162** or the shaft **2166** reaches the position LP**3** when the compression lever **223** is pulled, the arm movement detecting part **165** or **2165** may transmit a signal indicating that the compression lever **223** is pulled. The control unit **400** may receive the signal from the arm movement detecting part **165** or **2165** and stop the operation of the stroke drive motor **163** or **2163**.

In the additional pulling step S**74'**, the lever pulling arm **161** or **2161** may additionally pull the dust bin compression lever **223**.

In this case, whether to perform the additional pulling step S**74'** and the number of times the additional pulling step S**74'** is performed may be preset, or the user may input, through an input part (not illustrated), whether to perform the additional pulling step S**74'** and the number of times the additional pulling step S**74'** is performed. Alternatively, the control unit **400** may detect the amount of dust in the dust bin **220** using a sensor or the like and automatically set whether to perform the additional pulling step S**74'** and the number of times the additional pulling step S**74'** is performed.

After the lever pulling step S**73'**, the control unit **400** may operate the stroke drive motor **163** or **2163** in the forward direction to move the lever pulling arm **161** or **2161** to the height LP**2** before the dust bin compression lever **223** is pulled. In this case, the dust bin compression lever **223** is also returned to the original position by the elastic member (not illustrated).

That is, the arm movement detecting part **165** or **2165** may transmit the signal when the arm gear **162** or the shaft **2166** reaches the maximum stroke movement position LP**2** again. The control unit **400** may receive the signal from the arm movement detecting part **165** or **2165** and stop the forward operation of the stroke drive motor **163** or **2163**.

Thereafter, immediately after the dust collecting motor **191** operates or when a predetermined time has elapsed after the operation of the dust collecting motor **191**, the control unit **400** may operate the stroke drive motor **163** or **2163** in the reverse direction to pull the dust bin compression lever **223**.

According to the present embodiment, since the dust bin compression lever **223** is pulled an appropriate number of times during the operation of the dust collecting motor **191**, there is an effect of reducing the time it takes to empty the dust bin **220**.

Meanwhile, FIG. **57** is a flowchart for explaining a fourth embodiment of the method of controlling the cleaner station according to the present disclosure.

The fourth embodiment of the method of controlling the cleaner station according to the present disclosure will be described below with reference to FIGS. **5** to **57**.

The method of controlling the cleaner station according to the present embodiment includes the coupling checking step S**10**, the dust bin fixing step S**20**, the door opening step S**30**, the cover opening step S**40**, a dust bin compressing step S**50'**, the dust collecting step S**60**, the dust collection ending step S**80**, the door closing step S**90**, the compression ending step S**100**, and the release step S**110**.

In order to avoid a repeated description, the contents related to the method of controlling the cleaner station according to the second embodiment of the present disclosure may be used to describe the coupling checking step S**10**, the dust bin fixing step S**20**, the door opening step S**30**, the cover opening step S**40**, the dust collection ending step S**80**, the door closing step S**90**, the compression ending step S**100**, and the release step S**110** according to the fourth embodiment.

The dust bin compressing step S**50'** may include a first compression preparing step S**51'**, a second compression preparing step S**52'**, a lever pulling step S**53'**, and an additional pulling step S**54'**.

In the first compression preparing step S**51'**, when the control unit **400** receives a signal, which indicates that the discharge cover **222** is opened, from the first cover opening detecting part **155***fa*, the control unit **400** may stroke-move the lever pulling arm **161** or **2161** to the height at which the lever pulling arm **161** or **2161** may push the dust bin compression lever **223**.

Specifically, the control unit **400** may operate the stroke drive motor **163** or **2163** to move the lever pulling arm **161** or **2161** to a height equal to or higher than the height of the dust bin compression lever **223**.

