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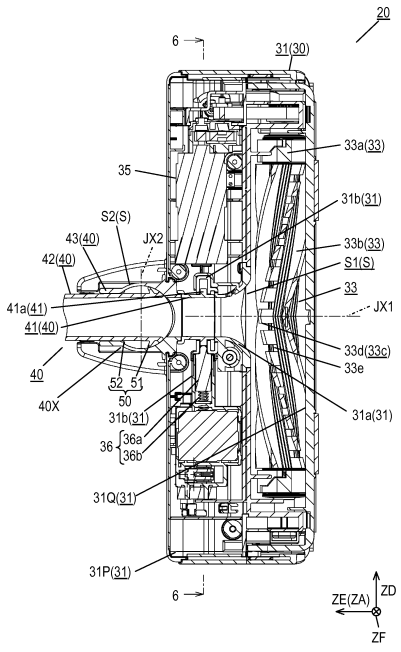
(54) STICK TYPE CLEANER

(57) A stick-shaped cleaner includes rotational structure (S) that allows suction tool (30) to rotate relative to a main body such that suction tool (30) is lengthwise along the main body, and lock mechanism (50) that locks rotation of suction tool (30) relative to the main body in a position with suction tool (30) being lengthwise along the main body. Thus, the stick-shaped cleaner that has suction tool (30) that can clean a tighter space and can be stowed in a tighter space can be provided.

FIG. 5



EP 3 427 623 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a stick-shaped cleaner that can be stowed upright.

BACKGROUND ART

[0002] A stick-shaped cleaner is generally of vertically long shape. As such, the stick-shaped cleaner can be stowed upright in a relatively tight space formed in a living space such as a living room (refer to, for example, PTL 1).
[0003] In other words, ease of stowing is an essential element of the stick-shaped cleaner. It is thus preferable that the stick-shaped cleaner be of structure that can be stowed in a tighter space.

Citation List

Patent Literature

[0004] PTL 1: Unexamined Japanese Patent Publication No. 2010-125193

SUMMARY OF THE INVENTION

[0005] A stick-shaped cleaner of the present invention includes at least a main body, a suction tool connected to the main body, a rotational structure that allows the suction tool to rotate relative to the main body such that the suction tool is lengthwise along the main body, and a lock mechanism that locks the rotation of the suction tool relative to the main body in a position with the suction tool being lengthwise along the main body.
[0006] Thus, the stick-shaped cleaner provided can easily be stowed in a tight space.

BRIEF DESCRIPTION OF DRAWINGS

[0007]

FIG. 1 is a side view of a stick-shaped cleaner according to an exemplary embodiment of the present invention.
FIG. 2 is a front view of the stick-shaped cleaner of FIG. 1.
FIG. 3 is a perspective view of a suction tool unit shown in FIG. 1.
FIG. 4 is a bottom view of the suction tool unit of FIG. 3.
FIG. 5 is a sectional view of the suction tool unit of FIG. 3.
FIG. 6 is a sectional view taken along line 6-6 of FIG. 5.
FIG. 7 is a sectional view illustrating a suction tool and a coupling pipe in a state relatively rotated from a state illustrated in FIG. 6.
FIG. 8 is a sectional view illustrating the suction tool and the coupling pipe in a state relatively rotated from the state illustrated in FIG. 7.
FIG. 9 is a sectional view taken along line 9-9 of FIG. 4
FIG. 10 is a sectional view illustrating a shutter in a state opened from a state illustrated in FIG. 9.
FIG. 11 is a front view illustrating the suction tool unit placed upright on a floor.
FIG. 12 is a side view illustrating the suction tool in a first state.
FIG. 13 is a side view illustrating the suction tool in a second state.
FIG. 14 is a side view illustrating the suction tool in a third state.
FIG. 15 is a sectional view illustrating the suction tool in an unlocked state.
FIG. 16 is an enlarged view of a lock mechanism shown in FIG. 15 and its periphery.
FIG. 17 is a sectional view illustrating the suction tool in a locked state.
FIG. 18 is an enlarged view of the lock mechanism seen in FIG. 17 and its periphery.
FIG. 19 is a front view illustrating the stick-shaped cleaner in its stowed state.

DESCRIPTION OF EMBODIMENT

[0008] An exemplary embodiment of the present invention is hereinafter described with reference to the drawings. It is to be noted that this exemplary embodiment is not restrictive of the present invention.

(Exemplary embodiment)

[0009] With reference to FIGS. 1 and 2, a description is hereinafter provided of structure of a stick-shaped cleaner (hereinafter may be abbreviated as "cleaner") according to the present exemplary embodiment.

[0010] FIG. 1 is a side view of cleaner 1 according to the present exemplary embodiment. FIG. 2 is a front view of cleaner 1 of FIG. 1.

[0011] As shown in FIG. 1, cleaner 1 of the present exemplary embodiment includes main body 10 and suction tool unit 20.

[0012] Main body 10 includes housing 11, handle 12, extension pipe 60, suction unit 70, dust collection unit 80, dust box 90, and battery unit 100. Housing 11 and extension pipe 60 are each of a slender shape. Extension pipe 60 is connected at one end to one end of housing 11. Suction tool unit 20 is connected to another end of extension pipe 60. It is to be noted that respective longitudinal directions of housing 11 and extension pipe 60 are defined by lengthwise ZA that is a longitudinal direction of cleaner 1 shown in FIG. 1. It is also to be noted that a direction perpendicular to a paper surface of FIG. 1 is defined by widthwise ZB.

[0013] Handle 12 is mounted to another end of housing 11. A user grips handle 12 to operate cleaner 1.

[0014] Housing 11 is mounted with, at its rear, suction unit 70, dust collection unit 80, dust box 90, and battery unit 100. Dust box 90, dust collection unit 80, suction unit 70, and battery unit 100 are disposed in a row in this order from extension pipe 60 along lengthwise ZA. Here suction unit 70, dust collection unit 80, dust box 90, and battery unit 100 are disposed with their respective longitudinal directions paralleling lengthwise ZA of cleaner 1.

[0015] Case 71 of suction unit 70, case 81 of dust collection unit 80, case 91 of dust box 90, and case 101 of battery unit 100 are of an approximately equal outside diameter (inclusive of cases where they are of an equal outside diameter). The above outside diameters define a maximum dimension of main body 10 along widthwise ZB (hereinafter "maximum width of main body 10").

[0016] Motor fan 72 is included in suction unit 70. Motor fan 72 generates suction power for sucking in dust. Dust collection unit 80 is formed of, for example, a centrifugal dust collector and separates the dust that is sucked by suction unit 70 from air. Dust box 90 receives the dust that is compressed by dust collection unit 80. Battery unit 100 supplies electric power to suction tool unit 20 and motor fan 72 of suction unit 70.

[0017] When cleaner 1 is viewed from its front as shown in FIG. 2, a direction orthogonal to lengthwise ZA of cleaner 1 is widthwise ZB of cleaner 1.

[0018] Housing 11 and extension pipe 60 are of an approximately equal dimension along widthwise ZB (inclusive of cases where they are of an equal dimension). Suction unit 70, dust collection unit 80, dust box 90, and battery unit 100 are of an approximately equal dimension along widthwise ZB (inclusive of cases where they are of an equal dimension). The respective dimensions of the above units along widthwise ZB are greater than the respective dimensions of housing 11 and extension pipe 60 along widthwise ZB.

[0019] Cleaner 1 of the present exemplary embodiment has the structure such as above.

[0020] With reference to FIGS. 2 to 6, a description is hereinafter provided of structure of suction tool unit 20.

[0021] FIG. 3 is a perspective view of suction tool unit 20 shown in FIG. 1. FIG. 4 is a bottom view of suction tool unit 20 of FIG. 3. FIG. 5 is a sectional view of suction tool unit 20 of FIG. 3. FIG. 6 is a sectional view taken along line 6-6 of FIG. 5.

[0022] As shown in FIGS. 3 and 4, suction tool unit 20 includes suction tool 30 and coupling pipe 40. Suction tool 30 includes case 31, shutter 32, rotating brush 33, and rollers 34. It is to be noted that as shown in FIG. 2, a dimension of suction tool 30 along longitudinal direction ZD is greater than the dimension of, for example, suction unit 70 along widthwise ZB, that is to say, the maximum width of main body 10.

[0023] As shown in FIG. 4, case 31 includes suction hole 31Q that opens at bottom face 31P. Rotating brush 33 is disposed in suction hole 31Q. Shutter 32 is provided at a front part of case 31 to be movable relative to case 31. As such, shutter 32 opens or closes the front part of case 31. As the front part of case 31 is opened, suction hole 31Q opens even at the front part of case 31 (refer to FIG. 10).

[0024] Rollers 34 are provided at a front face of shutter 32 and rotate along longitudinal direction ZD of suction tool 30. Rollers 34 enables smooth movement of suction tool 30 in cases where suction tool 30 is moved along widthwise ZB while making contact with a wall or a floor.

[0025] Rotating brush 33 includes base 33a, a plurality of first bristle brushes 33b and a plurality of second bristle brushes 33c. Base 33a is supported by case 31 to be rotatable relative to case 31. A plurality of first bristle brushes 33b and second bristle brushes 33c are implanted in a peripherally alternating manner in an outer periphery of base 33a. First bristle brushes 33b are each implanted in base 33a without gaps along a longitudinal direction of base 33a (that corresponds to longitudinal direction ZD of suction tool 30). Each of the plurality of second bristle brushes 33c includes a plurality of unit brushes 33d that are implanted at regular intervals along the longitudinal direction of base 33a. Gap 33e is thus formed between adjacent unit brushes 33d to allow air to flow smoothly. As such, with shutter 32 being open, air in front of case 31 flows into case 31 through gaps 33e. In this case, a resistance to the air that flows into is small as compared with cases where gaps 33e are not formed. Accordingly, suction tool unit 20 has increased suction power.

Consequently, dust can be collected efficiently with lower power consumption.

[0026] Coupling pipe 40 is connected to extension pipe 60 shown in FIG. 2. As shown in FIG. 5, suction tool 30 is connected so as to be rotatable relative to coupling pipe 40 about first axis JX1, which is a central axis of rotation of coupling pipe 40.

[0027] As such, cleaner 1 can assume a plurality of configurations according to how suction tool 30 is rotated. The plurality of configurations includes, for example, a first configuration, a second configuration, and a third configuration that are described below with reference to FIGS. 6 to 8 and FIGS. 13 and 19.

