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(54) **VACUUM CLEANER**

(57) A vacuum cleaner is provided. The vacuum cleaner includes: a suction nozzle configured to suck dirt on a floor to be cleaned; a vacuum cleaning unit configured to separate and collect dirt flowing through the suction nozzle; and an extension pipe assembly configured to include an upper end to which the vacuum cleaning

unit is connected and a lower end to which the suction nozzle is connected. The extension pipe assembly is inclined at a preset angle toward the suction nozzle based on an axis perpendicular to the floor to move center of gravity thereof so as to be set into a standing state.

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Description

[0001] The present general inventive concept relates to a vacuum cleaner, and more particularly, to a vacuum cleaner that keeps a standing state through a user's extremely simple manipulation when completing or pausing cleaning and is changed from the standing state to a standing releasing state when restarting cleaning.

[0002] In general, a vacuum cleaner is an apparatus that forms negative pressure between a suction nozzle and a floor to be cleaned, by using a suction force generated from a suction source, to suck and collect dirt on the floor.

[0003] The vacuum cleaner may be classified into a canister type, an upright type, a handy type, a stick type, and so on according to shapes and main uses.

[0004] In particular, the stick type vacuum cleaner includes a vacuum cleaning unit, a suction nozzle, and an extension pipe assembly that connects the vacuum cleaning unit and the suction nozzle. The vacuum cleaning unit of the stick type vacuum cleaner is detachably combined with the extension pipe assembly and may be applied to the handy type vacuum cleaner.

[0005] However, when the stick type vacuum cleaner completes or pauses cleaning, the stick type vacuum cleaner is difficult to autonomously keep a standing state. Therefore, the stick type vacuum cleaner is laid on the floor or rests against the wall.

[0006] When the stick type vacuum cleaner is laid on the floor, a user bends the body of the user to stand the vacuum cleaner and restart cleaning. Also, when the stick type vacuum cleaner rests against the wall, center of gravity of the vacuum cleaner is focused on an upper part of the vacuum cleaner. Therefore, the vacuum cleaner falls easily and thus may be damaged.

[0007] In addition, in the stick type vacuum cleaner, when a rotating brush that is installed in the suction nozzle is separated from the suction nozzle in order to perform cleaning, the user directly grasps the rotating brush to separate the rotating brush from the suction nozzle. Therefore, there occurs an unsanitary problem in which dirt remaining on the rotating brush sticks to hands of the user.

[0008] Exemplary embodiments address at least the above problems and/or disadvantages and other disadvantages not described above. Also, the exemplary embodiments are not required to overcome the disadvantages described above, and an exemplary embodiment may not overcome any of the problems described above.

[0009] The exemplary embodiments provide a vacuum cleaner that sets a standing state through an extremely simple manipulation of a user when completing or pausing cleaning and is changed from the standing state to a standing releasing state through a simple manipulation of the user.

[0010] The exemplary embodiments also provide a vacuum cleaner that simply separates a rotating brush of a suction nozzle from the suction nozzle and is sani-

tarily handled to reduce dirt sticking onto hands of a user when separating the rotating brush from the suction nozzle.

[0011] According to an aspect of the exemplary embodiments, there is provided a vacuum cleaner including: a suction nozzle configured to suck dirt on a floor to be cleaned; a vacuum cleaning unit configured to separate and collect dirt flowing through the suction nozzle; and an extension pipe assembly configured to include an upper end to which the vacuum cleaning unit is connected and a lower end to which the suction nozzle is connected. The extension pipe assembly may be inclined at a preset angle toward the suction nozzle based on an axis perpendicular to the floor to move center of gravity thereof so as to be set into a standing state.

[0012] The extension pipe assembly may keep a first length when the vacuum cleaner performs cleaning and may be changed into a second length shorter than the first length when the vacuum cleaner stands.

[0013] The extension pipe assembly may include: a connecting part configured to include an end to which the suction nozzle is connected; an extending part configured to include a first extension pipe that includes a lower end connected to an other end of the connecting part and a second extension pipe that is combined with the first extension pipe to slide in a coaxial direction; and a setting part configured to be disposed in the first extension pipe and the connecting part and adjust a length of the extending part.

[0014] The setting part may include: a first member configured to be elastically disposed in the first extension pipe to move so as to slide along a longitudinal direction of the first extension pipe; and a second member configured to be disposed in the connecting part to pivot in the connecting part and comprise an end that selectively interferes with and is released from interfering with a lower end of the first member. The first member may be released from interfering with the second member to unlock the second extension pipe in order to enable the second extension pipe to move down along the first extension pipe. In response to the extension pipe assembly inclining toward the suction nozzle, the second member may release the interference of the lower end of the first member.

[0015] The setting part may further include: a third member that is elastically installed in the connecting part to move back and forth and operates along with the second member to lock or unlock a lower end of the extension pipe assembly into or from the suction nozzle.

[0016] The third member may include an end that is selectively pushed and released from being pushed by the second member and an other end that is inserted into or drawn from a locking groove of the suction nozzle in response to the end of the third member being pushed or released from being pushed.

[0017] In response to the extension pipe assembly inclining toward the suction nozzle, the third member may operate along with the second member to lock the lower

end of the extension pipe assembly into the suction nozzle.

[0018] In response to the extension pipe assembly inclining toward the suction nozzle, the second member may release the interference of the lower end of the first member to reduce the length of the extending part and push the third member to lock the lower end of the extension pipe assembly into the suction nozzle.

[0019] The lower end of the extension pipe assembly may include: a first pivoting part configured to be connected to the suction nozzle to pivot from side to side; and a second pivoting part configured to be connected to the first pivoting part to pivot back and forth and to be connected to a lower end of the second extension pipe.

[0020] The setting part may further include: a fourth member configured to be elastically installed in the second pivoting part to move back and forth. The fourth member may be selectively pressurized and released from being pressurized by the second extension pipe to selectively lock and unlock the second pivoting part into and from the first pivoting part.

[0021] In response to the extension pipe assembly inclining toward the suction nozzle, the second member may unlock the second extension pipe of the first member, and the fourth member may be pressurized by the second extension pipe to lock the second pivoting part into the first pivoting part.

[0022] The vacuum cleaning unit may be detachably connected to the second extension pipe. The vacuum cleaning unit may also be connected to the second extension pipe through a connecting hose.

[0023] The suction nozzle may include: a body part configured to be connected to the lower end of the extension pipe assembly; and a brush part configured to be detachably combined with the body part. The brush part may pivot a lever member thereof in one direction to be separated from the body part.

[0024] The lever member may include at least one pressurizing protrusion. The body part may include at least one protrusion that is to be pressurized and correspond to the pressurizing protrusion pivoting along with the lever member. In response to the pressurizing protrusion interfering with the protrusion and then continuously pivoting in an interfering direction, the brush part may be separated from the body part by a repulsive force generated between the pressurizing protrusion and the protrusion.

[0025] The brush part may include: a housing; and a rotating brush configured to be disposed in the housing to pivot in the housing. At least a part of the lever member may be formed of a transparent or semi-transparent material and covers an upper part of the housing.

[0026] According to another aspect of the exemplary embodiments, there is provided a vacuum cleaner including: a suction nozzle; a vacuum cleaning unit; and an extension pipe assembly configured to connect the suction nozzle and the vacuum cleaning unit and have a variable length. As the extension pipe assembly may be

inclined in a first direction, a length of the extension pipe assembly may be reduced to move center of gravity thereof so as to set the vacuum cleaner into a standing state.

[0027] According to another aspect of the exemplary embodiments, there is provided a vacuum cleaner including: a suction nozzle; a vacuum cleaning unit; and an extension pipe assembly configured to include an extending part that is connected to the vacuum cleaning unit and a connecting part that is connected to a lower end of the extending part and is connected to the suction nozzle. The extension pipe assembly may selectively a standing state and a standing releasing state. In the standing state, the extending part may incline at a preset angle in one direction to reduce a length thereof so as to move center of gravity of the extension pipe assembly. In the standing releasing state, the length of the extending part may increase, and the extending part may pivot in a reverse direction of the one direction. Therefore, the center of gravity of the extension pipe assembly may be moved upwards.

[0028] The above and/or other aspects will be more apparent by describing certain exemplary embodiments with reference to the accompanying drawings, in which:

FIGS. 1 and 2 are front and rear perspective views of a vacuum cleaner according to an exemplary embodiment of the present general inventive concept; FIGS. 3A through 3C are side views sequentially illustrating a process of changing a vacuum cleaner from a standing releasing state (or a cleaning state) to a standing state, according to an exemplary embodiment of the present general inventive concept; FIG. 4 is a cross-sectional view taken along line IV-IV of FIG. 3A;

FIG. 5 is a rear view of a vacuum cleaner according to an exemplary embodiment of the present general inventive concept;

FIG. 6 is a cross-sectional view taken along line VI-VI of FIG. 5;

FIG. 7 is an enlarged view of part VII of FIG. 6;

FIG. 8 is an enlarged view of part VIII of FIG. 6;

FIG. 9 is a cross-sectional view taken along line IX-IX of FIG. 3A;

FIG. 10 is an enlarged cross-sectional view illustrating inner parts of a suction nozzle and an extension pipe assembly of FIG. 3B;

FIG. 11 is an enlarged cross-sectional view illustrating the inner part of the extension pipe assembly of FIG. 3B;

FIG. 12 is an enlarged cross-sectional view illustrating the inner parts of the suction nozzle and the extension pipe assembly of FIG. 3C;

FIG. 13 is an enlarged cross-sectional view illustrating the inner part of the extension pipe assembly of FIG. 3C;

FIG. 14 is an exploded perspective view illustrating a suction nozzle of a vacuum cleaner, according to

an exemplary embodiment of the present general inventive concept;

FIG. 15 is a perspective view illustrating a lever member of a brush part of the suction nozzle that pivots in one direction;

FIG. 16 is a cross-sectional view illustrating the inner part of the suction nozzle of FIG. 15; and

FIG. 17 is a perspective view illustrating the brush part of the suction nozzle that is separated from a body part of the suction nozzle.

