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(54) SURFACE CLEANING DEVICE WITH A SPIN DRYING FABRIC ROLLER

(57) A surface cleaning device for cleaning a wet surface (11) includes a fabric roller (4), a fluid collecting container (7), an electric motor (5) and a guide plate (6) mounted in a housing (2). The fabric roller (4) is drivable by the electric motor (5) to be in rollable contact with the wet surface (11) for absorbing fluid on the wet surface (11). The electric motor (5) is shiftable between a first state, where the fabric roller (4) is rotated at a lower first rotational speed for absorbing the fluid, and a second state, where the fabric roller (4) is rotated at a higher second rotational speed to centrifugally drip the fluid therefrom. The dripped fluid is deflected by the guide plate (6) and is received in the fluid collecting container (7).

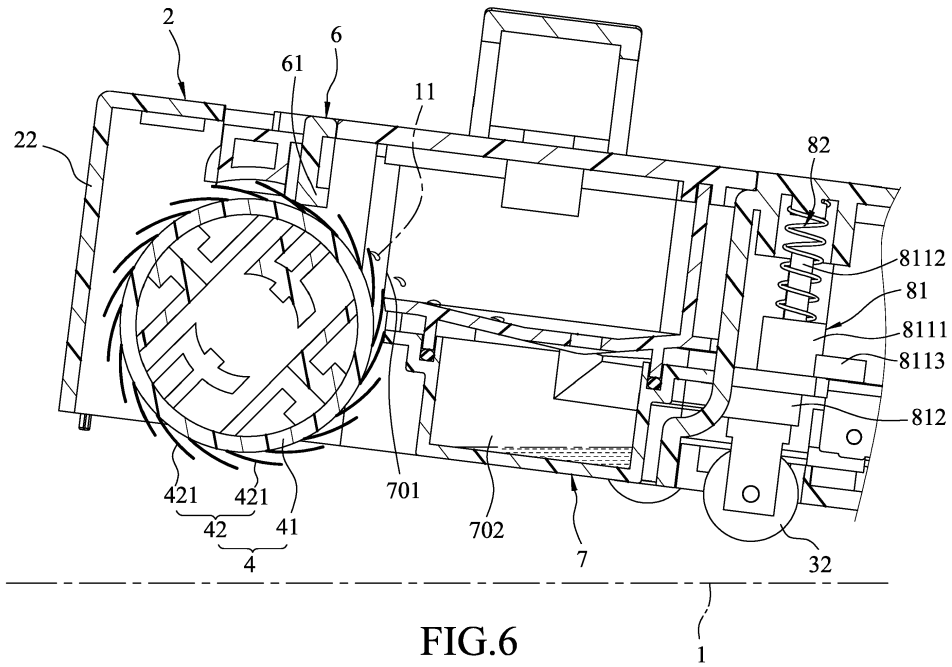

FIG.6

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Description

[0001] The disclosure relates to an automatic surface cleaning device, and more particularly to a surface cleaning device with a spin drying fabric roller for cleaning a wet surface.

[0002] A conventional automatic surface cleaning device, such as an electric mopping machine, is currently widely and commonly used. The user can clean the wet surface on the ground by a fabric roller mounted in the electric mopping machine and rollable on the ground. However, the fabric roller can be rotated only at a single rotational speed when used for absorbing the ground sewage and for centrifugally dripping the absorbed sewage therefrom. Therefore, the absorbed sewage cannot be efficiently removed from the fabric roller during the cleaning operation, which renders the cleaning effect of the surface cleaning device unsatisfied.

[0003] Therefore, an object of the disclosure is to provide a surface cleaning device that can alleviate at least one of the drawbacks of the prior art.

[0004] According to the disclosure, the surface cleaning device for cleaning a wet surface includes a housing, a fabric roller, a fluid collecting container, an electric motor and a guide plate. The housing defines a receiving space. The fabric roller is rotatably mounted in the receiving space, and has a rolling surface which is exposed from the receiving space and which is configured to be in rollable contact with the wet surface for absorbing fluid on the wet surface. The fluid collecting container is mounted in the receiving space and defines therein a fluid collecting space and an opening which is in communication with the fluid collecting space and disposed to open to the rolling surface of the fabric roller for receiving the fluid from the fabric roller during rotation of the fabric roller. The electric motor is mounted in the receiving space and operable to drive the rotation of the fabric roller. The electric motor is shiftable between a first state, where the fabric roller is rotated at a first rotational speed, and the rolling surface contacts the wet surface for absorbing the fluid, and a second state, where the fabric roller is rotated at a second rotational speed that is higher than the first rotational speed, and where the rolling surface is spaced apart from the wet surface to centrifugally drip the fluid from the rolling surface. The guide plate is mounted in the receiving space and between the fabric roller and the fluid collecting container to deflect the dripped fluid toward the opening and into the fluid collecting space.

[0005] Other features and advantages of the disclosure will become apparent in the following detailed description of the embodiments with reference to the accompanying drawings, of which:

FIG. 1 is a perspective view illustrating an embodiment of a surface cleaning device according to the disclosure;

FIG. 2 is a fragmentary, partly-sectioned, perspective view illustrating the embodiment;

FIG. 3 is a fragmentary sectional view illustrating a fabric roller rotated at a first rotational speed;

FIG. 4 is an enlarged, fragmentary sectional view of FIG. 3;

FIG. 5 is a view similar to FIG. 3, illustrating the fabric roller rotated at a second rotational speed;

FIG. 6 is an enlarged, fragmentary sectional view of FIG. 5; and

FIG. 7 is a fragmentary sectional view illustrating another embodiment of the surface cleaning device.