[0028] The first configuration has a first state that is assumed by suction tool 30, and is used when floor FL is cleaned. As shown in FIG. 2, the first state is such that longitudinal direction ZD of suction tool 30 is parallel to widthwise ZB of cleaner 1.

[0029] The second configuration has a second state that is assumed by suction tool 30 in the course of cleaner 1 switching from the first configuration to the third configuration. The second state is such that when cleaner 1 is viewed from its side as shown in FIG. 13, longitudinal direction ZD of suction tool 30 is orthogonal to lengthwise ZA of cleaner 1. As such, the second configuration is assumed in cases where floor FL of a narrow space such as between pieces of furniture is cleaned.

[0030] The third configuration has a third state that is assumed by suction tool 30, and is used when cleaner 1 is disposed in a specified storage space, such as on a stand. The third state is such that when cleaner 1 is viewed from its front as shown in FIG. 19, suction tool 30 is disposed with its longitudinal direction ZD being along lengthwise ZA of main body 10.

[0031] As shown in FIG. 5, suction tool 30 further includes nozzle motor 35 and rotation control part 36, for example. Nozzle motor 35 and rotation control part 36 are accommodated by case 31. Nozzle motor 35 is driven by electric power supplied from battery unit 100 (refer to FIG. 1) and thus causes rotating brush 33 to rotate.

[0032] Case 31 includes communicating pipe 31a and support 31b. Communicating pipe 31a is provided inside case 31 to communicate with suction hole 31Q that opens at bottom face 31P. Support 31b supports a portion of coupling pipe 40 that is inserted in case 31 such that coupling pipe 40 is rotatable relative to suction tool 30.

[0033] Coupling pipe 40 is formed of, for example, first coupling pipe 41, second coupling pipe 42, and restriction part 43. First coupling pipe 41 is disposed inside case 31 and is connected to communicating pipe 31a. First coupling pipe 41 includes flange 41a along its outer periphery. Flange 41a is accommodated by support 31b. Second coupling pipe 42 is connected to extension pipe 60 (refer to FIG. 1) to be nonrotatable relative to extension pipe 60.

[0034] Connection part 40X between first coupling pipe 41 and second coupling pipe 42 is formed of a ball joint. Connection part 40X includes, as a central axis of rotation, second axis JX2 that parallels at least widthwise ZB of cleaner 1.

[0035] Restriction part 43 is mounted to case 31 so as to partly cover connection part 40X. Restriction part 43 restricts such first coupling pipe 41 and second coupling pipe 42 so as not to rotate about the axis other than second axis JX2. Thus, first coupling pipe 41 and second coupling pipe 42 relatively rotate only about second axis JX2.

[0036] Suction tool unit 20 further includes rotational structure S. Rotational structure S allows suction tool 30 to rotate relative to main body 10 such that longitudinal direction ZD of suction tool 30 runs along lengthwise ZA (refer to FIG. 2) of main body 10.

[0037] Rotational structure S includes first rotational structure S1 and second rotational structure S2. First rotational structure S1 allows suction tool 30 to rotate relative to coupling pipe 40 about first axis JX1. Second rotational structure S2 allows suction tool 30 to rotate relative to coupling pipe 40 about second axis JX2. It is to be noted that second rotational structure S2 is formed of connection part 40X between first coupling pipe 41 and second coupling pipe 42, and restriction part 43.

[0038] When suction tool 30 is viewed from a plane of FIG. 5, first axis JX1 is disposed parallel to orthogonal direction ZE that is orthogonal to longitudinal direction ZD. Specifically, first axis JX1 is disposed, for example, in a middle of longitudinal direction ZD of suction tool 30 as well as in a middle of heightwise (thickness-wise) ZF of suction tool 30.

[0039] On the other hand, second axis JX2 is disposed parallel to widthwise ZB when main body 10 is viewed from its front as shown in FIG. 2. Second axis JX2 is disposed, for example, in the middle of heightwise ZF of suction tool 30.

[0040] Coupling pipe 40 further includes lock mechanism 50. Lock mechanism 50 locks relative rotation between first coupling pipe 41 and second coupling pipe 42. In other words, lock mechanism 50 can assume an unlocking state that enables first coupling pipe 41 and second coupling pipe 42 to relatively rotate, and a locking state that disenables first coupling pipe 41 and second coupling pipe 42 to relatively rotate.

[0041] Lock mechanism 50 includes projection 51 that is formed on second coupling pipe 42, and protrusion 52 that is formed on restriction part 43. The locking state and the unlocking state depend on whether or not projection 51 and protrusion 52 engage with each other.

[0042] Suction tool unit 20 of the present exemplary embodiment has the structure such as above.

[0043] With reference to FIGS. 6 to 8, structure and operation of first rotational structure S1 of rotational structure S in suction tool unit 20 are described below.

[0044] First, a specific description is provided of first rotational structure S1.

[0045] First rotational structure S1 is formed of rotation control part 36 including piston 36a and elastic members 36b. Rotation control part 36 controls rotation of suction tool 30 relative to coupling pipe 40 about first axis JX1. Piston 36a is disposed inside case 31 to make contact with flange 41a of first coupling pipe 41 while being movable along longitudinal direction ZD of case 31. Elastic members 36b are disposed inside case 31 so as to apply urging force that presses piston 36a against flange 41a. It is to be noted that elastic member 36b illustrated is, for example, a coil spring. Flange 41a is formed to be, for example, quadrangular.

[0046] Flange 41a has, at respective two adjacent corners of its side positioned opposite to piston 36a that makes contact with flange 41a, projections 41b that project toward support 31b.

[0047] Support 31b includes wall part 31c that is, for example, arc-shaped on its side positioned opposite to piston 36a across first axis JX1 along longitudinal direction ZD of suction tool 30.

[0048] First rotational structure S1 of rotational structure S has the structure such as above.

[0049] A description is provided next of the operation of first rotational structure S1.

[0050] First in cases where suction tool 30 is in the first state as shown in FIG. 6, top face 36aa of piston 36a of rotation control part 36 is entirely pressed against first side face 41d of flange 41a. Thus, one of projections 41b that is formed at the corner of flange 41a is pressed against wall part 31c of support 31b. As such, frictional force takes place between flange 41a and piston 36a as well as between flange 41a and wall part 31c. The frictional force acts to resist force that effects relative rotation between suction tool 30 and first coupling pipe 41. As a result, suction tool 30 is easy to maintain the first state.

[0051] In cases where next, force that rotates suction tool 30 and first coupling pipe 41 is applied, suction tool 30 and coupling pipe 40 are relatively rotated accordingly. This results in a change of position of contact between flange 41a and piston 36a. Here in cases where a rotation angle of suction tool 30 is less than a predetermined angle, urging force of elastic members 36b of rotation control part 36 acts to restore a rotational position of suction tool 30 to a rotational position of the first state. As such, even without application of turning force to suction tool 30 and coupling pipe 40 by the user, suction tool 30 is normally restored to the first state. It is to be noted that the rotation angle is an angle through which suction tool 30 is rotated from its first state. It is also to be noted that the predetermined angle is 45°.

[0052] When the rotation angle of suction tool 30 reaches the predetermined angle (45°) as shown in FIG. 7, top face 36aa of piston 36a makes contact with apex 41e of flange 41a. Thus, piston 36a is maximally pushed against elastic members 36b. As the rotation angle of suction tool 30 is increased further, following this condition, suction tool 30 and coupling pipe 40 relatively rotate. Top face 36aa of piston 36a thus comes into contact with second side face 41f of flange 41a.

[0053] When the rotation angle of suction tool 30 reaches a maximum angle as shown in FIG. 8, top face 36aa of piston 36a is entirely pressed against second side face 41f of flange 41a. It is also to be noted that the maximum angle is 90°. Suction tool 30 thus assumes the above-mentioned second state. Here another projection 41b formed at the corner of flange 41a abuts side face 36ab of piston 36a. For this reason, suction 30 and first coupling pipe 41 cannot rotate in a direction that further increases the rotation angle of suction tool 30.

[0054] In cases where the rotation angle of suction tool 30 is more than the predetermined angle (45°) but less than the maximum angle (90°), the urging force of elastic members 36b of rotation control part 36 acts to bring suction tool 30 closer to a rotational position of the second state. As such, even without application of turning force to suction tool 30 and coupling pipe 40, suction tool 30 is rotated to the second state. Consequently, enhanced ease of use is obtained.

[0055] In the manner described above, first rotational structure S1 of rotational structure S operates.

[0056] With reference to FIGS. 9 to 11 and FIG. 19, a description is hereinafter provided of operation of cleaner 1.

[0057] In cases where cleaner 1 assuming the first configuration is used first to clean floor FL as shown in FIG. 9, the front part of case 31 is closed by shutter 32 of suction tool 30.

[0058] As cleaner 1 accesses wall surface WS as shown in FIG. 10, following the above condition, shutter 32 is pressed against wall surface WS. Accordingly, shutter 32 moves to turn rearward relative to case 31 while raising its front, thus opening the front part of case 31. As such, air flows into case 31 even at the front part of case 31. Consequently, suction of dust in corner C formed by floor FL and wall surface WS is facilitated.

[0059] In cases where cleaner 1 is used to clean a narrow space such as between pieces of furniture, cleaner 1 is switched to the second configuration as shown in FIG. 11.

[0060] In the second configuration, shutter 32 of suction tool 30 is pressed first against floor FL. In this case, shutter 32 moves relative to case 31 as in the case of the first configuration, whereby the front part of case 31 is opened. As such, air flows into case 31 even at the front part of case 31. Consequently, suction of dust that is present on floor FL of the space between the pieces of furniture is facilitated.

[0061] In cases where cleaner 1 is disposed, for example, in a specified storage space, such as on a stand, cleaner 1 is switched to the third configuration as shown in FIG. 19.

[0062] In the third configuration, suction tool 30 is disposed with its longitudinal direction ZD being along lengthwise ZA of main body 10 when cleaner 1 is viewed from its front. The dimension of suction tool 30 along longitudinal direction ZD thus becomes less than a dimension of cleaner 1 along widthwise ZB in the first configuration. As such, cleaner 1

can be stowed in a tighter space. In addition, a dimension of suction tool 30 along heightwise ZF is less than the maximum width of main body 10. As such, cleaner 1 can be stowed in a space that is even tighter.

[0063] In the manner described above, cleaner 1 operates.