[0029] Exemplary embodiments are described in greater detail with reference to the accompanying drawings.

[0030] In the following description, the same drawing reference numerals are used for the same elements even in different drawings. The matters defined in the description, such as detailed construction and elements, are provided to assist in a comprehensive understanding of the exemplary embodiments. Thus, it is apparent that the exemplary embodiments can be carried out without those specifically defined matters. Also, well-known functions or constructions are not described in detail since they would obscure the exemplary embodiments with unnecessary detail.

[0031] In the drawings, sizes of some elements may be exaggerated for understanding of the present general inventive concept.

[0032] Hereinafter, a structure of a vacuum cleaner according to an exemplary embodiment of the present general inventive concept will be described with reference to the attached drawings.

[0033] The vacuum cleaner according to the exemplary embodiment of the present general inventive concept will now be described as a stick type vacuum cleaner including a handy cleaner that is detachably installed in an extension pipe assembly. However, the vacuum cleaner is not limited to the stick type vacuum cleaner and may be applied to a canister type vacuum cleaner. In this case, the extension pipe assembly may be connected to a vacuum cleaning unit through an additional connecting hose.

[0034] With reference to FIGS. 1 and 2, a structure and an operation of a vacuum cleaner 10 according to an exemplary embodiment of the present general inventive concept will be first roughly described. Elements (in particular, an extension pipe assembly 300 and a suction nozzle 500) for realizing a standing state and a standing releasing state of the vacuum cleaner 10 will be described in detail.

[0035] Referring to FIGS. 1 and 2, the vacuum cleaner 10 includes a vacuum cleaning unit 100, the extension pipe assembly 300 and the suction nozzle 500.

[0036] The vacuum cleaning unit 100 may be a handy cleaner and includes a suction motor (not shown), a dust container 110, a handle 130, and a suction part 150 that are formed in the vacuum cleaner 10. The suction motor generates a suction force in the vacuum cleaner 10, and

the dust container 110 collects dirt (all kinds of foreign substances such as dust, strands of hair, etc.) that is sucked into the vacuum cleaner 10. The handle 130 is used by a user to control the vacuum cleaner 10, and the suction part 150 is detachably combined with an upper end of the extension pipe assembly 300.

[0037] Also, a cyclone structure (not shown) that is connected to the dust container 110 may be formed in the vacuum cleaner 10 in order to separate dirt from air flowing into the vacuum cleaner 10.

[0038] A length of the extension pipe assembly 300 is variable. In this case, the extension pipe assembly 300 may include a telescopic structure to realize the variation of the length thereof.

[0039] The extension pipe assembly 300 has the upper end that is combined with the vacuum cleaning unit 100 to be connected to the vacuum cleaning unit 100 and a lower end that is combined with the suction nozzle 500 to be connected to the suction nozzle 500. The extension pipe assembly 300 guides the dirt flowing from the suction nozzle 500 to the vacuum cleaning unit 100.

[0040] The suction nozzle 500 sucks the dirt by using suction that is formed between a bottom of the suction nozzle 500 and a floor 20 to be cleaned as shown in FIG. 3A.

[0041] A process of changing the vacuum cleaner 10 of the present exemplary embodiment from the standing releasing state to the standing state will now be roughly described with reference to FIGS. 3A through 3C.

[0042] Referring to FIG. 3A, in the vacuum cleaner 10, an angle of the extension pipe assembly 300 formed with the floor 20 is kept smaller than an angle of θ_1 when performing cleaning. Therefore, when performing cleaning, the length of the extension pipe assembly 300 is kept not to be reduced. A state to perform cleaning (cleaning state) through the vacuum cleaner 10 is also defined as the standing releasing state.

[0043] In order to keep the vacuum cleaner 10 in the standing (upright) state when stopping cleaning, when the extension pipe assembly 300 is vertical (i.e. approximately perpendicular to the floor 20) as shown in FIG. 3A, the extension pipe assembly 300 is inclined at an angle of θ_2 in direction R toward the suction nozzle 500 as shown in FIG. 3B.

[0044] Therefore, the length of the extension pipe assembly 300 is reduced, and a height of the vacuum cleaning unit 100 becomes lower to be closer to the floor 20 than in the standing releasing state (the cleaning state).

[0045] Referring to FIG. 3C, in the vacuum cleaner 10, the length of the extension pipe assembly 300 is reduced, and the extension pipe assembly 300 keeps inclined at the angle of θ_2 toward the suction nozzle 500. Therefore, whole center of gravity is focused on a lower part of the vacuum cleaner 10, and thus the vacuum cleaner 10 may keep the standing state stable.

[0046] In this case, the angle θ_2 at which the extension pipe assembly 300 may incline in the direction R may be differently set according to a length in the front-and-rear

direction of the suction nozzle 500. In other words, as the length in the front-and-rear direction of the suction nozzle 500 are longer from the lower end of the extension pipe assembly 300 toward the suction nozzle 500, the angle $\theta 2$ of the extension pipe assembly 300 may increase. Here, the length and the angle $\theta 2$ of the extension pipe assembly 300 may be proportional to each other.

[0047] A structure of the extension pipe assembly 300 for changing the standing state and the standing releasing state of the vacuum cleaner 10 will now be described in detail with reference to the drawings.

[0048] As shown in FIGS. 1, 2, and 5, the extension pipe assembly 300 includes an extending part 310 that has a variable length, a connecting part 350 that is connected to a lower end of the extending part 310, and a setting part 390 of FIG. 6 that is disposed in the extending part 310 and the connecting part 350.

[0049] The extending part 310 includes a first extension pipe 320 and a second extension pipe 330 that is combined with the first extension pipe 320 to slide on the first extension pipe 320.

[0050] The extending part 310 keeps a first length L1 in the standing releasing state as shown in FIG. 3A and keeps a second length L2 shorter than the first length L1 in the standing state as shown in FIG. 3C.

[0051] A lower end of the first extension pipe 320 is connected to the connecting part 350, and the setting part 390 is disposed in the first extension pipe 320 so that a part of the setting part 390 (i.e., a first member 391 that will be described later with reference to FIG. 4) slides along a longitudinal direction of the first extension pipe 320.

[0052] The second extension pipe 330 is disposed on the same axis as the first extension pipe 320 and is combined with the first extension pipe 320 to slide along the longitudinal direction of the first extension pipe 320 in order to vary the length of the extending part 310.

[0053] The second extension pipe 330 has an upper end that is detachably combined with a suction part 150 of the vacuum cleaning unit 100 and is connected to the suction part 150 when being combined with the suction part 150. The second extension pipe 330 may further include a locking button 331 to lock the suction part 150 into the second extension pipe 330 or unlock the suction part 150 from the second extension pipe 330 when the suction part 150 is combined with the second extension pipe 330.

[0054] The connecting part 350 connects the extending part 310 and the suction nozzle 500 and includes first and second pivoting parts 360 and 370.

[0055] The first pivoting part 360 has a front end 361 that is connected to a rear end 501 of the suction nozzle 500 through a pivoting connecting hole 363 of FIG. 6. In this case, the first pivoting part 360 pivots on a virtual axis disposed in front of and in the rear of the suction nozzle 500 to pivot from side to side on the suction nozzle 500. Therefore, a user may easily pivot the suction nozzle 500, which moves along the floor 20, from side to side.

[0056] Also, a part (a third member 393 of FIG. 7 that will be described later) of the setting part 390 is disposed in the first pivoting part 360 to slide in the first pivoting part 360.

[0057] In the present general inventive concept, the suction nozzle 500 is connected to the connecting part 350 to pivot on the connecting part 350 but is not limited thereto. When the suction nozzle 500 and the connecting part 350 do not pivot on each other, the suction nozzle 500 and the connecting part 350 may be connected to each other. In this case, the third member 393 of the setting part 390 that will be described later may be omitted.

[0058] The second pivoting part 370 has an upper end 371 that is combined with the lower end of the first extension pipe 320 to be connected to the lower end of the first extension pipe 320. In this case, the upper end 371 of the second pivoting part 370 may be detachably combined with the second extension pipe 330 to easily maintain the vacuum cleaner 10 when the second extension pipe 330 is blocked by dirt. For this, a locking and unlocking structure, such as the locking button 331 of the second extension pipe 330, may be installed at the upper end 371 of the second pivoting part 370.

[0059] The second pivoting part 370 is connected to the first pivoting part 360 to pivot on a hinge axis 372 on which forward and backward directions of the suction nozzle 500 are disposed at an approximately right angle with the virtual axis. Therefore, the second pivoting part 370 pivots in the forward direction of the suction nozzle 500.

[0060] The second pivoting part 370 also includes first, second, and third wheels 373, 374, and 375 to slide along the floor 20. Here, the first wheel 373 is installed on a bottom of the second pivoting part 370, and the second and third wheels 374 and 375 are installed on both sides of the second pivoting part 370. The first wheel 373 supports the second pivoting part 370 to pivot on the second pivoting part 370 when the suction nozzle 500 moves back and forth along the floor 20. The second and third wheels 374 and 375 support the second pivoting part 370 when the suction nozzle 500 pivots from side to side.

[0061] Flexible hoses (not shown) are disposed in the first and second pivoting parts 360 and 370 and guide air containing dirt flowing into the suction nozzle 500 to the extension pipe assembly 300.