[0006] Before the disclosure is described in greater detail, it should be noted that where considered appropriate, reference numerals or terminal portions of reference numerals have been repeated among the figures to indicate corresponding or analogous elements, which may optionally have similar characteristics.

[0007] Referring to FIGS. 1 to 3, an embodiment of a surface cleaning device is for electrically cleaning a wet surface 11 on the floor 1. The surface cleaning device includes a housing 2 defining a receiving space 20, an erect handle body 24 pivotably mounted on a rear end 21 of the housing 2, a wheel assembly 3, a fabric roller 4, a treading member 23, an electric motor 5, a guide plate 6, a fluid collecting container 7, a shift activating assembly 8 and a microswitch 9. In this embodiment, the user can grip and move the erect handle body 24 to move the surface cleaning device on the floor 1 and to use the surface cleaning device as an electric mop.

[0008] The wheel assembly 3 is rollable on the floor 1, and includes a pair of rear wheels 31 which are mounted at the rear end 21 of the housing 2, and a middle wheel 32.

[0009] The fabric roller 4 is rotatably mounted in the receiving space 20 and at a front end 22 of the housing 2, and has a rolling surface which is exposed from the receiving space 20 and which is configured in rollable contact with the floor 1 for absorbing fluid on the wet surface 11. The fabric roller 4 has a roller body 41 which is rotatably connected to the housing 2, and a fabric cloth 42 which is disposed on a circumferential periphery of the roller body 41. The middle wheel 32 is located between the fabric roller 4 and the rear wheels 31.

[0010] The electric motor 5 is mounted in the receiving space 20 and is operable to drive the rotation of the fabric roller 4 with two different rotational speeds. The electric motor 5 is located adjacent to the rear end 21 of the housing 2. The treading member 23 extends from the rear end 21 of the housing 2 and is disposed rearwardly of the rear wheels 31.

[0011] The fluid collecting container 7 is mounted in the receiving space 20, and defines therein a fluid collecting space 702 and an opening 701 which is in communication with the fluid collecting space 702 and disposed to open to the rolling surface of the fabric roller 4 for receiving the fluid from the fabric roller 4 during the rotation of the fabric roller 4.

[0012] The guide plate 6 is mounted in the receiving

space 20 and between the fabric roller 4 and the fluid collecting container 7 to deflect the dripped fluid toward the opening 701 and into the fluid collecting space 702. As shown in FIG. 4, in this embodiment, the guide plate 6 is mounted on a top portion of the receiving space 20 and above the fabric roller 4 and extends toward the fabric roller 4 to have a lower edge 61 spaced apart from the fabric roller 4 by a gap (G).

[0013] When the fabric roller 4 is rotated at a first rotational speed, the rolling surface of the fabric roller 4 contacts the wet surface 11 to place the surface cleaning device in a first state, e.g., a fluid absorbing state (see FIGS. 3 and 4), where the fabric roller 4 can absorb the fluid on the wet surface 11. When the fabric roller 4 is rotated at a second rotational speed that is higher than the first rotational speed, the surface cleaning device may be placed in a second state, e.g., a spin dripping state (see FIGS. 5 and 6), where the rolling surface is spaced apart from the wet surface 11 to centrifugally drip the fluid from the rolling surface. The dripped fluid may enter and be collected in the fluid collecting space 702 of the fluid collecting container 7 through the opening 701.

[0014] The electric motor 5 is shiftable in response to movement of the fabric roller 4 relative to the wet surface 11. Specifically, the shift activating assembly 8 and the microswitch 9 are mounted in the receiving space 20 and adjacent to the middle wheel 32. The shift activating assembly 8 is mechanically operable in response to the movement of the middle wheel 32 relative to the floor 1. The microswitch 9 is electrically connected to the electric motor 5, and is triggerable by the shift activating assembly 8 to shift the electric motor 5 from the first state to the second state.

[0015] In this embodiment, the shift activating assembly 8 includes a movable member 81 and a biasing member 82. The movable member 81 is movably disposed in the receiving space 20 between upper and lower positions, and has an upper shaft portion 8112, a lower pivot portion 812 to which the middle wheel 32 is pivotably connected, a shoulder portion 8111 which is interposed between the upper shaft portion 8112 and the lower pivot portion 812, and an actuating contact 8113 which projects rearwardly from the shoulder portion 8111. The biasing member 82 is in the form of a coil spring which is sleeved around the upper shaft portion 8112 and abuts against the shoulder portion 8111 to impart a downward biasing force to move the movable member 81 to the lower position.

[0016] The microswitch 9 is disposed adjacent to the shift activating assembly 8, and has an actuated contact 92 which projects toward the movable member 81 and below the actuating contact 8113. Referring to FIG. 3, the actuating contact 8113 is spaced apart from the actuated contact 92 when the middle wheel 32 contacts the floor 1, where the movable member 81 is in the upper position.

[0017] Specifically, in this embodiment, when the middle wheel 32 and the fabric roller 4 contact the floor 1 (as shown in FIGS. 3 and 4), the treading member 23 is spaced apart from the floor 1 by a distance (D), and the biasing member 82 is in a compressed state to keep the actuating contact 8113 of the movable member 81 away from the actuated contact 92 so as to place the electric motor 5 in the first state (the fluid absorbing state) to drive the rotation of the fabric roller 4 at the lower first rotational speed. Once the treading member 23 is acted upon by a downward treading force thereon to lift the fabric roller 4 and the middle wheel 32 from the floor 1 with the rear wheels 31 serving as a fulcrum (as shown in FIGS. 5 and 6), the movable member 81 is moved downwardly by means of the downward biasing force of the biasing member 82 to the lower position to bring the actuating contact 8113 in contact with the actuated contact 92 so as to shift the electric motor 5 to the second state (the spin dripping state) to drive the rotation of the fabric roller 4 at the higher second rotational speed.