[0064] With reference to FIGS. 12 to 14, a description is hereinafter provided of a procedure for switching cleaner 1 from the first configuration to the third configuration.

[0065] As shown in FIG. 12, suction tool 30 that assumes the first state in the first configuration as indicated by a dotted line is rotated first about second axis JX2 in rotation direction R that is shown in the drawing. Suction tool 30 here is rotated until its orthogonal direction ZE (refer to FIG. 5) parallels lengthwise ZA of main body 10.

[0066] Next, suction tool 30 is rotated about first axis JX1 in rotation direction W1 that is shown in FIG. 12. Suction tool 30 thus assumes the second state as shown in FIG. 13.

[0067] Next, suction tool 30 is rotated about second axis JX2 in rotation direction R1 that is shown in FIG. 13. Suction tool 30 here is rotated until its longitudinal direction ZD runs along lengthwise ZA of main body 10 as shown in FIG. 14. Suction tool 30 thus assumes the third state illustrated in FIG. 19.

[0068] Through the above operation, cleaner 1 is switched from the first configuration to the third configuration.

[0069] The states of lock mechanism 50 are hereinafter described correspondingly to the above configurations of suction tool 30.

[0070] With reference to FIGS. 15 and 16, a description is provided first of the state of lock mechanism 50 in the course of switching of suction tool 30 from the second state to the third state.

[0071] FIG. 15 illustrates a relationship between suction tool 30 and coupling pipe 40 in the course of the switching of suction tool 30 from the second state to the third state. FIG. 16 is an enlarged view illustrating the state of lock mechanism 50 in this condition.

[0072] As shown in FIGS. 15 and 16, in the course of the switching of suction tool 30 from the second state to the third state, protrusion 52 and projection 51 of lock mechanism 50 do not come into engagement with each other. As such, gap G is formed between end 41c of first coupling pipe 41 and outer peripheral surface 42a of second coupling pipe 42. Lock mechanism 50 is thus maintained in the unlocking state.

[0073] With reference to FIGS. 17 and 18, a description is provided next of the state of lock mechanism 50 when suction tool 30 is in the third state.

[0074] FIG. 17 illustrates a relationship between suction tool 30 and coupling pipe 40 when suction tool 30 assumes the third state. FIG. 18 is an enlarged view illustrating the state of lock mechanism 50 in this condition.

[0075] When suction tool 30 is in the third state, protrusion 52 and projection 51 of lock mechanism 50 are in engagement with each other as shown in FIGS. 17 and 18. In this way, suction tool 30 and coupling pipe 40 are restricted from rotating about second axis JX2 in one direction.

[0076] In the above condition, end 41c of first coupling pipe 41 and outer peripheral surface 42a of second coupling pipe 42 make contact with each other. As such, suction tool 30 and coupling pipe 40 are restricted from rotating about second axis JX2 even in another direction.

[0077] Suction tool 30 is thus locked by lock mechanism 50.

[0078] For this reason, in cases where cleaner 1 is stowed, for example, on a stand with suction tool 30 in the locked state, suction tool 30 does not rotate relative to main body 10 even if cleaner 1 is moved. Thus, improved ease of work is achieved when cleaner 1 is stowed.

(Modifications)

[0079] The configurations described in the above exemplary embodiment are examples that can be assumed by the stick-shaped cleaner; however, the above exemplary embodiment is not limiting.

[0080] In other words, the stick-shaped cleaner of the present exemplary embodiment can include, in addition to the above exemplary embodiment, the exemplary embodiment's modifications such as described below and any mode resulting from a combination of at least two modifications that are mutually consistent.

[0081] Specifically, while suction tool 30 is disposed in the position that reduces the maximum width of cleaner 1 in the example of FIG. 19, this disposition is not limiting. For example, suction tool 30 may be disposed below dust box 90 at a rear of main body 10. Even in this case, the maximum width of cleaner 1 can be reduced as in the case where the suction tool is disposed as shown in FIG. 19.

[0082] Moreover, the lock mechanism that locks suction tool 30 can be modified into any structure of choice. For example, cleaner 1 may structurally include, in place of lock mechanism 50, a lock mechanism that fixes suction tool 30 to extension pipe 60 when suction tool 30 is in the third state. The above lock mechanism may structurally fix suction tool 30 through use of, for example, magnetic force between a magnet provided to suction tool 30 and a magnet provided to extension pipe 60. Suction tool 30 may be fixed by interfitting of respective parts of suction tool 30 and extension pipe 60.

[0083] As described above, the stick-shaped cleaner of the present invention includes the rotational structure that allows the suction tool to rotate relative to the main body such that the suction tool is lengthwise along the main body,

and the lock mechanism that locks the rotation of the suction tool relative to the main body in the position with the suction tool being lengthwise along the main body.

[0084] According to this structure, with the longitudinal direction of the suction tool being along the lengthwise of the main body, the stick-shaped cleaner has its dimension reduced along its widthwise when viewed from in a front view of the main body. Thus, the stick-shaped cleaner can be stowed in a tighter space. In the above condition, the rotation of the suction tool can be locked by the lock mechanism. Thus, improved ease of work is achieved when the stick-shaped cleaner is stowed.

[0085] The stick-shaped cleaner of the present invention may be of such structure that with the suction tool being lengthwise along the main body, the height of the suction tool is equal to or less than the maximum width of the main body. Thus, the cleaner can be stowed in a space that is even tighter.

[0086] In the stick-shaped cleaner of the present invention, the rotational structure may include the first rotational structure that allows the suction tool to rotate about the first axis that is heightwise and lengthwise orthogonal to the suction tool, and the second rotational structure that allows the suction tool to rotate about the second axis that is lengthwise orthogonal to the main body when the main body is viewed from in the front view of the main body. Thus, suction of dust that is present on floor FL of a space such as between pieces of furniture is facilitated.

[0087] The stick-shaped cleaner of the present invention may further include the rotation control part that applies, in cases where the first state is such that the suction tool is lengthwise along the second axis, while the second state is such that the suction tool is lengthwise orthogonal to the second axis, force to the suction tool to bring the rotational position of the suction tool closer to the rotational position of the first state when the suction tool is rotated from the first state through an angle that is less than the predetermined angle, and applies force to the suction tool to bring the rotational position of the suction tool closer to the rotational state of the second state when the suction tool is rotated through an angle that is not less than the predetermined angle. Thus, even without application of turning force to the suction tool and the coupling pipe by the user, the suction tool can be restored to the first state with ease.

INDUSTRIAL APPLICABILITY

[0088] The present invention is applicable to various stick-shaped cleaners such as those for home use and those for business use.

REFERENCE MARKS IN THE DRAWINGS

[0089]

1	cleaner (stick-shaped cleaner)
10	main body
11	housing
12	handle
20	suction tool unit
30	suction tool
31, 71, 81, 91, 101	case
31a	communicating pipe
31b	support
31c	wall part
31P	bottom face
31Q	suction hole
32	shutter
33	rotating brush
33a	base
33b	first bristle brush
33c	second bristle brush
33d	unit brush
33e, G	gap
34	roller
35	nozzle motor
36	rotation control part
36a	piston
36aa	top face
36ab	side face

36b	elastic member
40	coupling pipe
40X	connection part
41	first coupling pipe
41a	flange
41b	projection
41c	end
41d	first side face
41e	apex
41f	second side face
42	second coupling pipe
42a	outer peripheral surface
43	restriction part
50	lock mechanism
51	projection
52	protrusion
60	extension pipe
70	suction unit
72	motor fan
80	dust collection unit
90	dust box
100	battery unit
FL	floor
R, R1, W1	rotation direction
S	rotational structure
S1	first rotational structure
S2	second rotational structure
JX1	first axis
JX2	second axis
ZA	lengthwise (longitudinal direction of main body)
ZB	widthwise
ZD	longitudinal direction
ZE	orthogonal direction
ZF	heightwise
WS	wall surface
C	corner

Claims

1. A stick-shaped cleaner comprising:

a rotational structure that allows a suction tool to rotate relative to a main body such that the suction tool is lengthwise along the main body; and
a lock mechanism that locks the rotation of the suction tool relative to the main body in a position with the suction tool being lengthwise along the main body.

2. The stick-shaped cleaner according to claim 1, wherein with the suction tool being lengthwise along the main body, a height of the suction tool is not longer than a maximum width of the main body.

3. The stick-shaped cleaner according to claim 1 or 2, wherein the rotational structure includes:

a first rotational structure that allows the suction tool to rotate about a first axis that is heightwise and lengthwise orthogonal to the suction tool; and
a second rotational structure that allows the suction tool to rotate about a second axis that is lengthwise orthogonal to the main body when the main body is viewed from in a front view of the main body.

4. The stick-shaped cleaner according to claim 3, further comprising a rotation control part that applies, in cases where

a first state is such that the suction tool is lengthwise along the second axis, while a second state is such that the suction tool is lengthwise orthogonal to the second axis, force to the suction tool to bring a rotational position of the suction tool closer to a rotational position of the first state when the suction tool is rotated from the first state through an angle that is less than a predetermined angle, and

applies force to the suction tool to bring a rotational position of the suction tool closer to a rotational position of the second state when the suction tool is rotated through an angle that is not less than the predetermined angle.