[0062] Referring to FIG. 6, the setting part 390 includes first, second, third, and fourth members 391, 392, 393, and 394. The first and second members 391 and 392 adjust the length of the extending part 310, and the third member 393 operates along with the second member 392 to selectively lock or unlock the suction nozzle 500 into or from the connecting part 350. The fourth member 394 operates with the adjustment of the length of the extending part 310 to lock or unlock the first and second pivoting parts 360 and 370 of the connecting part 350.

[0063] Referring to FIGS. 4 and 6, the first member 391 locks the second extension pipe 330 in order to en-

able the extending part 310 to keep the first length L1.

[0064] For this, the first member 391 is disposed in the first extension pipe 320 to slide along the longitudinal direction of the first extension pipe 320 and includes a locking protrusion 391a that is formed at an upper end of the first member 391 to form a single body with the first member 391. The locking protrusion 391a is detachably inserted into a lock groove 333 of FIG. 8 that is formed in the lower end of the second extension pipe 330.

[0065] When the first member 391 is released from interfering with the second member 392, the locking protrusion 391a of the first member 391 is unlocked from the locking groove 333 of the second extension pipe 330. After that, as shown in FIG. 8, the locking protrusion 391a slides down along a slope 326 of a protrusion 325 protruding in the first extension pipe 320 to unlock the second extension pipe 330. In this case, the second extension pipe 330 is unlocked by the first member 391 to slide down along the first extension pipe 320.

[0066] As shown in FIGS. 4 and 6, a first elastic member 395 has an end that is fixed to a first fixing protrusion 321 protruding in the first extension pipe 320 and an other end that is fixed to a second fixing protrusion 391a formed to form a single body with the first member 391. In this case, a through-hole 391c is formed along a longitudinal direction of the first member 391 so that the first member 391 does not interfere with the first protrusion 321 of the first extension pipe 320 when the first member 391 slides up and down. The first elastic member 395 is disposed in the through-hole 391c of the first member 391.

[0067] An elastic force of the first elastic member 395 acts on the first member 391 to pull the first member 391 downwards when the first member 391 is in a position for locking the second extension pipe 330. Therefore, the interference of the second member 392 with the first member 391 is released, and the first member 391 is moved downwards by the first elastic member 395.

[0068] The first member 391 interferes with the second member 392 and thus rises. Therefore, when the first member 391 locks the second extension pipe 330, the elastic force is continuously applied to the first member 391 by the first elastic member 395.

[0069] Referring to FIG. 7, a lower end 391d of the first member 391 is inserted into the upper end 371 of the second pivoting part 370 and is joined to an upper end 392a of the second member 392. As the first member 391 pivots in one direction and a reverse direction of the second member 392, the first member 391 selectively interferes with the upper end 392a of the second member 392 and is released from the interference with the upper end 392a of the second member 392.

[0070] A central part of the second member 392 is combined with a hinge pin 371a protruding in the second pivoting part 370 to pivot in one direction and a reverse direction. If the second pivoting part 370 pivots toward the suction nozzle 500, a lower end of the second member 392 (a part under the hinge pin 371a) is pushed toward a rear part of the connecting part 350 by a part 371b

of the second pivoting part 370 so that the second member 392 pivots in the same direction as the second pivoting part 370. Therefore, as the upper end 392a of the second member 392 pivots, the lower end 391d of the first member 391 is released from interfering with the upper end 392a of the second member 392.

[0071] A lower end 392b of the second member 392 contacts a rear end 393a of the third member 393, pressurizes the rear end 393a of the third member 393 toward the suction nozzle 500 when the second pivoting part 370 pivots toward the suction nozzle 500, and releases the pressurization of the rear end 393a of the third member 393 when the second pivoting part 370 pivots in a reverse direction.

[0072] As described above, as the second member 392 pivots along with the second pivoting part 370 in one direction and the reverse direction, the first and third members 391 and 393 operate together.

[0073] The front end 393b of the third member 393 is selectively inserted into and drawn from a locking groove 503 formed in the rear end 501 of the suction nozzle 500 to lock and unlock the first pivoting part 360 into and from the suction nozzle 500.

[0074] For this, the third member 393 is disposed in the first pivoting part 360 to move back and forth based on the suction nozzle 500. Here, when the third member 393 is released from being pressurized by the second member 392, the third member 393 is elastically supported by a second elastic member 396 to return to a position where the front end 393b is drawn from the locking groove 503 of the suction nozzle 500.

[0075] In this case, the second elastic member 396 has an end that is supported by an inner part of the first pivoting part 360 and an other end that is supported by a hooking protrusion 393c protruding from the third member 393.

[0076] The fourth member 394 selectively locks and unlocks the second pivoting part 370 into and from the first pivoting part 360. For this, as shown in FIGS. 7 and 9, a lower end 394b of the fourth member 394 is selectively inserted into and drawn from a locking groove 365 that is formed in a rear part of the first pivoting part 360.

[0077] In the standing releasing state, an upper end 394a of the fourth member 394 protrudes to a preset length outside the upper part 371 of the second pivoting part 370, and the lower end 394b of the fourth member 394 keeps drawn from the locking groove 365 of the first pivoting part 360. On the contrary to this, in the standing state, the upper end 394a of the fourth member 394 is pressurized downwards by a lower end 335 of the second extension pipe 330 to insert the lower end 394b of the fourth member 394 into the locking groove 365 of the first pivoting part 360 as shown in FIG. 12.

[0078] In this case, the fourth member 394 is elastically supported by a third elastic member 397 in a direction for pressurizing the second pivoting part 370.

[0079] The third elastic member 397 is disposed in a groove 394c that is formed in the fourth member 394

along a longitudinal direction of the fourth member 394. The third elastic member 397 has also an end that is supported by an inner part of the second pivoting part 370 and another end that is supported by a side 394d of the groove 394c of the fourth member 394.

[0080] An operation for changing the vacuum cleaner 10 having the above-described structure from the standing releasing state to the standing state or from the standing state to the standing releasing state will now be described in detail.

[0081] Referring to FIG. 3A, when the vacuum cleaner 10 performs cleaning, the extending part 310 of the extension pipe assembly 300 moves within an angle range smaller than the angle of $\theta 1$. Here, the standing releasing state is kept.

[0082] In the standing releasing state, the lower end 391d of the first member 391 interferes with the upper end 392a of the second member 392 as shown in FIG. 7, and thus the locking protrusion 391a of the first member 391 is inserted into a locking groove 333 of the second extension pipe 330 as shown in FIG. 8.

[0083] Therefore, as the second extension pipe 330 keeps a locking state, the extending part 310 keeps the first length L1. As a result, the user may perform cleaning on the floor 20 through the vacuum cleaner 10 with stretching a back of the user.

[0084] If the user completes or pauses cleaning, the user may keep the vacuum cleaner 10 in a stable standing state through a simple manipulation that inclines the extension pipe assembly 300 toward the suction nozzle 500.

[0085] In other words, referring to FIG. 3B, the extending part 310 of the extension pipe assembly 300 is inclined at the angle of $\theta 2$ in the direction R toward the suction nozzle 500 so as to go beyond a virtual axis A1 that is approximately perpendicular to the floor 20.

[0086] In this process, the second member 392 pivots in the same direction as a pivoting direction of the second pivoting part 370 by the second pivoting part 370 that pivots on the hinge axis 372 as shown in FIG. 10. Here, the upper end 392a of the second member 392 releases the interference of the lower end 391d of the first member 391.

[0087] Therefore, the first member 391 slides down by an elastic force of the first elastic member 395 of FIG. 6 as shown in FIG. 11. Simultaneously with this, the locking protrusion 391a of the first member 391 gets out of the locking groove 333 of the second extension pipe 330 and then slides down along the slope 326 as shown in FIG. 13.

[0088] The second extension pipe 330 is released from being locked to slide down along the first extension pipe 320 by self-weights of the second extension pipe 330 and the vacuum cleaning unit 100. Therefore, the extending part 310 is changed into a second length L2 shorter than the first length L1, and center of gravity of the vacuum cleaner 10 is moved from an upper part of the vacuum cleaner 10 to a lower part of the vacuum cleaner 10 so as to change the vacuum cleaner 10 into the stable

standing state.

[0089] Also, the third member 393 operates along with the second member 392, and the fourth member 394 operates by the second extension pipe 330 to further stably keep the vacuum cleaner 10 in the standing state.

[0090] In other words, as shown in FIG. 10, as the rear end 393a of the third member 393 is pressurized toward the suction nozzle 500, the front end 393b of the third member 393 is inserted into the locking groove 503 of the suction nozzle 500. Therefore, the connecting part 350 is locked into the suction nozzle 500 not to pivot from side to side on the suction nozzle 500.

[0091] Also, as shown in FIG. 12, as the upper end 394a of the fourth member 394 is pressurized by the lower end 335 of the second extension pipe 330, the fourth member 394 is moved down, and the lower end 394b of the fourth member 394 is inserted into the locking groove 365 of the first pivoting part 360. Therefore, the second pivoting part 370 is locked into the first pivoting part 360 not to pivot back and forth on the first pivoting part 360.

[0092] On the contrary to this, if the vacuum cleaner 10 is released from the standing state to restart cleaning, the user grabs the handle 130 of the vacuum cleaner 10 to pull the handle 130 upwards as shown in FIG. 3A in order to increase the length of the extending part 310 of the extension pipe assembly 300. After that, the user may release the standing state of the vacuum cleaner 10 through a simple manipulation for pivoting the extending part 310 of the extension pipe assembly 300 at a preset angle in the rear of the suction nozzle 500 on the hinge axis 372.

[0093] As described above, if the vacuum cleaner 10 is changed from the standing state to the standing releasing state, the second pivoting part 370 pivots in the same direction of the pivoting direction of the extending part 310. Therefore, the second member 392 reinterferes with the lower end 391d of the first member 391 to raise the first member 391 into an original position.