[0018] Referring to FIGS. 3 to 6, the fabric cloth 42 of the fabric roller 4 has a plurality of mopping cloth pieces 421 which respectively have mopping surfaces that are configured to be attached to the roller body 41 when the fabric roller 4 is rotated at the first rotational speed so as to be spaced apart from the guide plate 6, and to extend tangentially and outwardly from the circumferential periphery of the roller body 41 when the fabric roller 4 is rotated at the second rotational speed to flap the guide plate 6 so as to remove the fluid from the mopping cloth pieces 421.

[0019] In use, with an automatic shifting of the electric motor 5 in response to the movement of the fabric roller 4, the fabric roller 4 can be rotated at a lower rotational speed during contact with the wet surface 11 for absorbing the fluid on the wet surface 11, and can be rotated at a higher rotational speed during lift away from the floor 1 for centrifugally spin dripping the fluid therefrom so as to efficiently clean the wet surface.

[0020] Other than treading of the treading member 23, the fabric roller 4 and the middle wheel 32 can be lifted in any other manners. For example, the fabric roller 4 may be moved upwardly, the guide plate 6 may be moved downwardly, etc., which can shift the electric motor 5 between the first and second states.

[0021] Referring to FIG. 7, in another embodiment, the fluid collecting container 7 has an upper cover 71 which is mounted on a top portion of the housing 2, and a container body 72 which extends downwardly from a periphery of the upper cover 71 and defines therein the opening 701 and the fluid collecting space 702. The guide plate 6 is mounted on and extends from the upper cover 71 toward the fabric roller 4.

Claims

1. A surface cleaning device for cleaning a wet surface (11), comprising:

a housing (2) defining a receiving space (20);
a fabric roller (4) rotatably mounted in said receiving space (20), and having a rolling surface which is exposed from said receiving space (20) and which is configured to be in rollable contact with the wet surface (11) for absorbing fluid on the wet surface (11) ;
a fluid collecting container (7) mounted in said receiving space (20) and defining therein a fluid collecting space (702) and an opening (701) which is in communication with said fluid collecting space (702) and disposed to open to said rolling surface of said fabric roller (4) for receiving the fluid from said fabric roller (4) during rotation of said fabric roller (4) ; and
an electric motor (5) mounted in said receiving space (20) and operable to drive the rotation of said fabric roller (4), said surface cleaning device being **characterized in that**:

said electric motor (5) is shiftable between a first state, where said fabric roller (4) is rotated at a first rotational speed, and said rolling surface contacts the wet surface (11) for absorbing the fluid, and a second state, where said fabric roller (4) is rotated at a second rotational speed that is higher than the first rotational speed to centrifugally drip the fluid from said rolling surface;
said surface cleaning device further comprising a guide plate (6) which is mounted in said receiving space (20) and between said fabric roller (4) and said fluid collecting container (7) to deflect the dripped fluid toward said opening (701) and into said fluid collecting space (702).

2. The surface cleaning device as claimed in Claim 1, **characterized in that** said electric motor (5) is shiftable in response to the movement of said fabric roller (4) relative to the wet surface (11) between the first and second states, wherein said rolling surface is spaced apart from the wet surface (11) in the second state.

3. The surface cleaning device as claimed in Claim 2, **characterized in that** said fabric roller (4) is mounted at a front end (22) of said housing (2), said surface cleaning device further comprising:

a wheel assembly (3) rollable on a floor (1), and including a pair of rear wheels (31) which are mounted at a rear end (21) of said housing (2), and a middle wheel (32) which is interposed between said fabric roller (4) and said rear wheels (31); and
a treading member (23) extending from said rear end (21) of said housing (2) and disposed rearwardly of said rear wheels (31) to be acted upon by a downward treading force thereon to lift said fabric roller (4) and said middle wheel (32) from the floor (1) with said rear wheels (31) serving as a fulcrum so as to shift said electric motor from the first state to the second state.

4. The surface cleaning device as claimed in Claim 3, further **characterized by**:

a shift activating assembly (8) mounted in said receiving space (20) and adjacent to said middle wheel (32), and mechanically operable in response to the movement of said middle wheel (32) relative to the floor (1) ; and
a microswitch (9) mounted in said receiving space (20) and adjacent to said shift activating assembly (8), and electrically connected to said electric motor (5), said microswitch (9) being triggerable by said shift activating assembly (8) to shift said electric motor (5) from the first state to the second state.

5. The surface cleaning device as claimed in Claim 4, **characterized in that** said shift activating assembly (8) includes a movable member (81) which is movably disposed in said receiving space (20) between upper and lower positions, and a biasing member (82) which is disposed to bias said movable member (81) to the lower position so as to trigger said microswitch (9) .

6. The surface cleaning device as claimed in Claim 5, **characterized in that** said movable member (81) has an upper shaft portion (8112), a lower pivot portion (812) to which said middle wheel (32) is pivotably connected, and a shoulder portion (8111) which is interposed between said upper shaft portion (8112) and said lower pivot portion (812), said biasing member (82) being sleeved around said upper shaft portion (8112) and abutting against said shoulder portion (8111) to impart a downward biasing force to move said movable member (81) to the lower position.

7. The surface cleaning device as claimed in Claim 6, **characterized in that** said microswitch (9) has an actuated contact (92) which projects toward said movable member (81), said movable member (81) having an actuating contact (8113) which projects from said shoulder portion (8111) and above said actuated contact (92) such that said actuating contact (8113) is spaced apart from said actuated contact (92) when said middle wheel (32) contacts the floor (1) where said movable member (81) is in the upper position, and such that, once the downward treading force is applied to said treading member (23) to lift said fabric roller (4) and said middle wheel

(32), said movable member (81) is moved downwardly by the downward biasing force of said biasing member (82) to bring said actuating contact (8113) in contact with said actuated contact (92) so as to shift said electric motor (5) to the second state.