FIG. 1

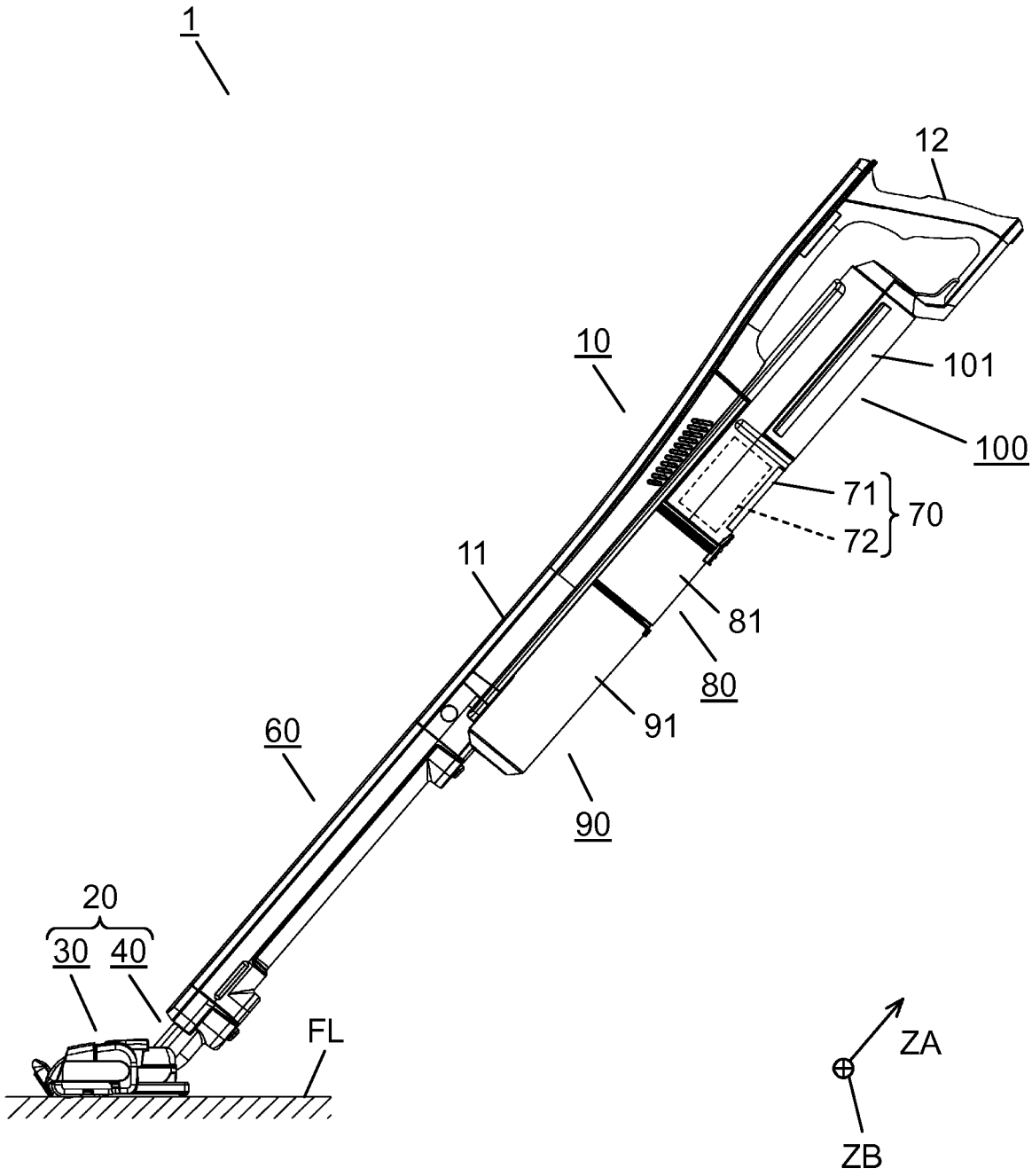


FIG. 2

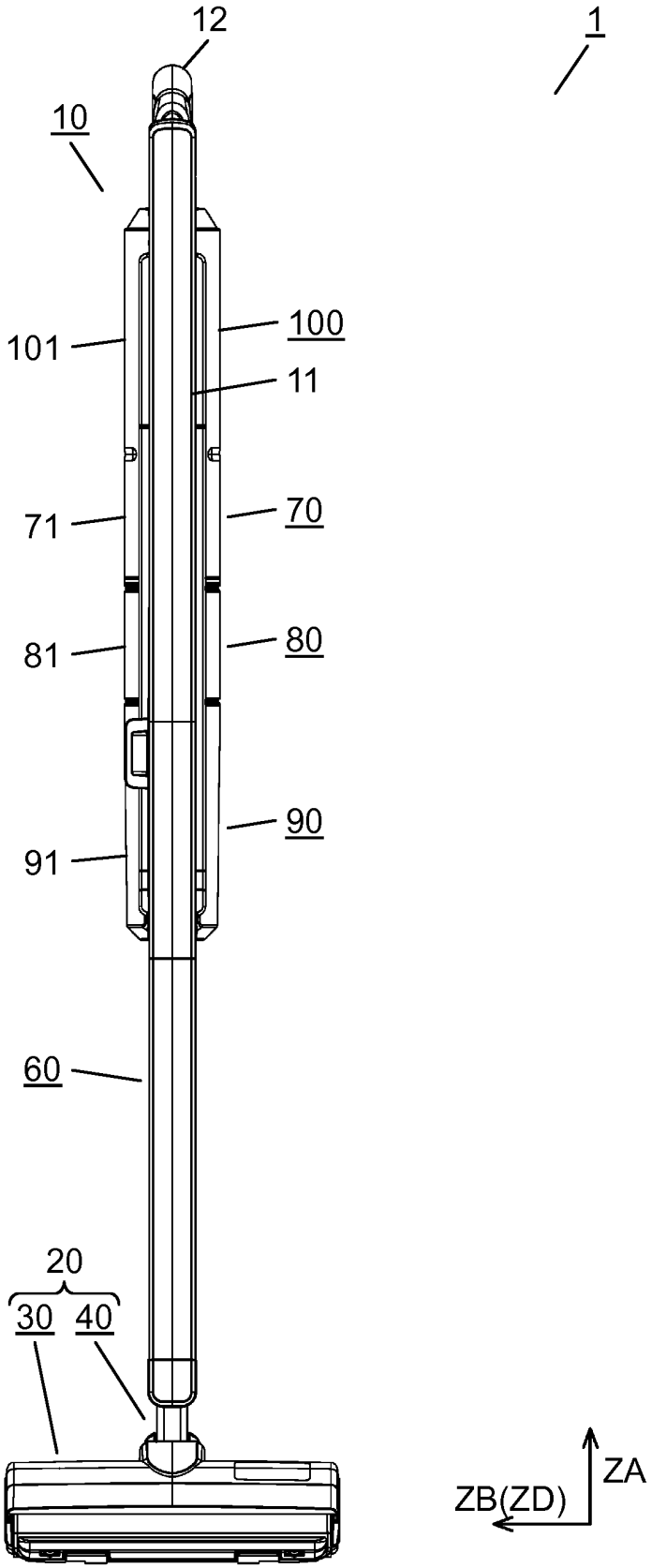


FIG. 3

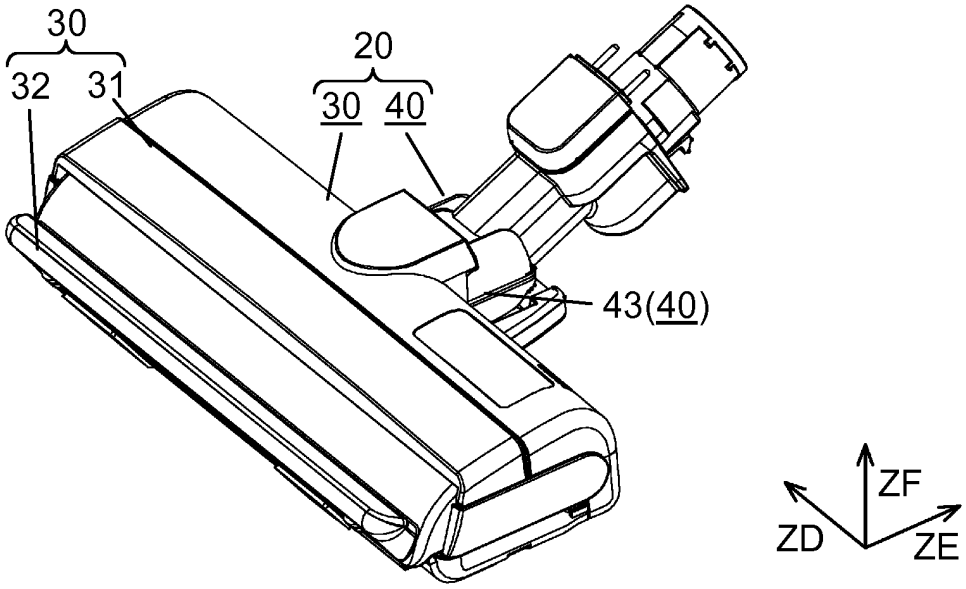

30
32
31
20
30
40
43(40)
ZF
ZD
ZE

FIG. 4

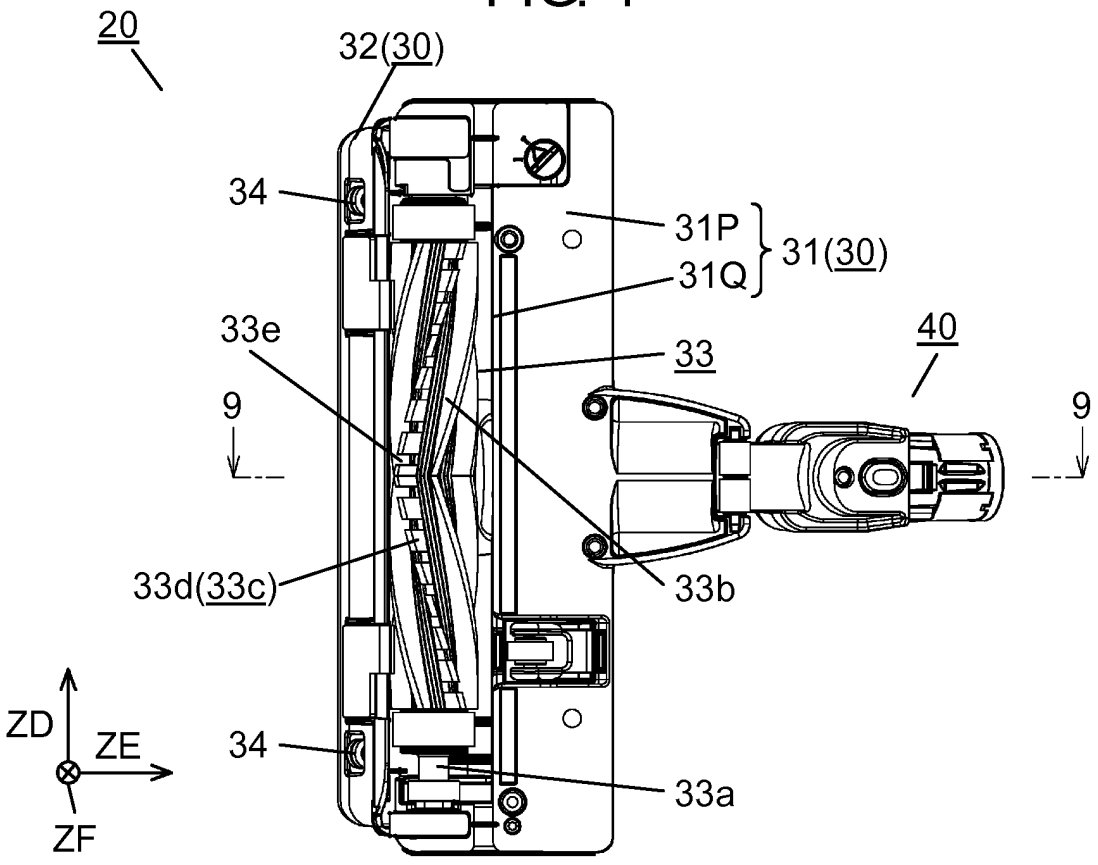

20
32(30)
34
31P
31Q
31(30)
33e