[0094] The first member 391 is raised by the second member 392 to combine the locking protrusion 391a of the first member 391 with the locking groove 333 of the second extension pipe 330. Therefore, the extending part 310 re-keeps the first length L1.

[0095] As the third member 393 is released from being pressurized by the second member 392, the third member 393 is moved to an original position thereof by the second elastic member 396 so as to draw the front end 393b of the third member 393 from the locking groove 503 of the suction nozzle 500. Therefore, the connecting part 350 is unlocked from the suction nozzle 500.

[0096] The fourth member 394 is released from being pressurized by the second extension pipe 330 and is moved upwards by the third elastic member 397 to return to an original position thereof. Therefore, as the lower end 394b of the fourth member 394 is drawn from the locking groove 365 of the first pivoting part 360, the second pivoting part 370 is unlocked from the first pivoting part 360.

[0097] The vacuum cleaner 10 according to the present exemplary embodiment as described above may easily change the standing state and the standing releasing state through simple manipulations.

[0098] A structure and an operation of the suction nozzle 500 will now be described in detail with reference to FIGS. 14 through 17.

[0099] Referring to FIG. 14, the suction nozzle 500 includes a body part 510 that is connected to the connecting part 350 and a brush part 530 that is detachably combined with the body part 510.

[0100] An installing groove 511 is formed in a front part of the body part 510 to approximately correspond to a width of the brush part 530. The installing groove 511 includes a pair of protrusions 513 that are to be pressurized and protrude from an inner side 512 of the body part 510.

[0101] The protrusions 513 protrude to have preset lengths in a straight line direction in which the brush part 530 is installed into and separated from the body part 510. Curved parts 514 are respectively formed at front ends of the protrusions 513. The curved parts 514 contact curved parts 554 of a pair of pressurizing protrusions 553, which will be described later, slide on the curved parts 554 of the pressurizing protrusions 553.

[0102] Also, a suction hole 517 is formed in a center of the inner side 512 of the body part 510 to suck dirt on the floor 20 through the brush part 530.

[0103] The brush part 530 includes a housing 540 that has a rotating brush 543 and a lever member 550 that is hinged on an upper part of the housing 540 to pivot on the upper part of the housing 540.

[0104] The housing 540 includes a pair of guide parts 544 that are formed at both sides of the housing 540 to enclose the pressurizing protrusions 553 of the lever member 550 and guide pivoting of the pair of pressurizing protrusions 553. In this case, hinge protrusions 545 are formed at the pair of guide parts 544 so that both sides of the lever member 550 are hinged on the hinge protrusions 545.

[0105] Also, a pair of combination holes 547 are formed in both sides of a back side of the housing 540 so that the pair of pressurizing protrusions 513 are pressurized to be inserted into the pair of combination holes 547 as shown in FIG. 17. When the brush part 530 is combined with the body part 510, the pair of protrusions 513 are pressurized to be combined with the pair of combination holes 547 so as to firmly fix the brush part 530 to the body part 510.

[0106] The lever member 550 operates to separate the brush part 530 from the body part 510 and has a width corresponding to left and right widths of the housing 540 to cover an upper part of the housing 540. In this case, the lever member 550 may be formed of a transparent or semi-transparent material, so that the user checks the rotating brush 543 without opening the lever member 550.

[0107] Also, the pair of pressurizing protrusions 553

are formed at the both sides of the lever member 550 to protrude downwards so as to be parallel with each other. In this case, the pair of pressurizing protrusions 553 are set in positions respectively corresponding to the pair of protrusions 513.

[0108] A grabbing part 555 of the lever member 550 is combined with a rear end of the lever member 550. The grabbing part 555 is used to easily pivot the lever member 550 on the pair of hinge protrusions 545. Therefore, if the lever member 550 is covered with the housing 540, the grabbing part 555 corresponds to a groove 519 that is formed in an upper part of the body part 510. In this case, the groove 519 provides a space, into which a finger of the user is inserted, so as to easily pivot the lever member 550 through the grabbing part 555.

[0109] A process of separating the brush part 530 from the body part 510 of the suction nozzle 500 having the above-described structure will now be described with reference to FIGS. 15 through 17.

[0110] Referring to FIGS. 15 and 16, when the brush part 530 is combined with the body part 510, and the lever member 550 pivots in direction B marked with an arrow on the pair of hinge protrusions 545, the pair of pressurizing protrusions 553 pivot along with the lever member 550 to interfere with the protrusions 513 of the body part 510.

[0111] If the lever member 550 continuously pivots in the direction B in this state, a repulsive force is generated between the pair of pressurizing protrusions 553 and the pair of protrusions 513. Therefore, the brush part 530 slides from the body part 510 toward the suction nozzle 500 by the repulsive force to be spaced apart from the body part 510.

[0112] Therefore, the user may easily fully separate the brush part 530 that is spaced apart from the body part 510 as shown in FIG. 17. In a process of separating the brush part 530 from the body part 510, the user performs only a simple manipulation of pivoting the lever member 550 onto which dirt does not stick. Therefore, the user does not need to directly touch the rotating brush 543 and thus may sanitarily handle the vacuum cleaner 10.

[0113] The foregoing exemplary embodiments and advantages are merely exemplary and are not to be construed as limiting. The present teaching can be readily applied to other types of apparatuses. Also, the description of the exemplary embodiments is intended to be illustrative and many alternatives, modifications, and variations will be apparent to those skilled in the art while still falling within the scope of the invention as defined by the claims.

Claims

1. A vacuum cleaner comprising:

a suction nozzle (500) configured to suck dirt

- from a floor to be cleaned;
 a vacuum cleaning unit (100) configured to collect dirt flowing through the suction nozzle; and
 an extension pipe assembly (300) comprising an upper end to which the vacuum cleaning unit is connected and a lower end to which the suction nozzle is connected,
 wherein the extension pipe assembly is movable from a cleaning position to a standing position by being inclined at a preset angle from the vertical towards the suction nozzle.
2. The vacuum cleaner of claim 1, wherein the extension pipe assembly is arranged to shorten when the vacuum cleaner is moved from the cleaning position into the standing position.
 3. The vacuum cleaner of claim 2, wherein the extension pipe assembly comprises:
 - a connecting part comprising an end to which the suction nozzle is connected;
 - an extending part comprising a first extension pipe that comprises a lower end connected to an other end of the connecting part and a second extension pipe that is combined with the first extension pipe to slide in a coaxial direction; and
 - a setting part disposed in the first extension pipe and the connecting part for adjusting a length of the extending part.
 4. The vacuum cleaner of claim 3, wherein the setting part comprises:
 - a first member elastically disposed in the first extension pipe so as to slide along a longitudinal direction of the first extension pipe; and
 - a second member disposed to pivot in the connecting part and comprising an end that selectively interferes with and is released from interfering with a lower end of the first member, wherein the first member is released from interfering with the second member to unlock the second extension pipe in order to enable the second extension pipe to move down along the first extension pipe.
 5. The vacuum cleaner of claim 4, wherein in response to the extension pipe assembly inclining toward the suction nozzle, the second member is arranged to release the interference of the lower end of the first member.
 6. The vacuum cleaner of claim 4 or 5, wherein the setting part further comprises:
 - a third member that is elastically installed in the connecting part to move back and forth and ar-
- ranged to operate along with the second member to lock or unlock a lower end of the extension pipe assembly into or from the suction nozzle.
7. The vacuum cleaner of claim 6, wherein the third member comprises an end that is selectively pushed and released from being pushed by the second member and another end that is inserted into or drawn from a locking groove of the suction nozzle in response to the end of the third member being pushed or released from being pushed.
 8. The vacuum cleaner of claim 6 or 7, wherein in response to the extension pipe assembly inclining toward the suction nozzle, the third member is arranged to operate along with the second member to lock the lower end of the extension pipe assembly into the suction nozzle.
 9. The vacuum cleaner of claim 6, 7 or 8, wherein in response to the extension pipe assembly inclining toward the suction nozzle, the second member is arranged to release the interference of the lower end of the first member to reduce the length of the extending part and to push the third member to lock the lower end of the extension pipe assembly into the suction nozzle.
 10. The vacuum cleaner of any one of claims 4 to 9, wherein the lower end of the extension pipe assembly comprises:
 - a first pivoting part configured to be connected to the suction nozzle to pivot from side to side; and
 - a second pivoting part configured to be connected to the first pivoting part to pivot back and forth and to be connected to a lower end of the second extension pipe.
 11. The vacuum cleaner of claim 10, wherein the setting part further comprises:
 - a fourth member elastically installed in the second pivoting part to move back and forth, wherein the fourth member is selectively pressurized and released from being pressurized by the second extension pipe to selectively lock and unlock the second pivoting part into and from the first pivoting part.
 12. The vacuum cleaner of claim 11, wherein in response to the extension pipe assembly inclining toward the suction nozzle, the second member is arranged to unlock the second extension pipe of the first member, and the fourth member is pressurized by the second extension pipe to lock the second pivoting part into the first pivoting part.