8. The surface cleaning device as claimed in Claim 1, **characterized in that** said fabric roller (4) has a roller body (41) which is rotatably connected to said housing (2), and a plurality of mopping cloth pieces (421) which are disposed on a circumferential periphery of said roller body (41) and which respectively have mopping surfaces that are configured to be attached to said roller body (41) when said fabric roller (4) is rotated at the first rotational speed so as to be spaced apart from said guide plate (6), and to extend tangentially and outwardly from said circumferential periphery of said roller body (41) when said fabric roller (4) is rotated at the second rotational speed to flap said guide plate (6) so as to remove the fluid from said mopping cloth pieces (421).

9. The surface cleaning device as claimed in Claim 1, **characterized in that** said guide plate (6) is mounted on a top portion of said receiving space and above said fabric roller (4) and extends toward said fabric roller (4) .

10. The surface cleaning device as claimed in Claim 1, **characterized in that** said fluid collecting container (7) has an upper cover (71) which is mounted on a top portion of said housing (2), and a container body (72) which extends downwardly from a periphery of said upper cover (71) and defines therein said opening (701) and said fluid collecting space (702), said guide plate (6) being mounted on and extending from said upper cover (71) toward said fabric roller (4).

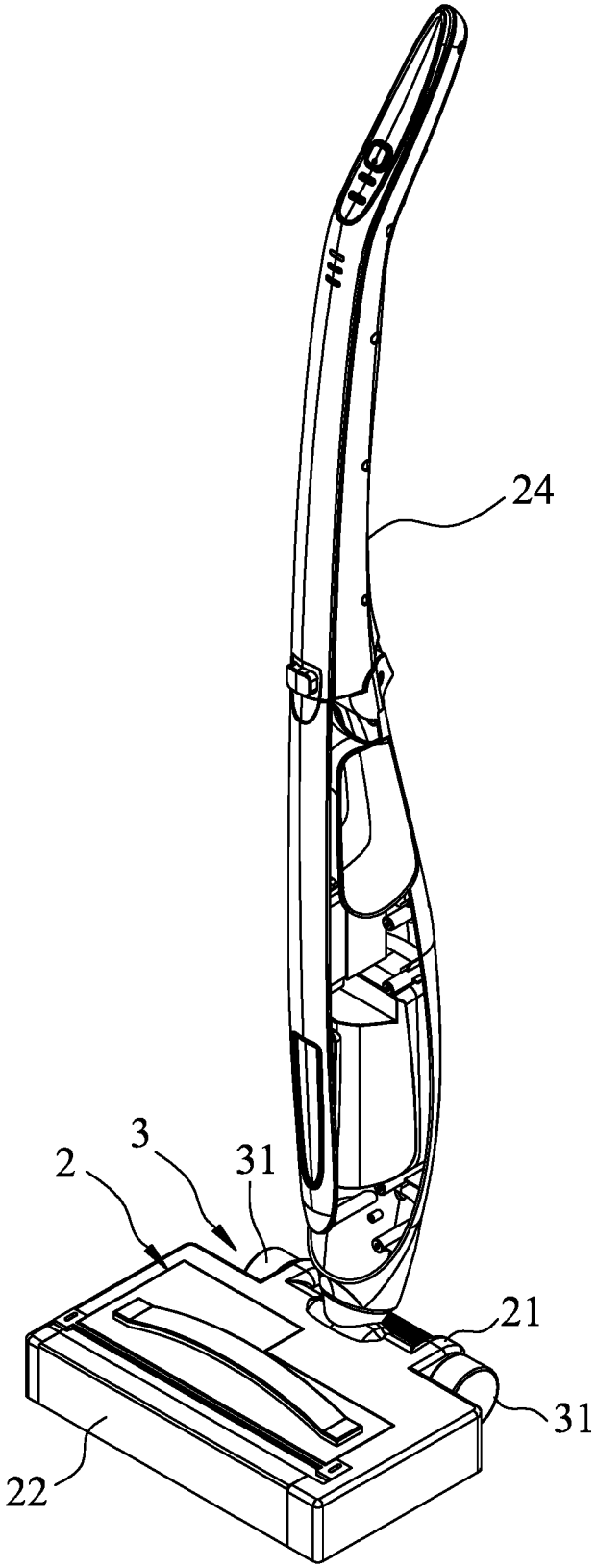


FIG.1

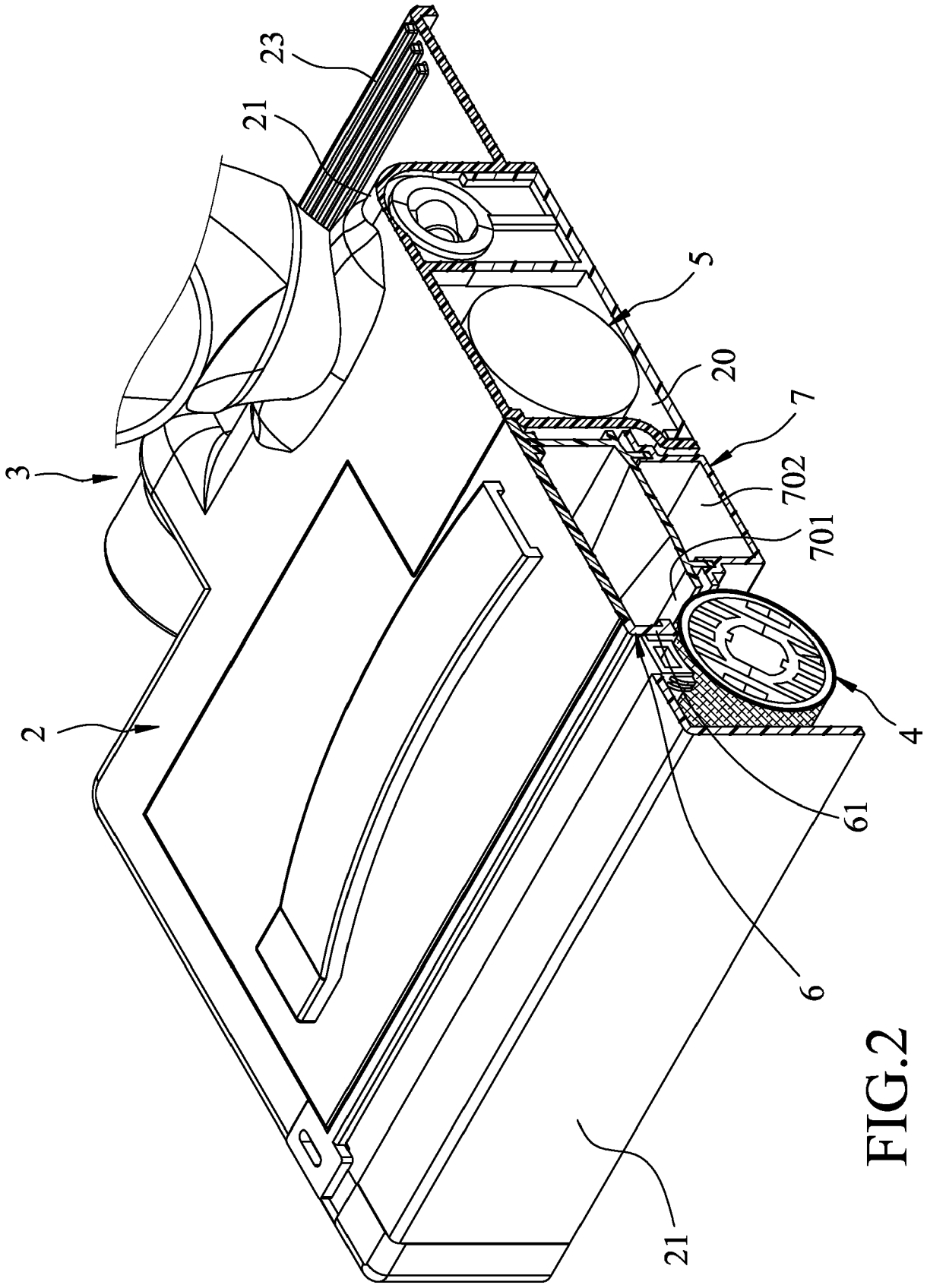
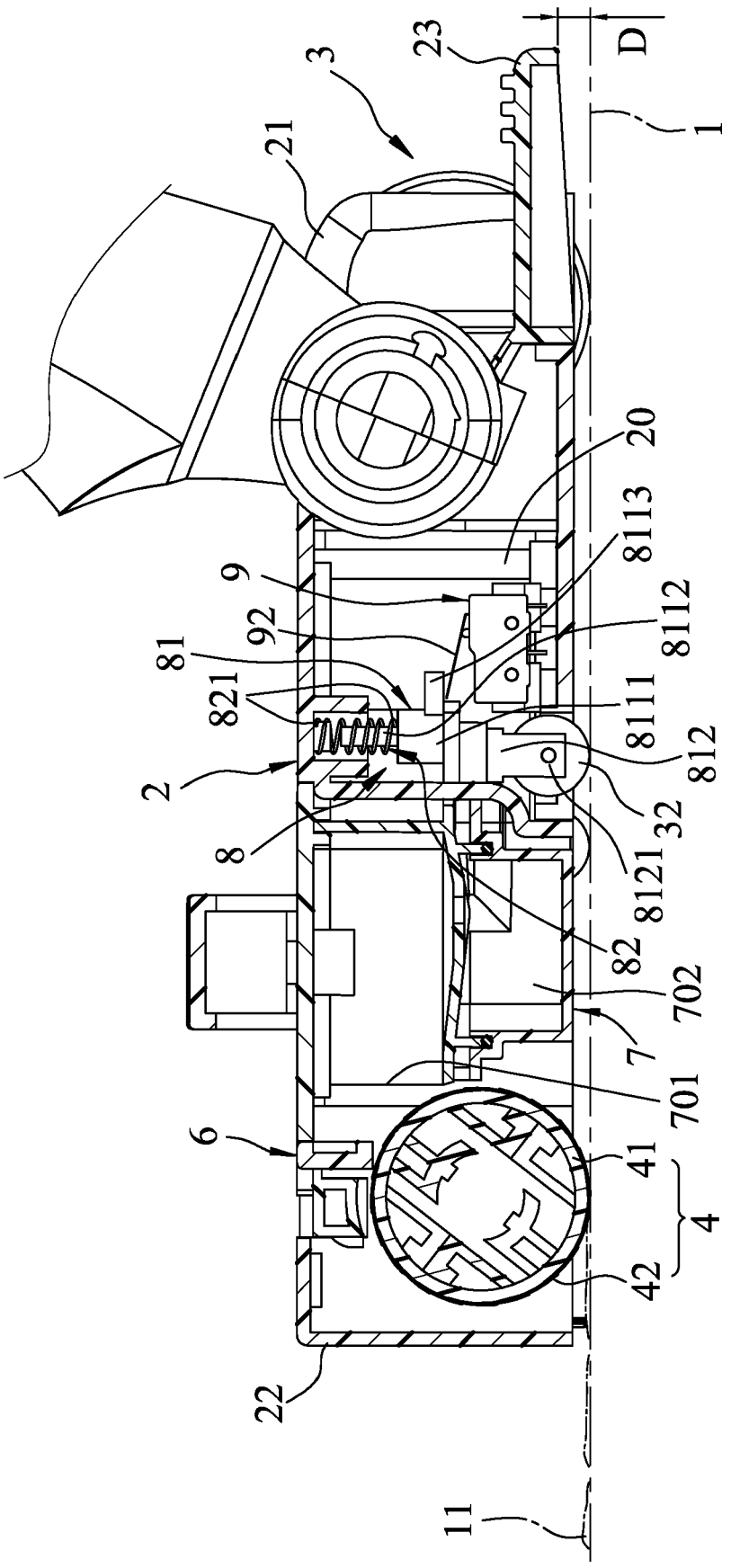