33
40
9
9
33d(33c)
33b
ZD
ZE
ZF
34
33a

FIG. 5

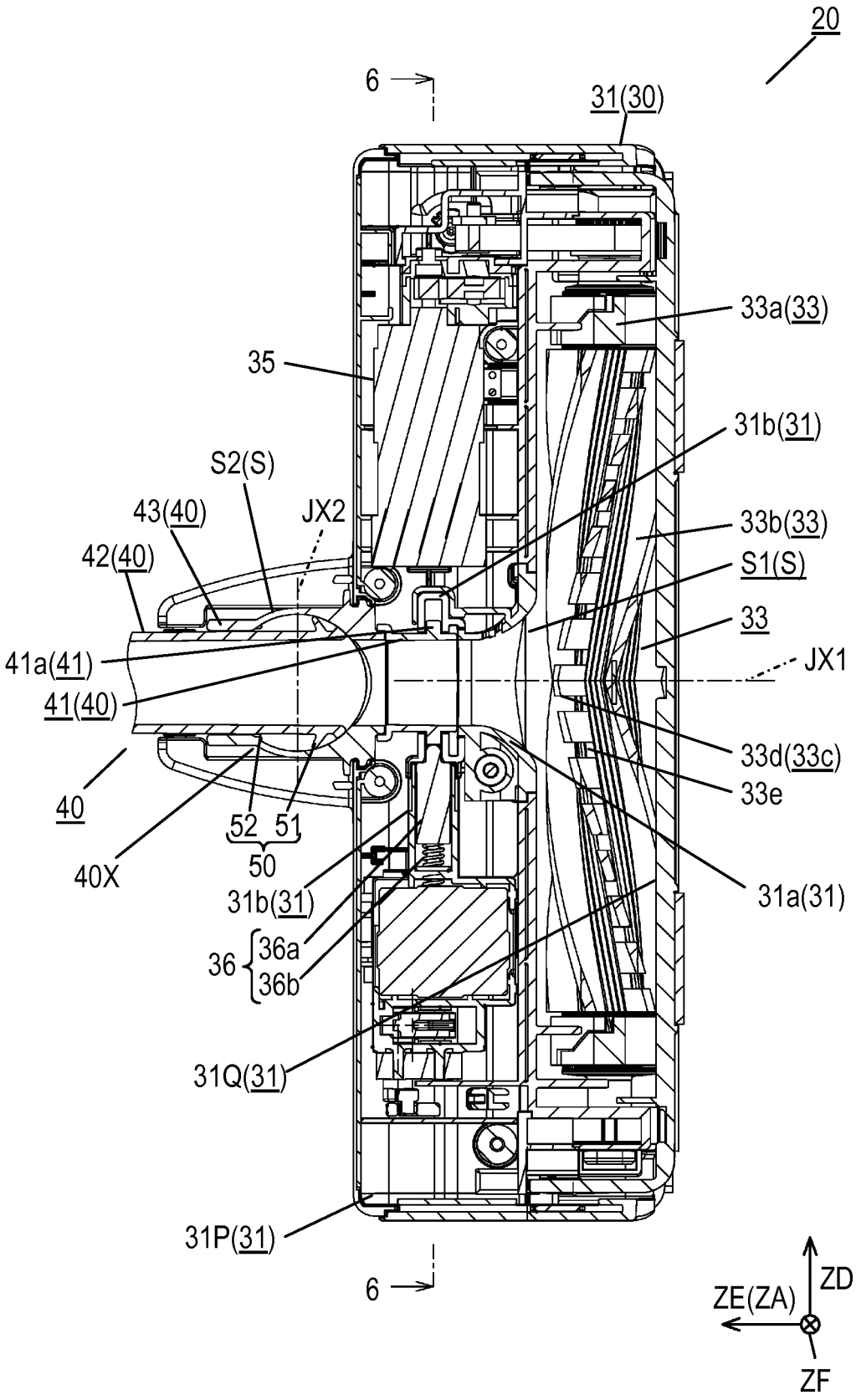

20
6
31(30)
33a(33)
35
31b(31)
S2(S)
43(40)
JX2
33b(33)
42(40)
S1(S)
33
41a(41)
JX1
41(40)
33d(33c)
33e
40
52
51
50
40X
31a(31)
31b(31)
36
36a
36b
31Q(31)
31P(31)
6
ZD
ZE(ZA)
ZF