13. The vacuum cleaner of any one of the preceding claims, wherein the suction nozzle comprises:

a body part configured to be connected to the lower end of the extension pipe assembly; and 5
a brush part configured to be detachably combined with the body part,
wherein the brush part is arranged to pivot a lever member thereof in one direction to be separated from the body part. 10

14. The vacuum cleaner of claim 13, wherein:

the lever member comprises at least one pressurizing protrusion; 15
the body part comprises at least one protrusion that is to be pressurized and corresponds to the pressurizing protrusion pivoting along with the lever member; and
in response to the pressuring protrusion interfering with the protrusion and then continuously pivoting in an interfering direction, the brush part is separated from the body part by a repulsive force generated between the pressurizing protrusion and the protrusion. 20
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15. The vacuum cleaner of claim 14, wherein the brush part comprises:

a housing; and 30
a rotating brush configured to be disposed in the housing to pivot in the housing,
wherein at least a part of the lever member is formed of a transparent or semi-transparent material and covers an upper part of the housing. 35

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FIG. 1

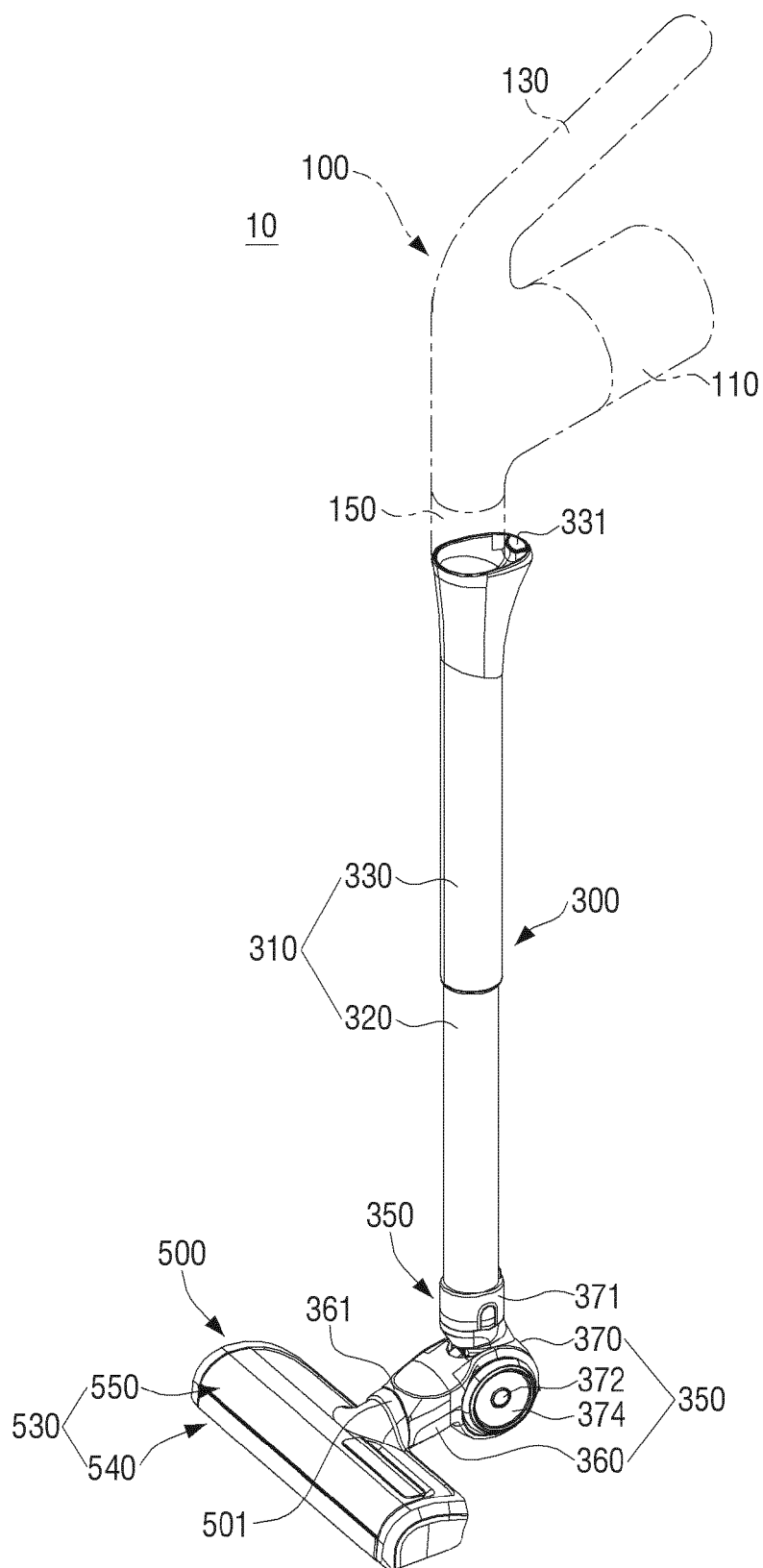


FIG. 2

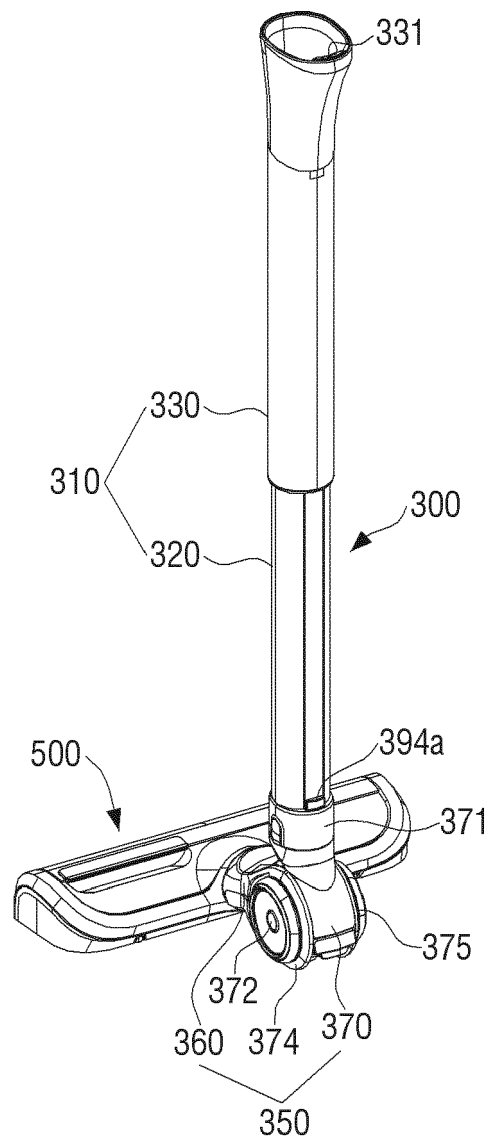


FIG. 3B

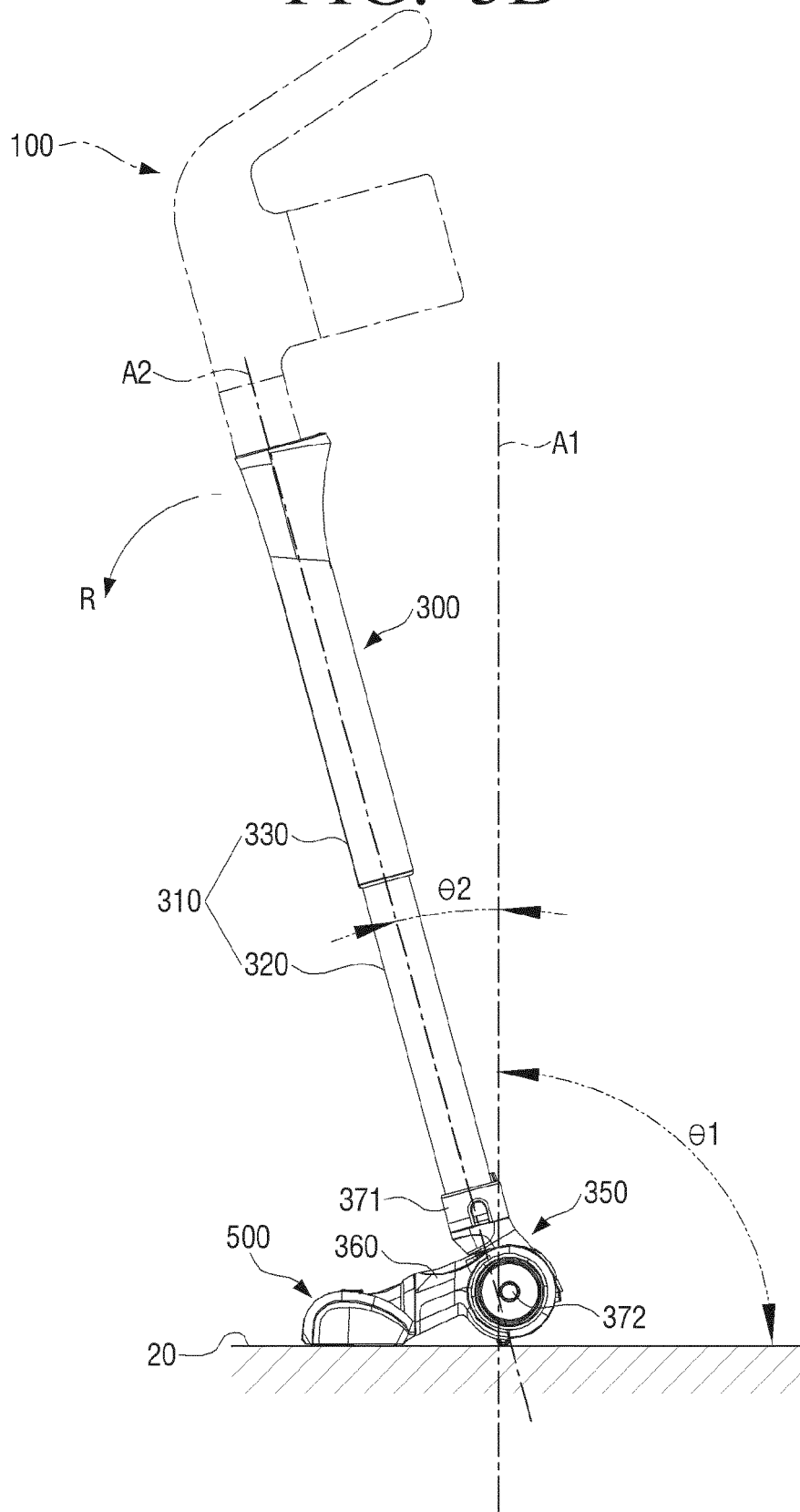


FIG. 3C

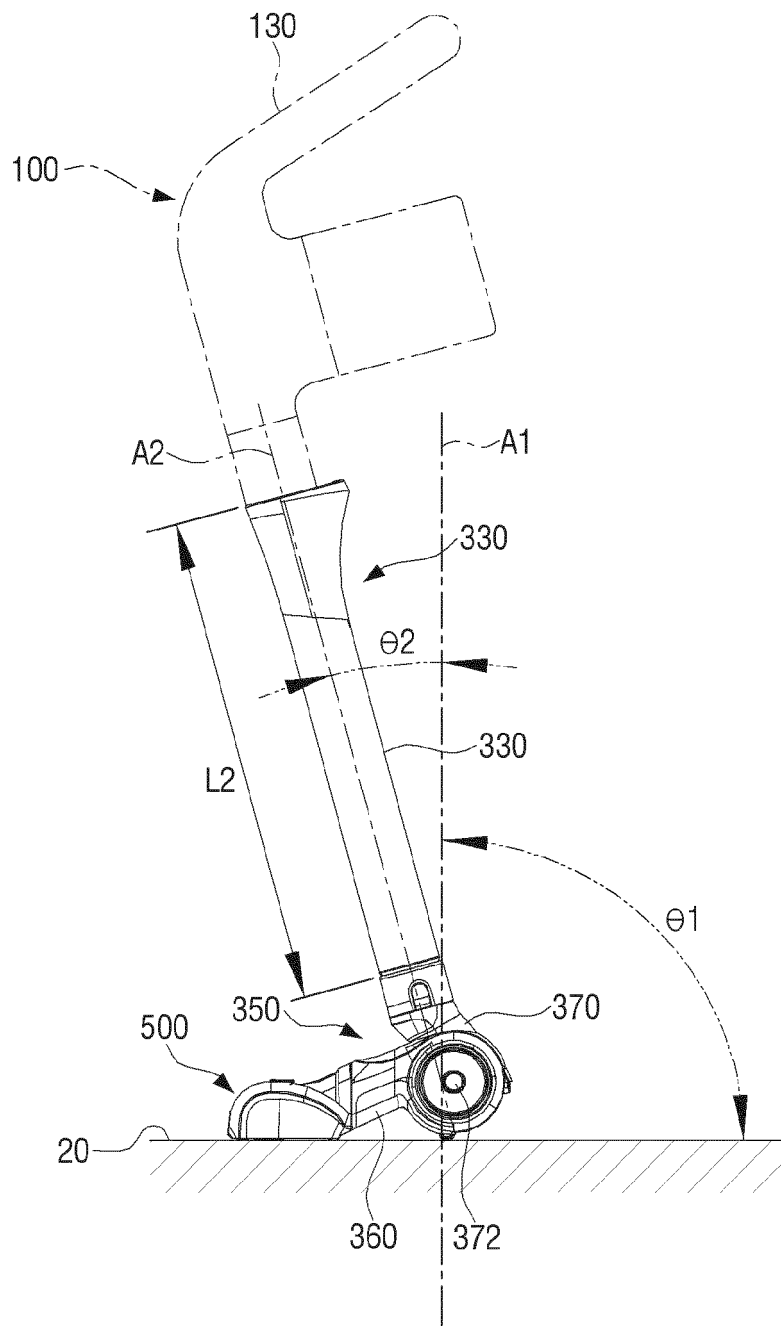


FIG. 4

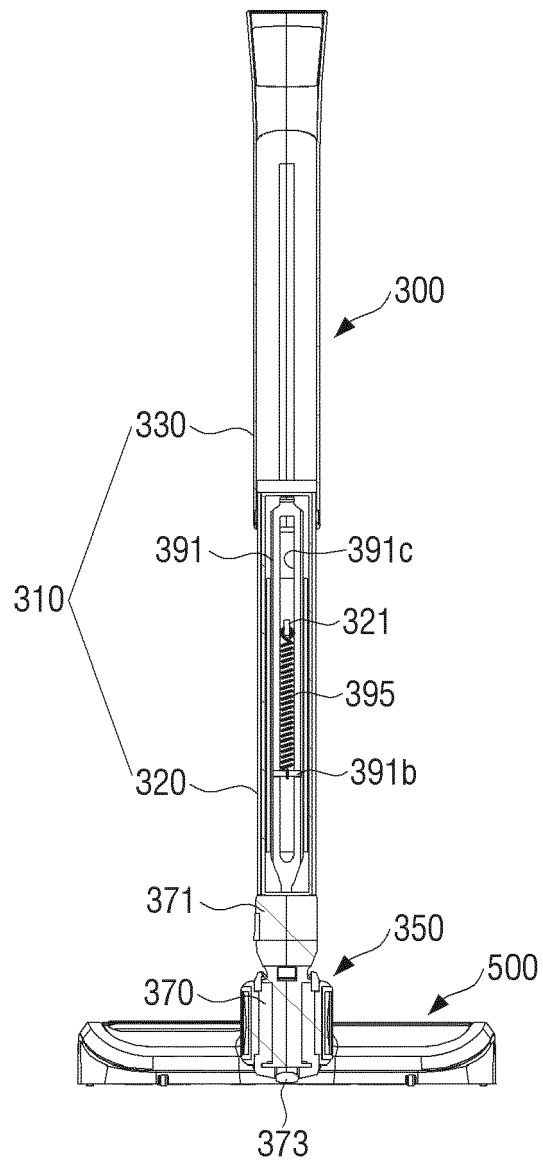


FIG. 5

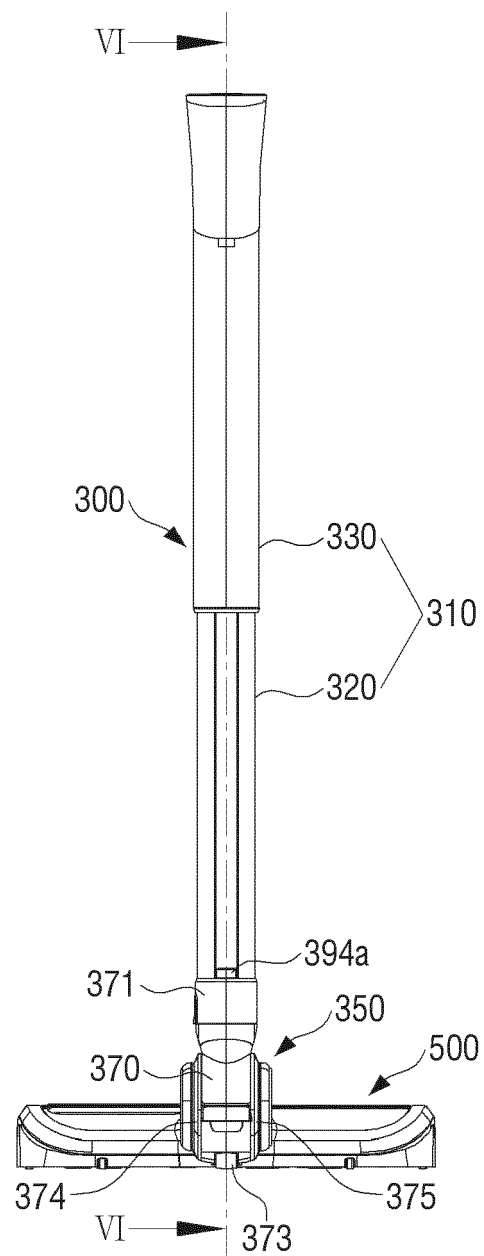


FIG. 6

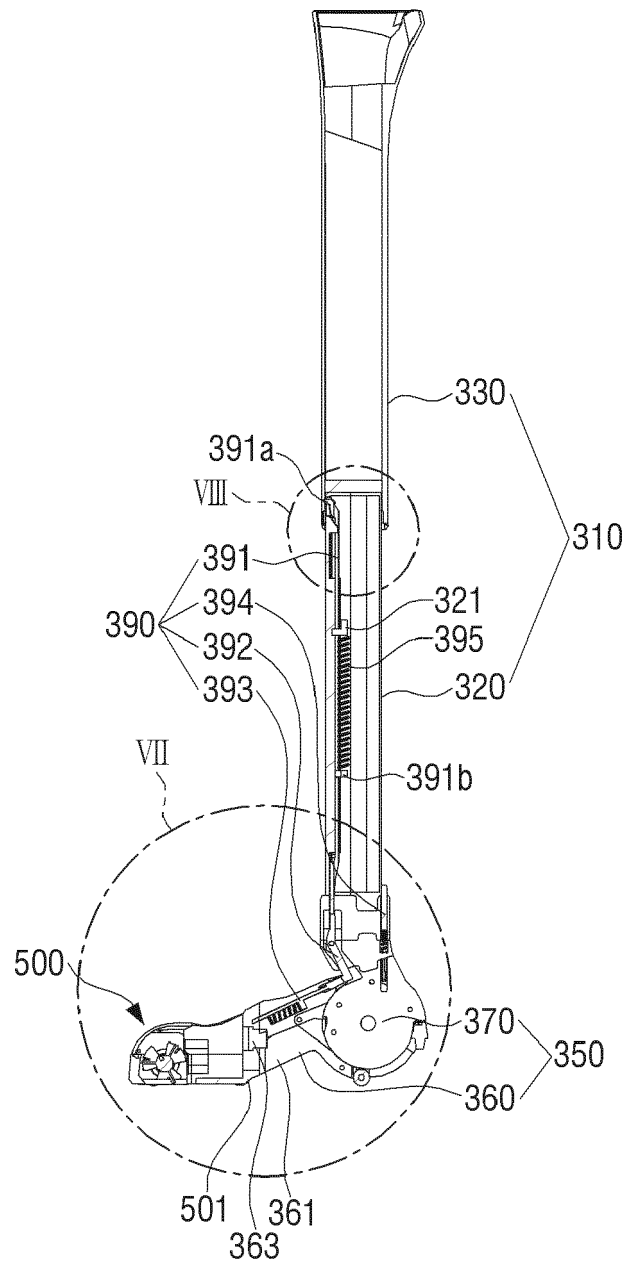


FIG. 7

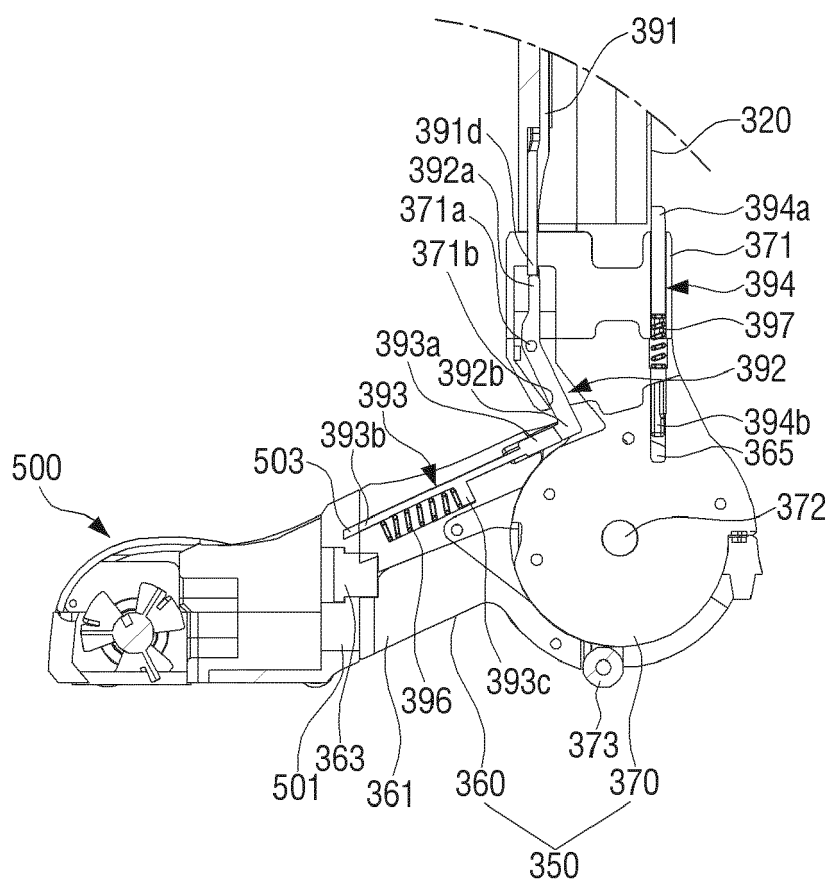


FIG. 8

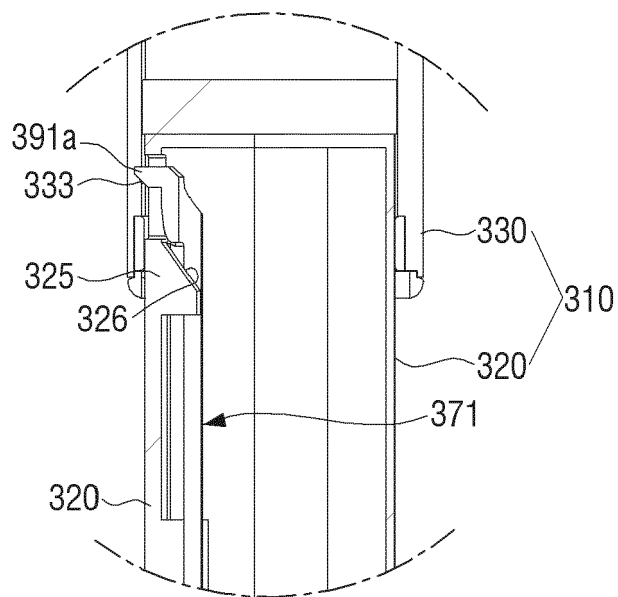


FIG. 9

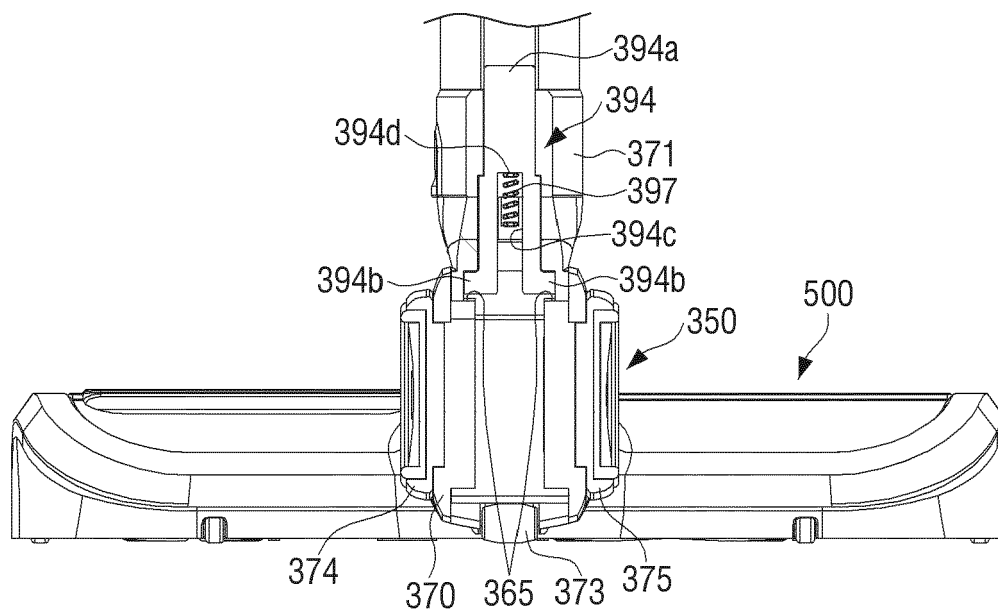