FIG.2


3
23
D
1
21
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8113
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8112
92
81
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812
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702
7
701
6
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22
11

FIG.3

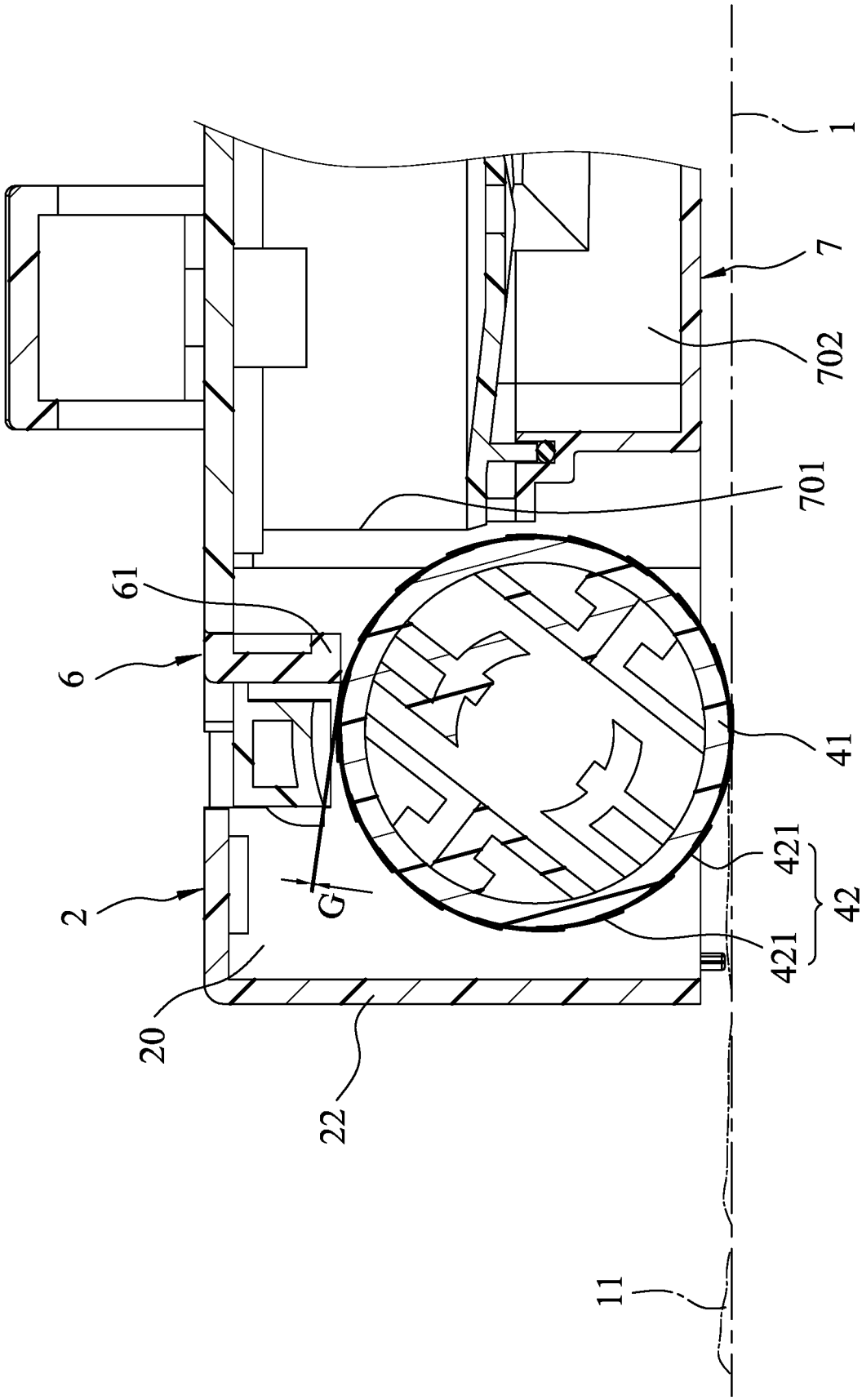
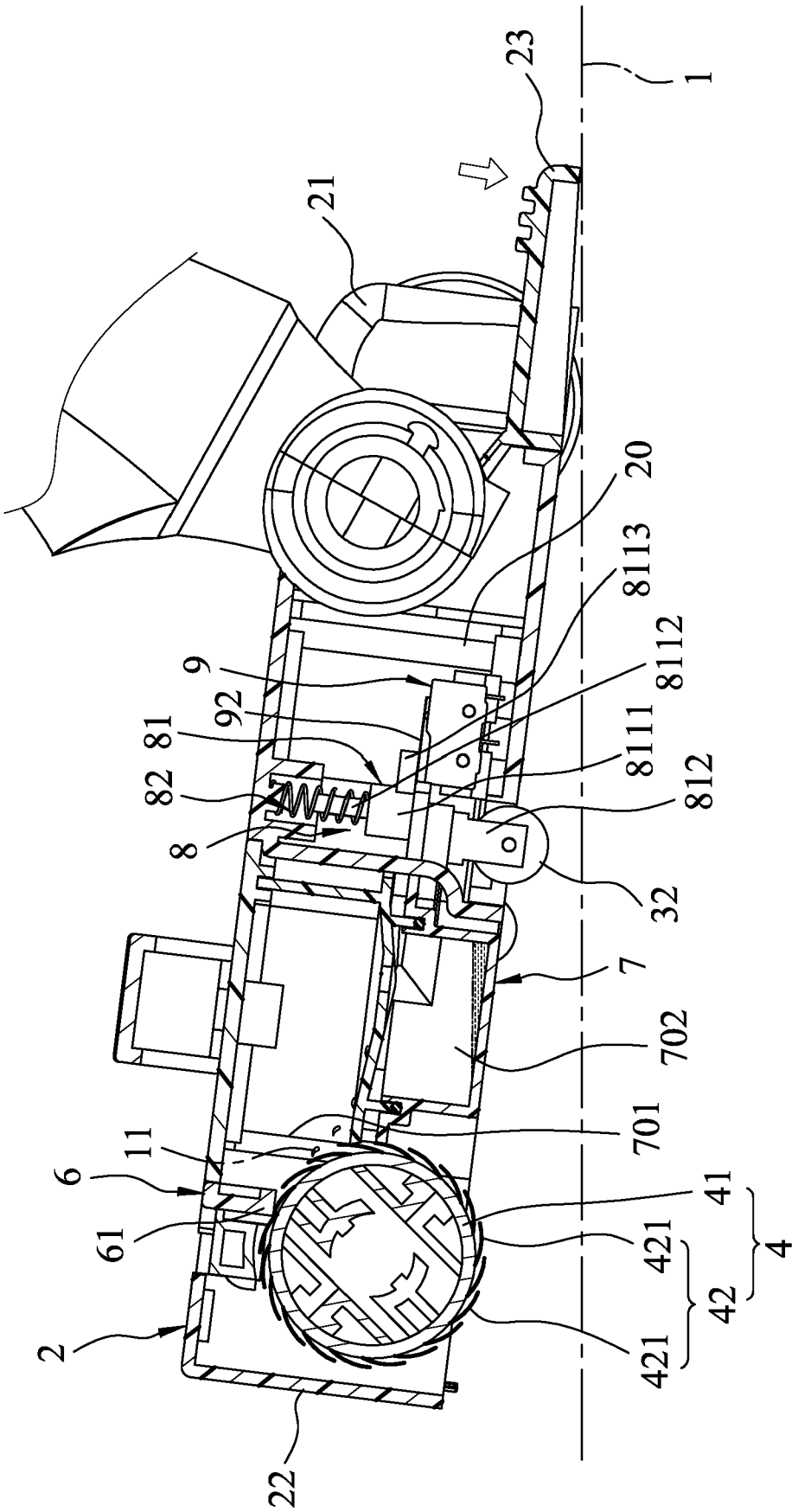