FIG. 6

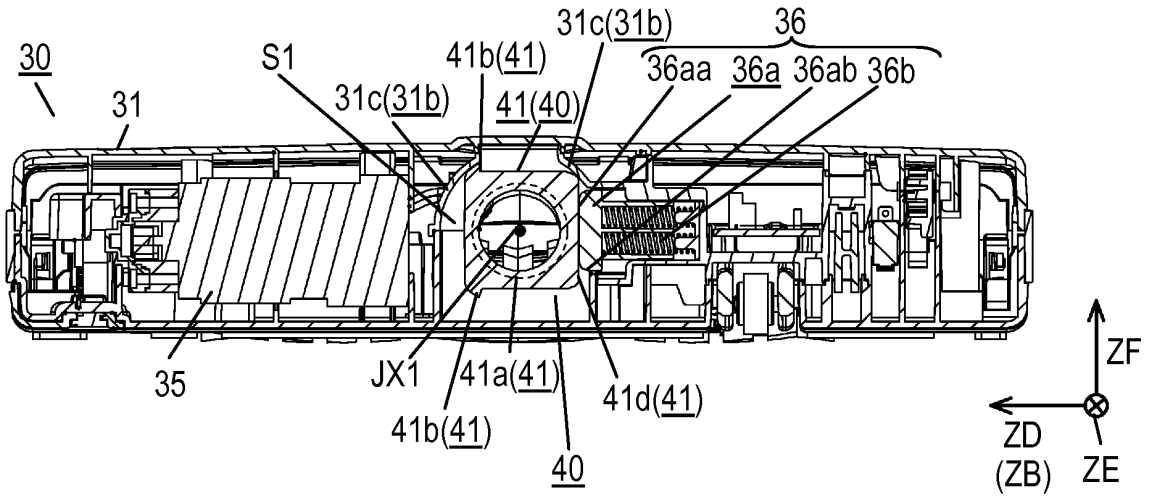


FIG. 7

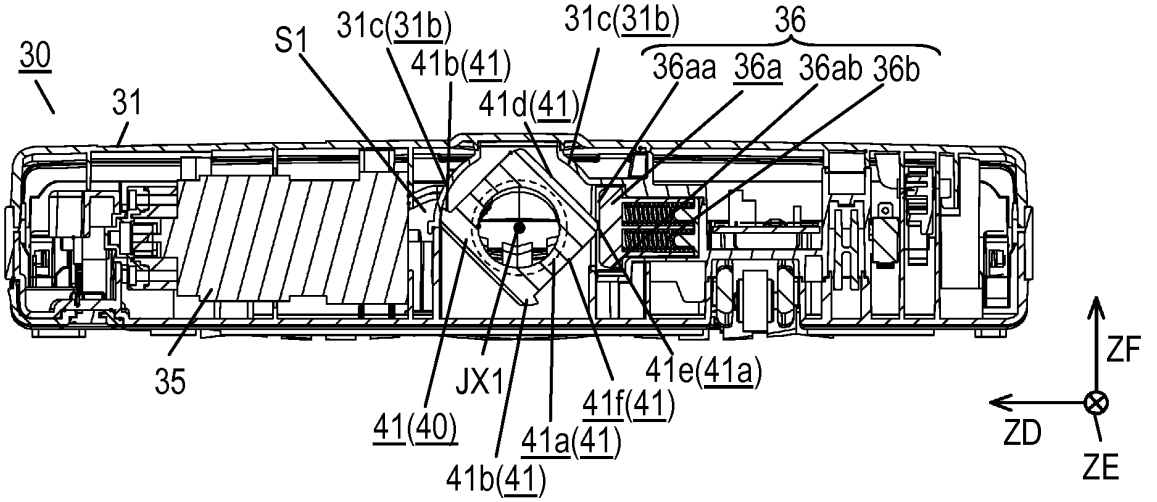


FIG. 8

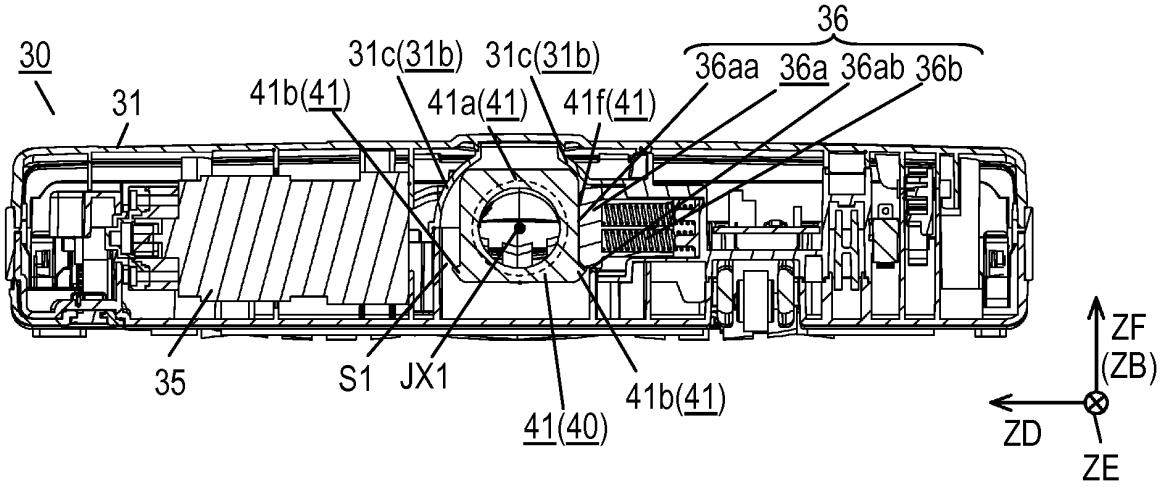


FIG. 9

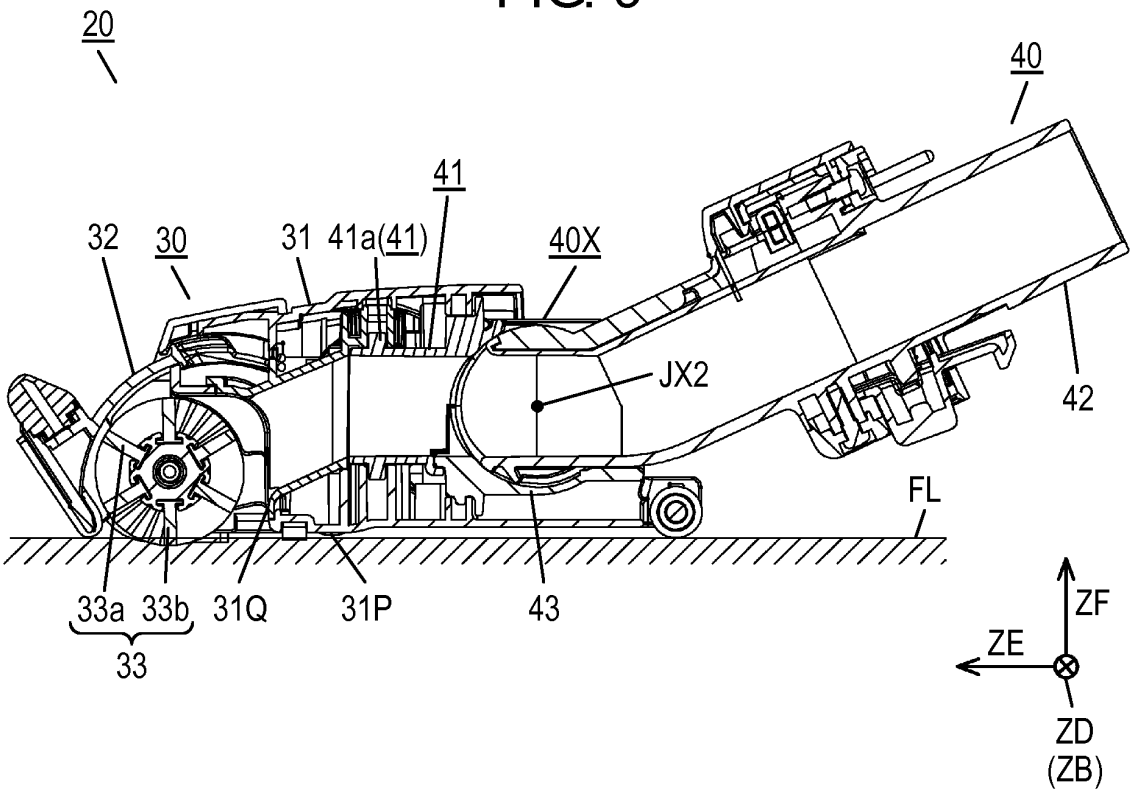

20
40
41
32
30
31
41a(41)
40X
JX2
42
FL
33a
33b
31Q
31P
43
33
ZF
ZE
ZD
(ZB)

FIG. 10

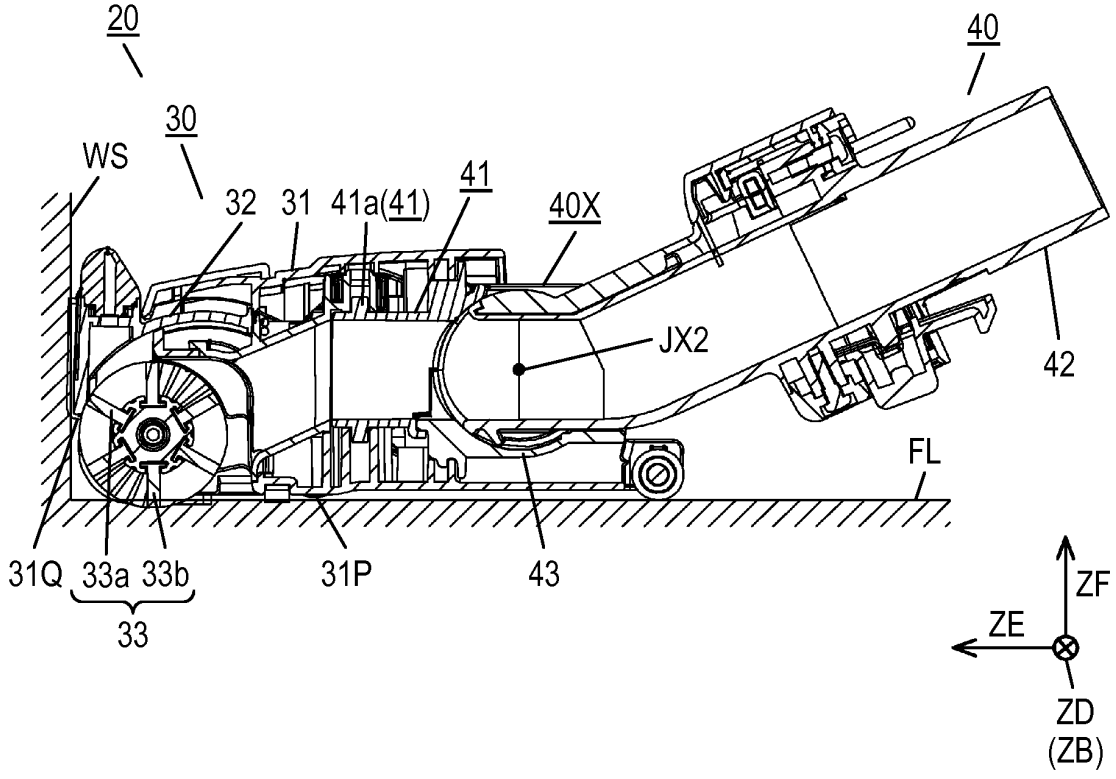

20
40
30
WS
32
31
41a(41)
41
40X
JX2
42
FL
31Q
33a
33b
31P
43
33
ZF
ZE
ZD
(ZB)