FIG. 10

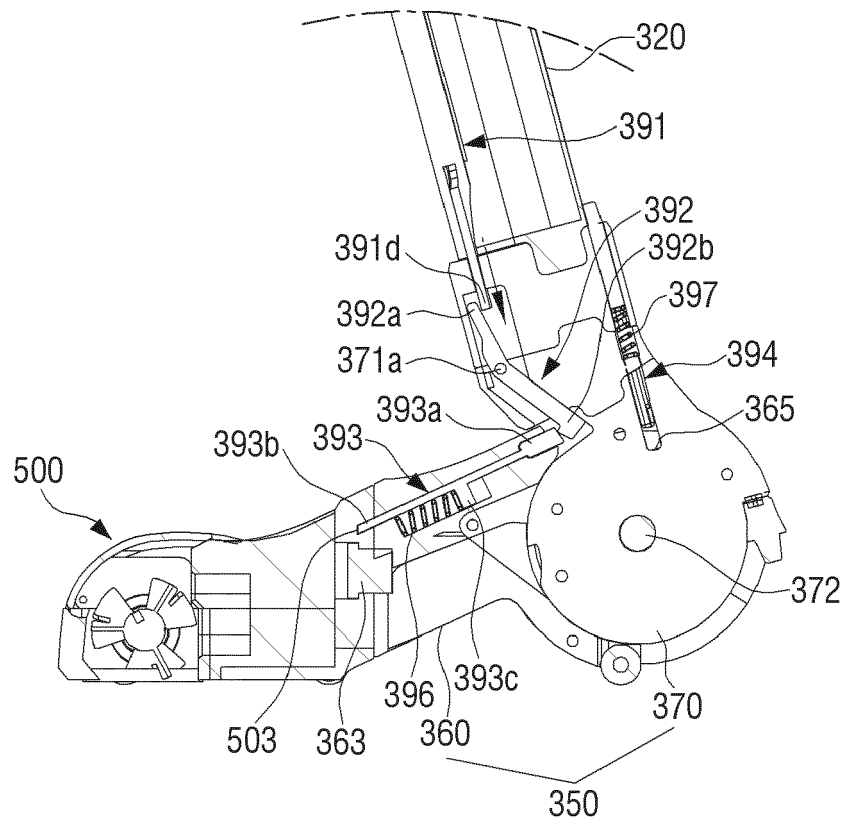


FIG. 11

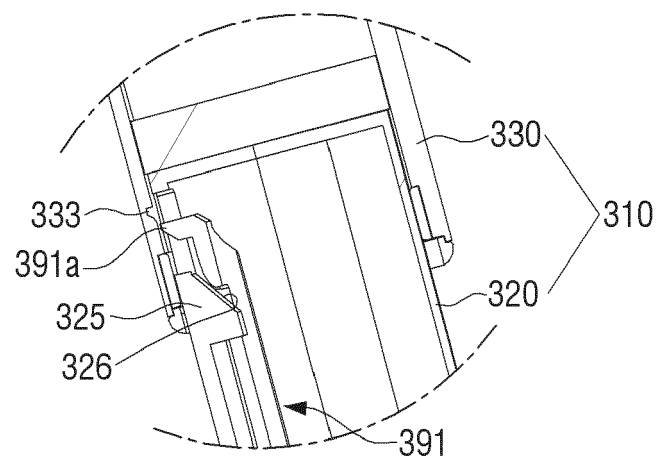


FIG. 12

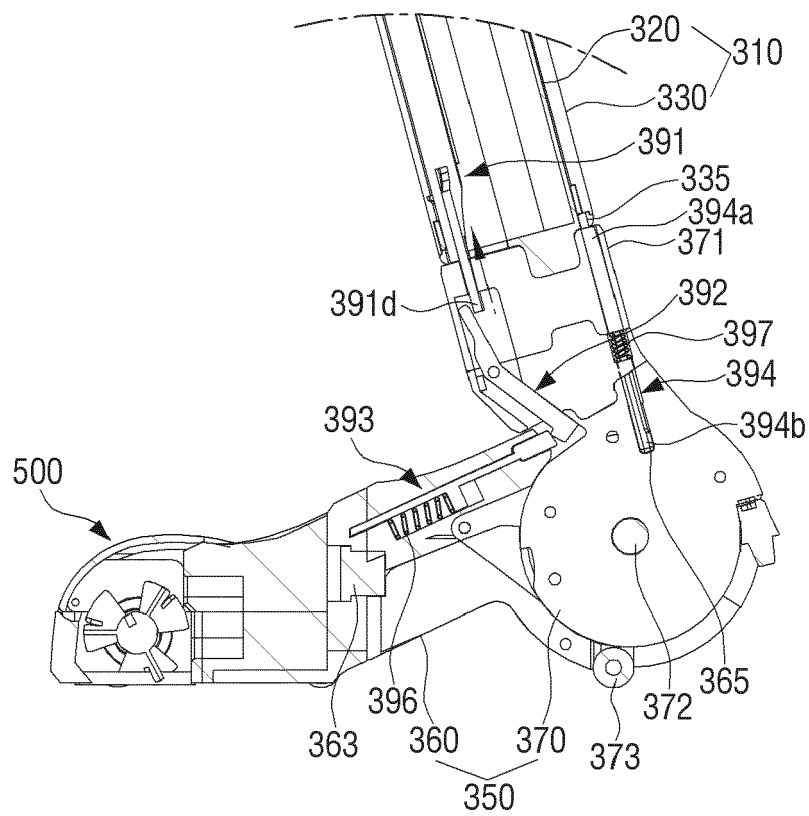


FIG. 13

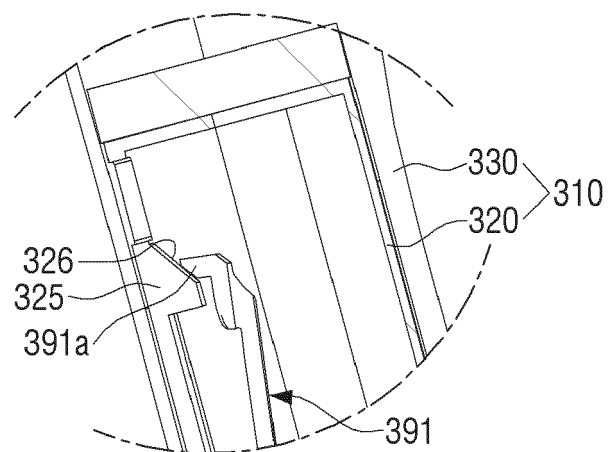


FIG. 14

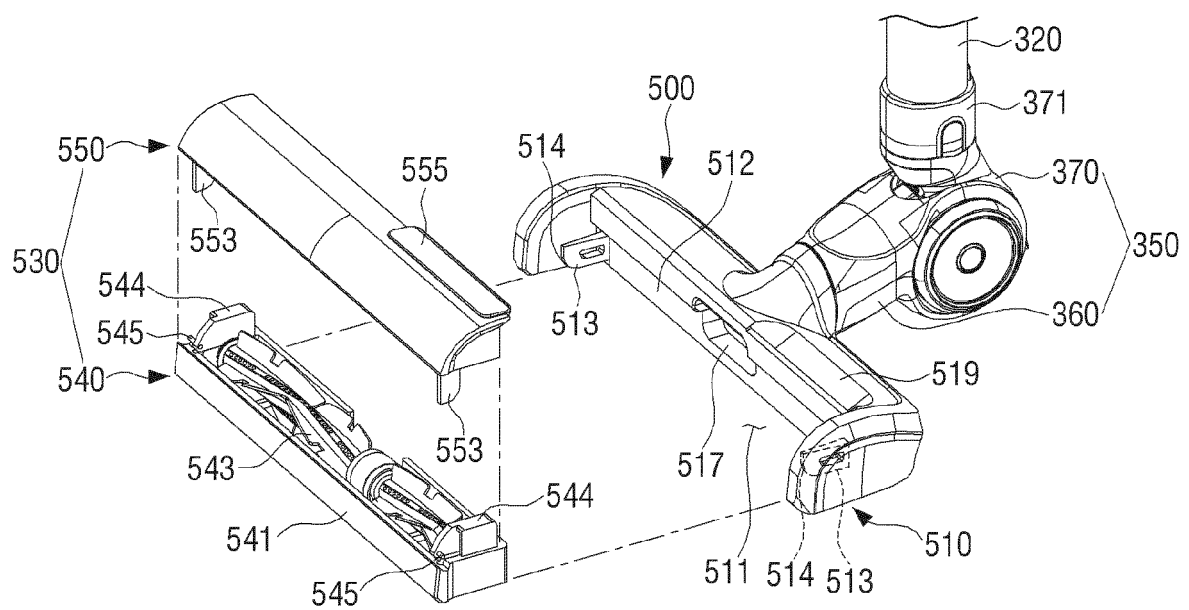


FIG. 15

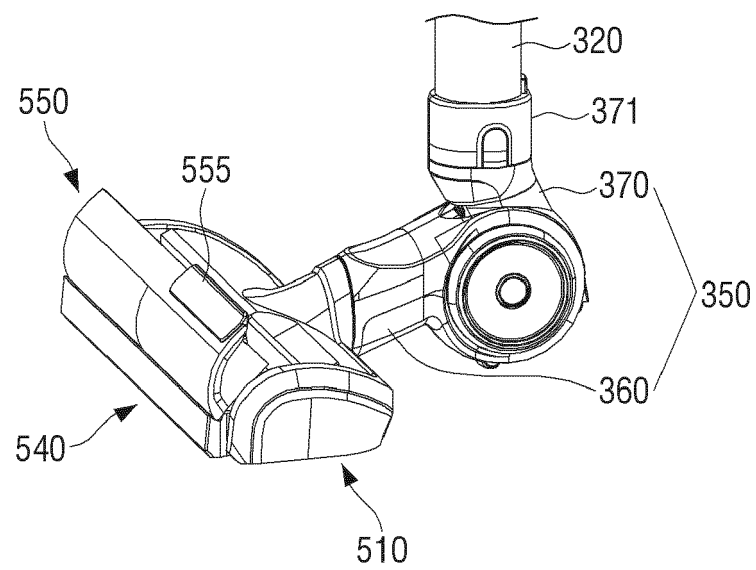


FIG. 16

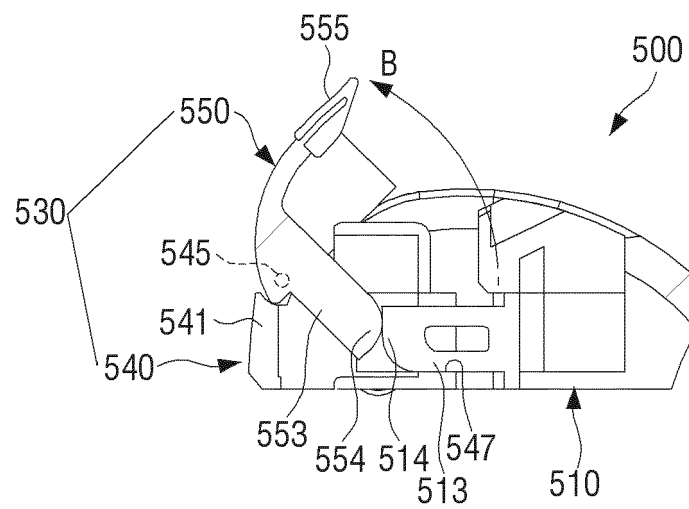
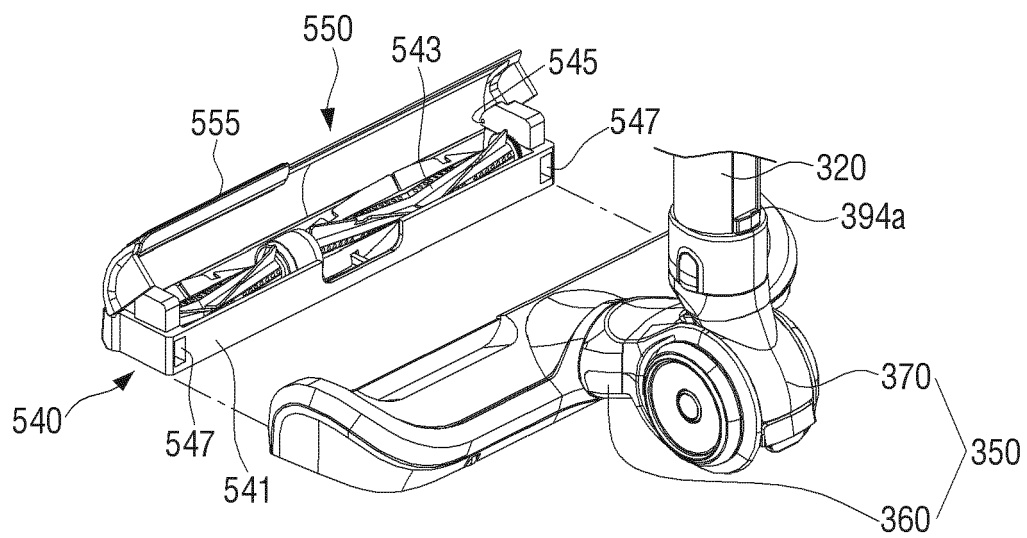


FIG. 17





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Place of search Munich		Date of completion of the search 21 January 2016	Examiner Hubrich, Klaus
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