FIG.4


23
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8112
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FIG.5

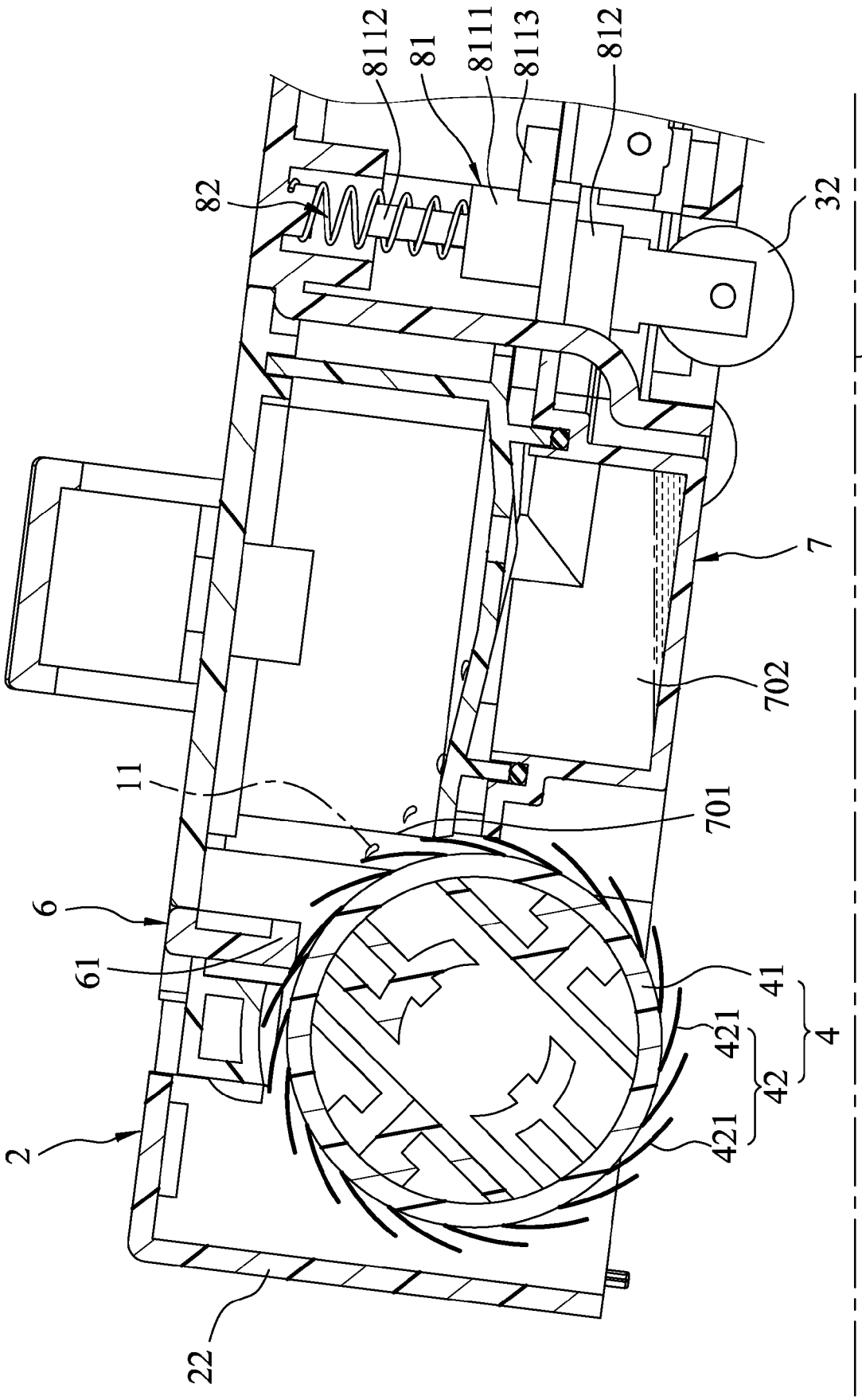

FIG.6

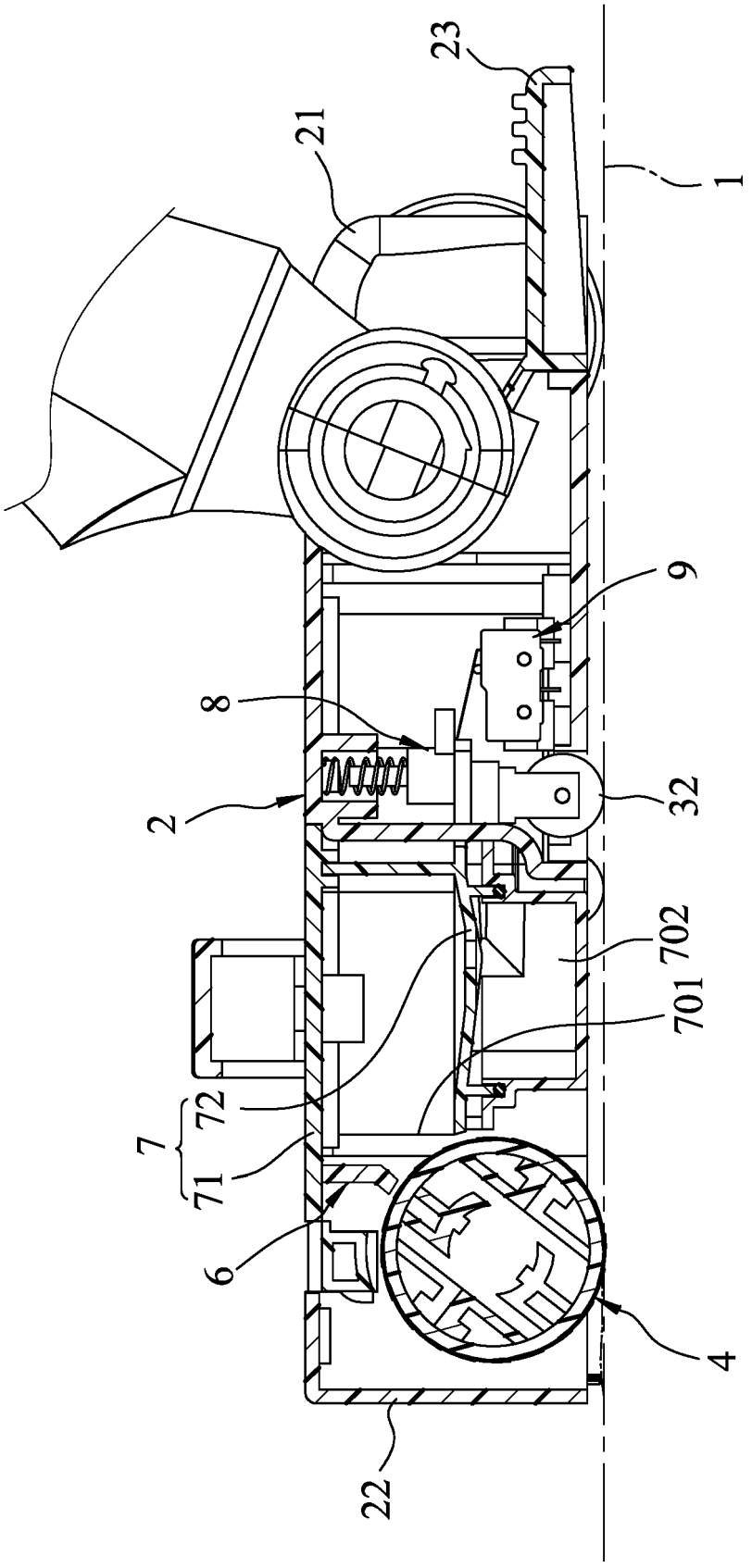

FIG.7

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EUROPEAN SEARCH REPORT

Application Number
EP 19 20 1578

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 1 644 189 A (HENDRICKS ROYAL E) 4 October 1927 (1927-10-04) * page 1, line 31 - page 2, line 20; figure 1 *	1-10	INV. A47L11/292 A47L11/40
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TECHNICAL FIELDS SEARCHED (IPC)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 February 2020	Blumenberg, Claus

CATEGORY OF CITED DOCUMENTS

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03-02-2020

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