FIG. 11

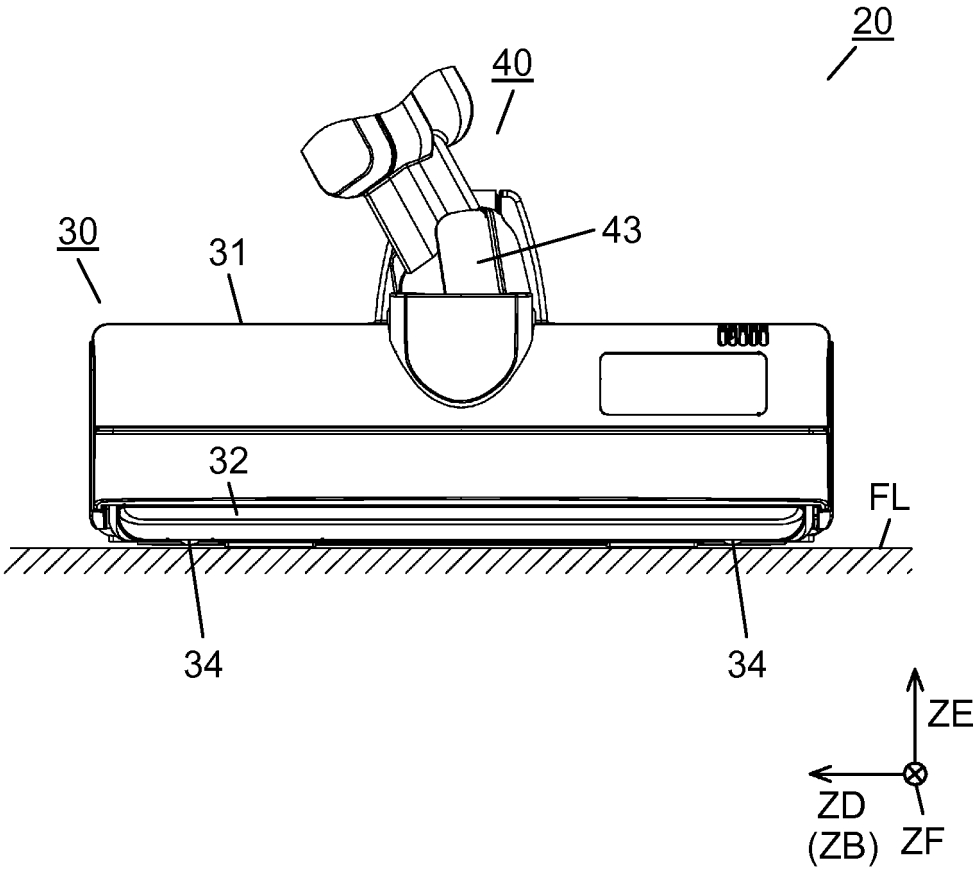


FIG. 12

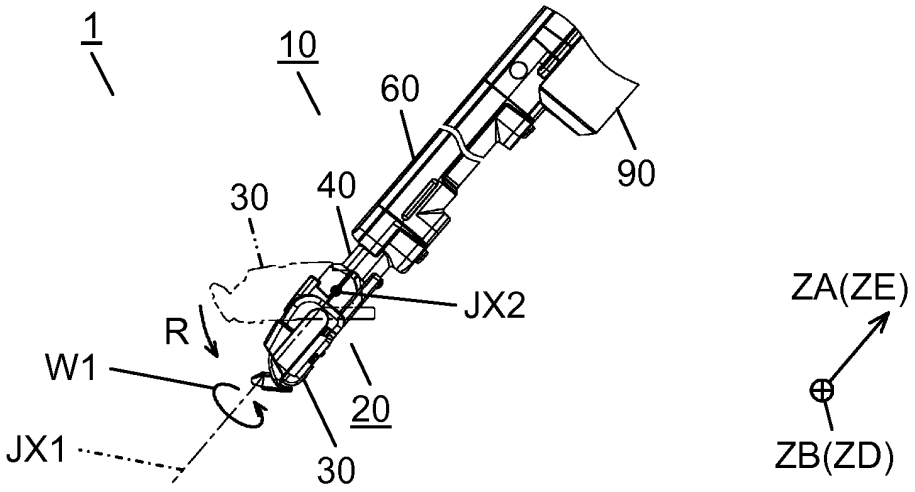


FIG. 13

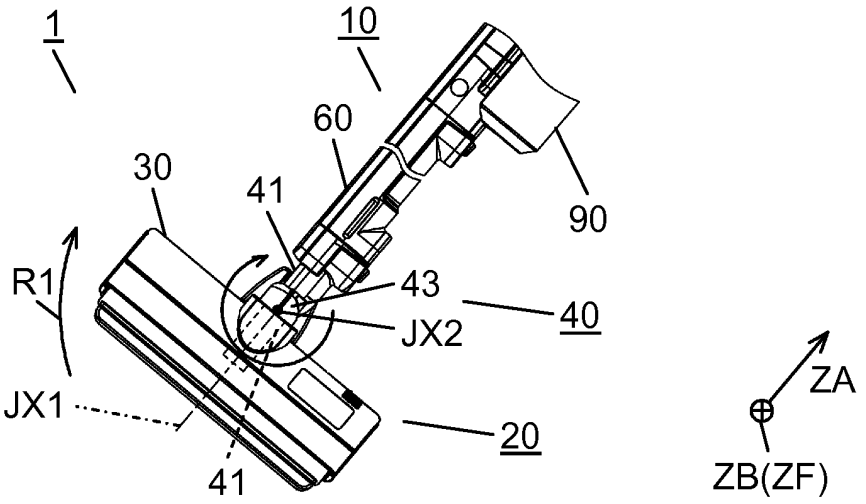


FIG. 14

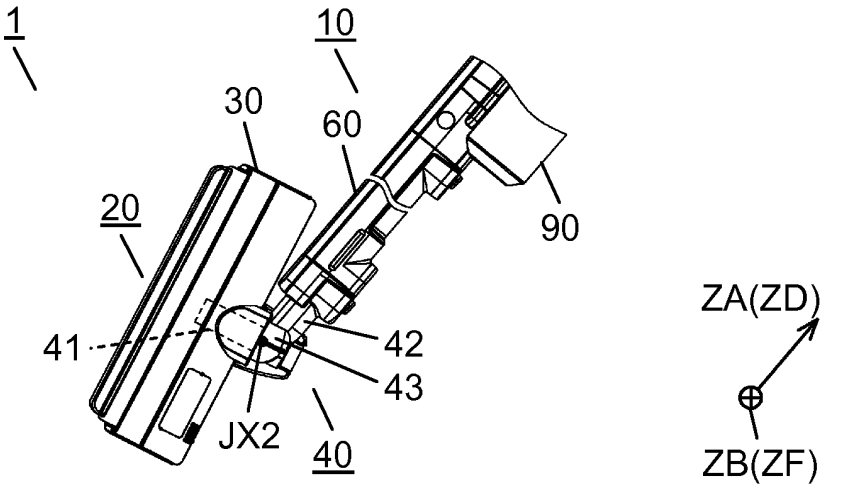


FIG. 15

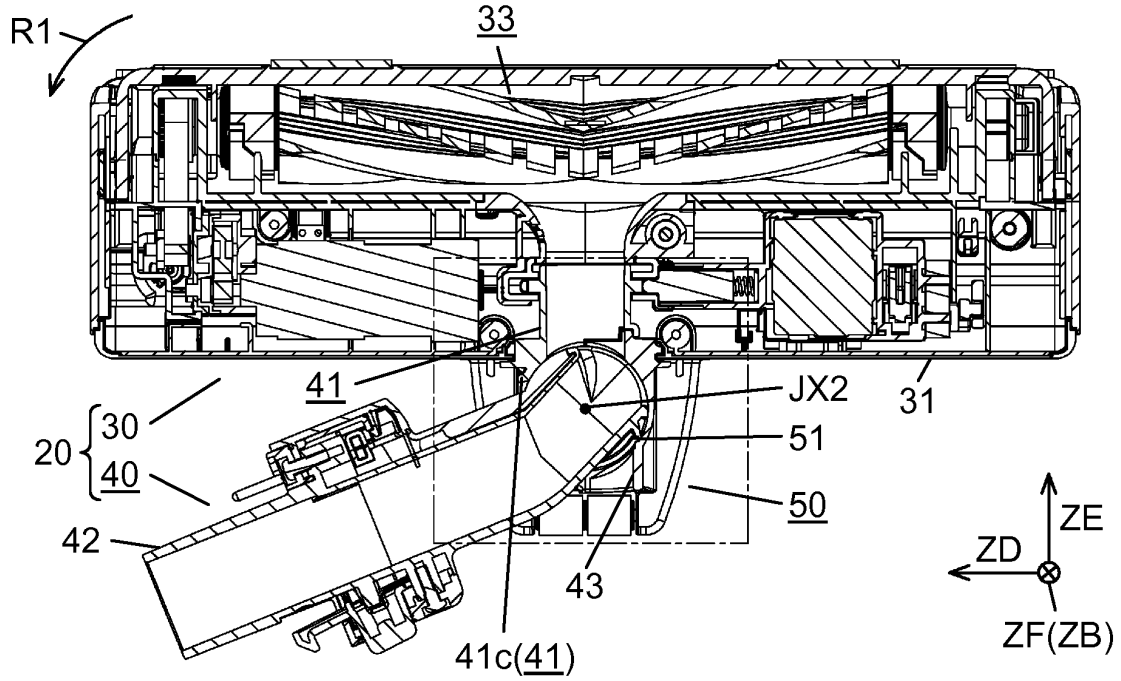

R1
33
41
JX2
31
20
30
40
51
50
42
43
41c(41)
ZE
ZD
ZF(ZB)

FIG. 16

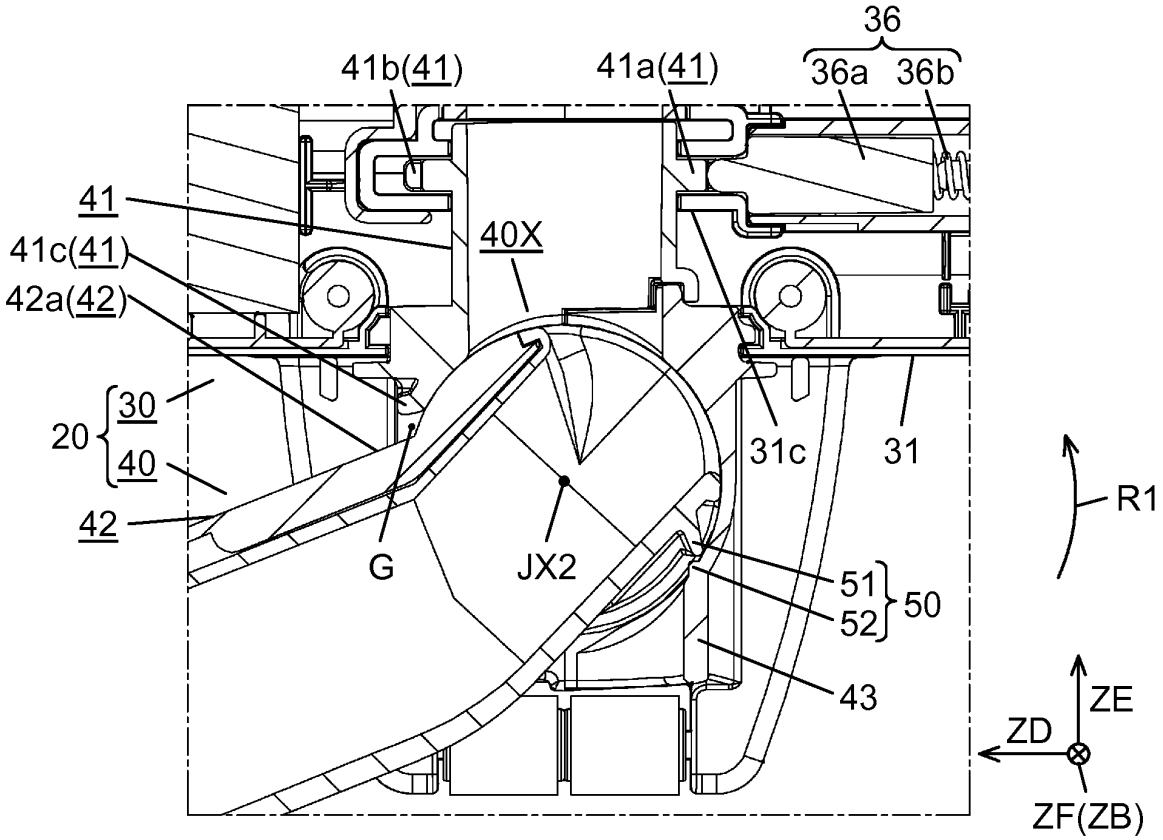

36
41b(41)
41a(41)
36a
36b
41
40X
41c(41)
42a(42)
20
30
40
42
G
JX2
31c
31
R1
51
52
50
43
ZE
ZD
ZF(ZB)

FIG. 17

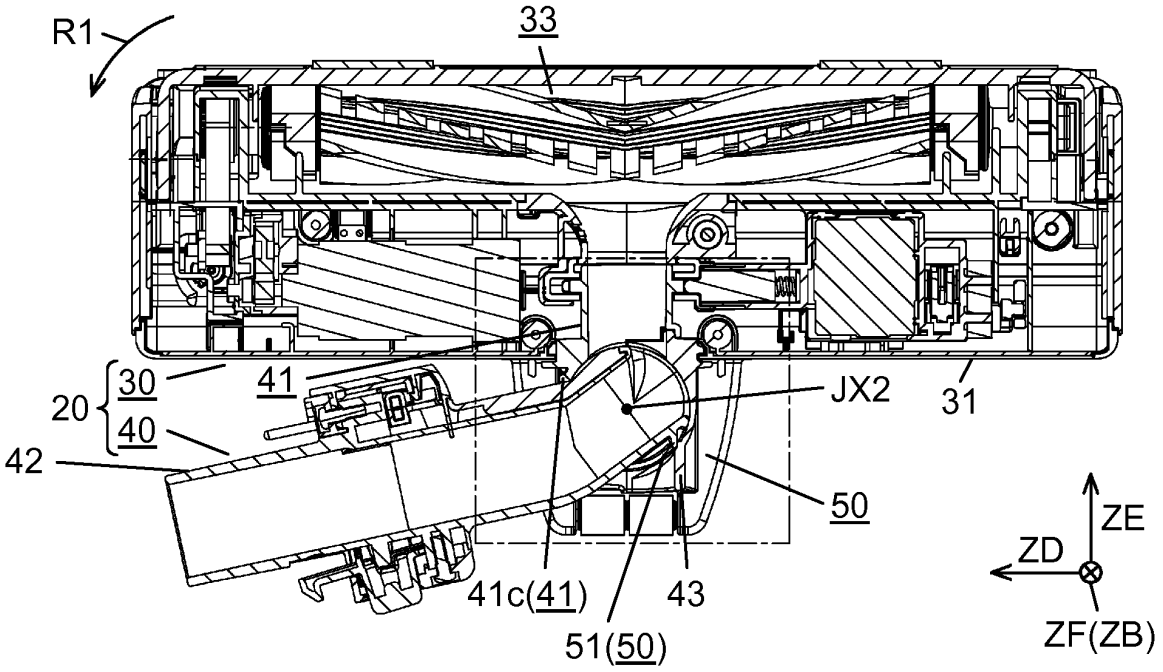

R1
33
20
30
40
41
42
JX2
31
50
41c(41)
43
51(50)
ZE
ZD
ZF(ZB)