When the arm movement detecting part **165** or **2165** detects that the lever pulling arm **163** or **2163** is moved to the height equal to or higher than the height of the dust bin compression lever **223**, the arm movement detecting part **165** or **2165** may transmit a signal indicating that the lever pulling arm **163** or **2163** is stroke-moved to the target position. That is, the arm movement detecting part **165** or **2165** may transmit the signal when the arm movement detecting part **165** or **2165** detects that the arm gear **162** or

the shaft **2166** reaches the maximum stroke movement position LP**2**. The control unit **400** may receive the signal from the arm movement detecting part **165** or **2165** and stop the operation of the stroke drive motor **163** or **2163**.

In the second compression preparing step S**52'**, the lever pulling arm **161** or **2161** may be rotated to the position at which the lever pulling arm **161** or **2161** may push the dust bin compression lever **223**.

Specifically, when the control unit **400** receives the signal, which indicates that the lever pulling arm **163** or **2163** is moved to the height equal to or higher than the height of the dust bin compression lever **223**, from the arm movement detecting part **165** or **2165**, the control unit **400** may operate the rotation drive motor **164** or **2164** to move the lever pulling arm **161** or **2161** to the position at which the lever pulling arm **161** or **2161** may push the dust bin compression lever **223**.

When the arm movement detecting part **165** or **2165** detects that the arm gear **162** or the shaft **2166** is rotated to the position at which the arm gear **162** or the shaft **2166** may pull the compression lever **223**, the arm movement detecting part **165** or **2165** may transmit a signal indicating that the lever pulling arm **163** or **2163** is rotated to the target position. The control unit **400** may receive the signal from the arm movement detecting part **165** or **2165** and stop the operation of the rotation drive motor **164** or **2164**.

In the lever pulling step S**53'**, the lever pulling arm **161** or **2161** may pull the dust bin compression lever **223** at least once.

Specifically, after the second compression preparing step S**52'**, the control unit **400** may operate the stroke drive motor **163** or **2163** in the reverse direction to pull the lever pulling arm **161** or **2161**.

In this case, when the arm movement detecting part **165** or **2165** detects that the arm gear **162** or the shaft **2166** reaches the position LP**3** when the compression lever **223** is pulled, the arm movement detecting part **165** or **2165** may transmit a signal indicating that the compression lever **223** is pulled. The control unit **400** may receive the signal from the arm movement detecting part **165** or **2165** and stop the operation of the stroke drive motor **163** or **2163**.

In the additional pulling step S**54'**, the lever pulling arm **161** or **2161** may additionally pull the dust bin compression lever **223**.

In this case, whether to perform the additional pulling step S**54'** and the number of times the additional pulling step S**54'** is performed may be preset, or the user may input, through an input part (not illustrated), whether to perform the additional pulling step S**54'** and the number of times the additional pulling step S**54'** is performed. Alternatively, the control unit **400** may detect the amount of dust in the dust bin **220** using a sensor or the like and automatically set whether to perform the additional pulling step S**54'** and the number of times the additional pulling step S**54'** is performed.

After the lever pulling step S**53'**, the control unit **400** may operate the stroke drive motor **163** or **2163** in the forward direction to move the lever pulling arm **161** or **2161** to the height LP**2** before the dust bin compression lever **223** is pulled. In this case, the dust bin compression lever **223** is also returned to the original position by the elastic member (not illustrated).

That is, the arm movement detecting part **165** or **2165** may transmit the signal when the arm gear **162** or the shaft **2166** reaches the maximum stroke movement position LP**2** again. The control unit **400** may receive the signal from the arm movement detecting part **165** or **2165** and stop the forward operation of the stroke drive motor **163** or **2163**.

Thereafter, immediately after the dust collecting motor **191** operates or when a predetermined time has elapsed after the operation of the dust collecting motor **191**, the control unit **400** may operate the stroke drive motor **163** or **2163** in the reverse direction to pull the dust bin compression lever **223**.

In the present embodiment, the dust collecting step S**60** is performed after the dust bin compressing step S**50'**.

Therefore, in the dust collecting step S**60**, when the discharge cover **222** is opened and the inside of the dust bin **220** is compressed a preset number of times, the dust collecting motor **191** may operate to collect the dust from the dust bin **220**.