FIG. 18

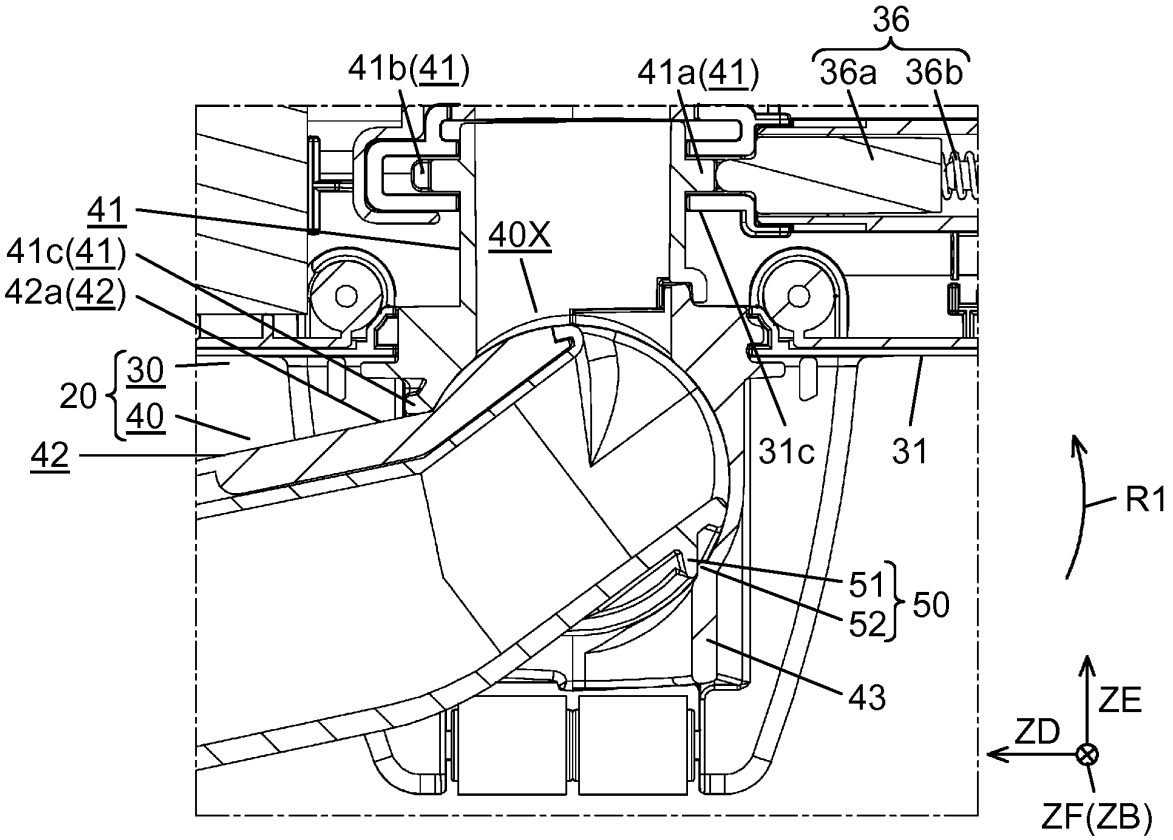
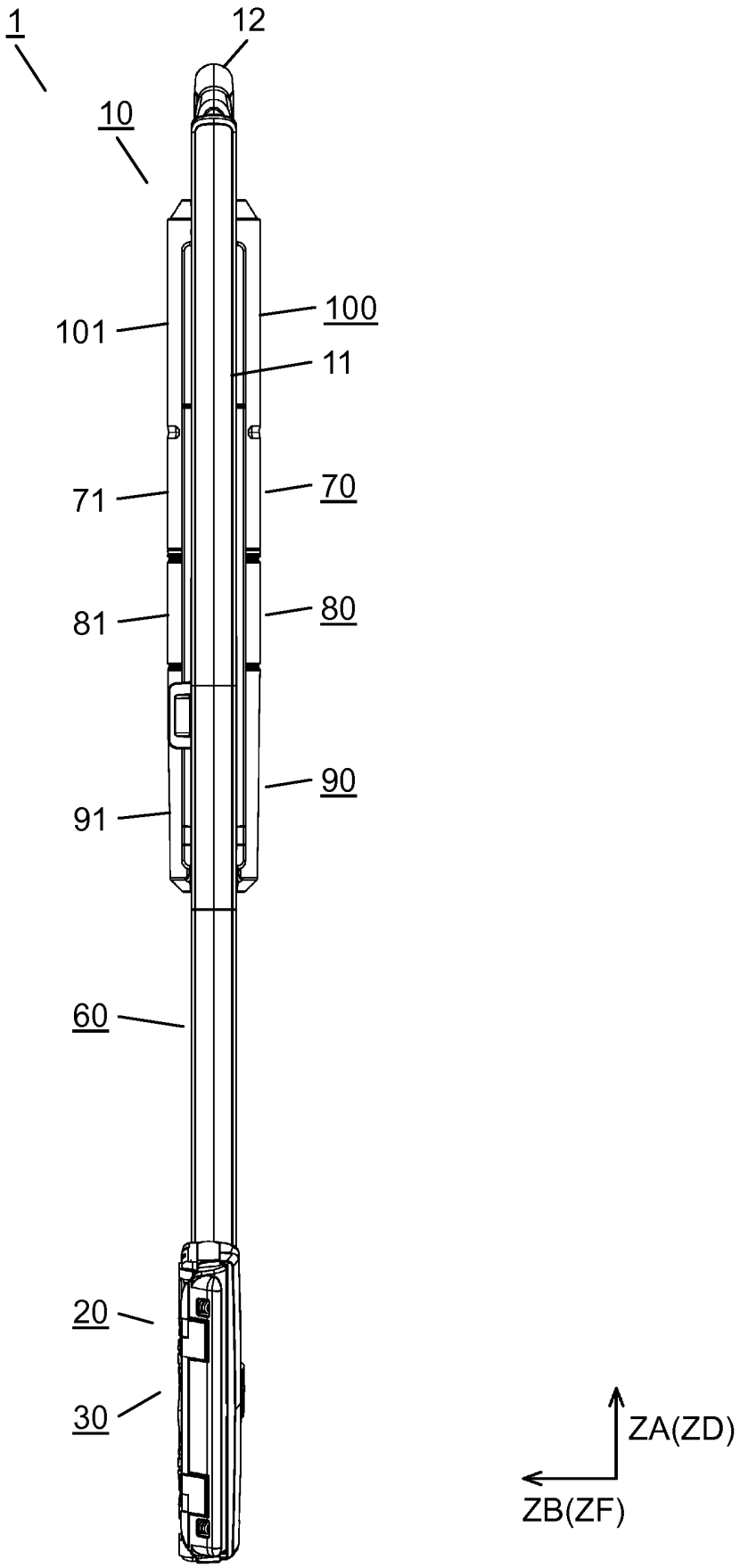

36
41b(41)
41a(41)
36a
36b
41
41c(41)
42a(42)
40X
20
30
40
42
31c
31
R1
51
52
50
43
ZE
ZD
ZF(ZB)

FIG. 19



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/002095

A. CLASSIFICATION OF SUBJECT MATTER
A47L9/02(2006.01)i, *A47L9/24*(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A47L9/02, A47L9/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2017
Kokai Jitsuyo Shinan Koho 1971-2017 Toroku Jitsuyo Shinan Koho 1994-2017

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2006-503607 A (Dyson Technology Ltd.), 02 February 2006 (02.02.2006), paragraphs [0025] to [0026]; fig. 3 to 5 & GB 2391459 A & WO 2004/014209 A1 & DE 60323505 D & KR 10-2005-0056196 A & CN 1674818 A	1-4
Y	JP 2000-126101 A (Sharp Corp.), 09 May 2000 (09.05.2000), paragraphs [0020] to [0031]; fig. 1 to 8 & US 6345408 B1 & EP 976358 A2 & DE 69934264 D & KR 10-2000-0011985 A & CN 1251752 A	1-4

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Date of the actual completion of the international search	Date of mailing of the international search report
08 February 2017 (08.02.17)	21 February 2017 (21.02.17)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/002095

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	JP 2004-136108 A (Hitachi, Ltd.), 13 May 2004 (13.05.2004), entire text; all drawings (Family: none)	1-4
A	JP 2005-161100 A (Matsushita Electric Industrial Co., Ltd.), 23 June 2005 (23.06.2005), entire text; all drawings (Family: none)	1-4
A	JP 2001-87181 A (Matsushita Electric Industrial Co., Ltd.), 03 April 2001 (03.04.2001), entire text; all drawings (Family: none)	1-4
A	JP 44-26627 Y1 (Mitsubishi Electric Corp.), 07 November 1969 (07.11.1969), entire text; all drawings (Family: none)	1-4
A	JP 9-187404 A (Sanyo Electric Co., Ltd.), 22 July 1997 (22.07.1997), entire text; all drawings (Family: none)	1-4
A	JP 10-211132 A (Mitsubishi Electric Corp.), 11 August 1998 (11.08.1998), entire text; all drawings & KR 10-0215693 B & CN 1189318 A	1-4

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Patent documents cited in the description

- JP 2010125193 A **[0004]**