According to the present embodiment, since the dust collecting motor **191** operates after the dust bin compression lever **223** is pulled an appropriate number of times, there is an effect of reducing the time it takes to empty the dust bin **220**.

While the present disclosure has been described with reference to the specific embodiments, the specific embodiments are only for specifically explaining the present disclosure, and the present disclosure is not limited to the specific embodiments. It is apparent that the present disclosure may be modified or altered by those skilled in the art without departing from the technical spirit of the present disclosure.

All the simple modifications or alterations to the present disclosure fall within the scope of the present disclosure, and the specific protection scope of the present disclosure will be defined by the appended claims.

What is claimed is:

1. A cleaner system comprising:

a cleaner comprising:

a suction part that defines a suction flow path configured to receive air, the suction flow path extending in a longitudinal axis of the suction part,

a suction motor disposed in the cleaner and configured to generate suction force for suctioning the air through the suction part, the suction motor being configured to rotate about a rotation axis that intersects the longitudinal axis of the suction part,

a cyclone configured to separate dust from the air introduced through the suction part, and

a dust bin configured to store the dust separated by the cyclone; and

a cleaner station that is configured to couple to the cleaner and defines a dust collecting space configured to receive the dust from the dust bin of the cleaner, the cleaner station comprising a dust collecting motor disposed in the cleaner station and configured to generate a suction force for suctioning the dust in the dust bin into the dust collecting space,

wherein the cleaner station is configured such that the dust collecting space is disposed below a part that is configured to couple to the cleaner, and the dust collecting motor is disposed below the dust collecting space,

wherein the cleaner station extends in a longitudinal direction intersecting the rotation axis of the suction motor, and

wherein at least a portion of the cleaner is configured to be coupled to the cleaner station and disposed inside the cleaner station.

2. The cleaner system of claim 1, wherein the dust collecting motor is configured to rotate about a dust collecting motor axis that extends in the longitudinal direction of the cleaner station.

3. The cleaner system of claim 1, wherein the dust collecting motor is configured to rotate about a dust collecting motor axis that intersects the rotation axis of the suction motor, and

wherein a height from a ground surface to an intersection point between the rotation axis of the suction motor and the dust collecting motor axis is less than or equal to a maximum height of the cleaner station.

4. The cleaner system of claim 1, wherein the cleaner station further comprises a coupling part that is configured to couple to at least a portion of the dust bin.

5. The cleaner system of claim 4, wherein the cleaner is configured to couple to the coupling part of the cleaner station along the rotation axis of the suction motor.

6. The cleaner system of claim 4, wherein the cleaner is configured to couple to the coupling part of the cleaner station along the longitudinal direction of the cleaner station.

7. The cleaner system of claim 1, wherein the cleaner further comprises a handle disposed at a position opposite to the suction part with respect to the suction motor.

8. A cleaner system comprising:

a cleaner comprising:

a suction part that defines a suction flow path configured to receive air, the suction flow path extending in a longitudinal axis of the suction part,

a suction motor disposed in the cleaner and configured to rotate about a rotation axis to thereby generate a suction force for suctioning the air through the suction part, and

a dust bin configured to store dust separated from the air received through the suction part; and

a cleaner station that extends in a longitudinal direction intersecting the rotation axis of the suction motor, the cleaner station comprising:

a coupling part configured to couple to the dust bin,

a housing that defines a dust collecting space configured to receive the dust from the dust bin of the cleaner, and

a dust collecting motor disposed in the housing and configured to rotate about a dust collecting motor axis to thereby generate a suction force for suctioning the dust in the dust bin into the dust collecting space,

wherein the cleaner station is configured such that the dust collecting space is disposed below the coupling part, and

wherein at least a portion of the coupling part is configured to, based on the cleaner being coupled to the cleaner station, be disposed between the longitudinal axis of the suction part and the dust collecting motor axis.

9. The cleaner system of claim 8, wherein the coupling part comprises:

a coupling surface configured to face a bottom surface of the dust bin based on the cleaner being coupled to the cleaner station;

a plurality of sidewalls that protrude from the coupling surface; and

a guide surface disposed between the plurality of sidewalls and configured to face a circumferential surface of the dust bin based on the cleaner being coupled to the cleaner station, and

wherein the coupling surface, the plurality of sidewalls, and the guide surface define an accommodation space configured to accommodate at least a portion of the dust bin.

10. The cleaner system of claim 8, wherein the coupling part comprises:

a coupling surface configured to face a bottom surface of the dust bin based on the cleaner being coupled to the cleaner station; and

a guide protrusion that protrudes from the coupling surface and is configured to, based on the cleaner being coupled to the cleaner station, be disposed above the dust bin in a vertical direction with respect to a ground surface.

11. The cleaner system of claim 8, wherein the longitudinal axis of the suction part intersects the rotation axis of the suction motor.

12. The cleaner system of claim 8, wherein the cleaner is configured to be coupled to the cleaner station such that the rotation axis of the suction motor and a longitudinal axis of the cleaner station intersect each other at a position inside the housing.

13. The cleaner system of claim 8, wherein a longitudinal axis of the dust bin intersects the longitudinal axis of the suction part.

14. The cleaner system of claim 8, wherein the cleaner is configured to be coupled to the cleaner station such that the dust collecting motor axis intersects the longitudinal axis of the suction part.

15. The cleaner system of claim 8, wherein the cleaner is configured to be coupled to the cleaner station such that the dust collecting motor axis and the rotation axis of the suction motor intersect each other at a position below a top surface of the cleaner station.

16. The cleaner system of claim 8, wherein the cleaner station further comprises a charging part configured to, based on the cleaner being coupled to the cleaner station, electrically connect to the cleaner and be disposed between the longitudinal axis of the suction part and the dust collecting motor axis.

17. The cleaner system of claim 8, wherein the cleaner station further comprises a sealer that is configured to, based on the cleaner being coupled to the cleaner station, be in contact with a circumferential surface of the dust bin and disposed between the longitudinal axis of the suction part and the dust collecting motor axis.

18. The cleaner system of claim 8, wherein the cleaner further comprises a battery configured to supply power to the suction motor, and

wherein the battery is configured to, based on the cleaner being coupled to the cleaner station, be disposed above the dust bin and between the longitudinal axis of the suction part and the dust collecting motor axis.

19. The cleaner system of claim 8, wherein the coupling part is disposed above the dust collecting motor in a vertical direction and configured to be spaced apart from the suction motor in a horizontal direction based on the cleaner being coupled to the cleaner station,

wherein a vertical distance between the coupling part and the dust collecting motor in the vertical direction is greater than a horizontal distance between the coupling part and the suction motor in the horizontal direction, and

wherein a weight of the dust collecting motor is greater than a weight of the suction motor.

20. A cleaner system comprising:

a cleaner comprising:

a suction part that defines a suction flow path configured to receive air, the suction flow path extending in a longitudinal axis of the suction part,

a suction motor disposed in the cleaner and configured to configured to rotate about a rotation axis to thereby generate a suction force for suctioning the air through the suction part,

at least one cyclone configured to separate dust from the air received through the suction part, and

a dust bin configured to store the dust separated from the air received through the suction part; and

a cleaner station that extends in a longitudinal direction intersecting the rotation axis of the suction motor, the cleaner station comprising:

a guide surface configured to couple to a circumferential surface of the dust bin,

a housing that defines a dust collecting space configured to receive the dust from the dust bin of the cleaner, and

a dust collecting motor disposed in the housing and configured to rotate about a dust collecting motor axis to thereby generate a suction force for suctioning the dust in the dust bin into the dust collecting space,

wherein the cleaner station is configured such that the dust collecting space is disposed below a part that is configured to couple to the cleaner, and the dust collecting motor is disposed below the dust collecting space, and

wherein at least a portion of the guide surface is configured to, based on the cleaner being coupled to the cleaner station, be disposed between the longitudinal axis of the suction part and the dust collecting motor axis.

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