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(54) VACUUM CLEANER

STAUBSAUGER

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Description

TECHNICAL FIELD

[0001] The present invention relates to improvement in an electric vacuum cleaner having a dust-collecting case detachably attached in a vacuum cleaner body to accumulate sucked dust.

BACKGROUND ART

[0002] There has been conventionally known a duct-collecting case of electric vacuum cleaner, i.e., a dust cup comprising an installation type attached in a vacuum cleaner body in a state which is not visible externally and a dust-collecting case of electric vacuum cleaner, i.e., a dust cup comprising an exposure type attached to a vacuum cleaner body in an exposed state. Since the installation type has a structure that a dust-collecting case is housed in a dust-collecting case chamber provided in a vacuum cleaner body, and is sealed by a lid disposed in the dust-collecting case chamber, the installation type has following advantages compared with the exposure type.

[0003] More particularly, if this dust-collecting case of installation form is adapted to an electric vacuum cleaner having a cyclone-typed dust-collecting structure, in particular, the wind roar of cyclone is shielded; namely, the noise can be minimized because the wind roar is not sent outside of the vacuum cleaner body. In addition, since the dust-collecting case is not seen externally, specific design is not required for the external appearance of the dust-collecting case vacuum cleaner body and the external appearance can be simplified, and also the vacuum cleaner has a superior appearance.

[0004] However, the dust-collecting case is often removed from the dust-collecting case chamber for throwing the accumulated dust away or cleaning. If the lid of dust-collecting case chamber is closed in this removed state, without installing the dust-collecting case in the dust-collecting case chamber, it cannot be seen whether or not the dust-collecting case is installed in the vacuum cleaner body from the external of vacuum cleaner body. Therefore, a switch for sucking dust is often turned on without housing the dust-collecting case in the dust-collecting case chamber. As described above, if an electric blower fan is operated without housing the dust-collecting case in the vacuum cleaner body, dust sucked from a suction inlet is sucked into the electric blower fan. Therefore, operation for removing the dust from the electric blower fan is required, and in some cases, there is a problem that the electric blower fan is destroyed. Even if a secondary filter is provided in the upstream side of electric blower fan for protecting the electric blower fan, the cooling wind of electric blower fan becomes insufficient because the secondary filter is immediately clogged with dust, and the sucked foreign material is sucked into the electric blower fan by crashing the secondary filter. Therefore, there is a problem that the electric blower fan is destroyed.

[0005] Moreover, in addition to the above dust-collecting case type, there has been conventionally disclosed in JP H01-291821A an electric vacuum cleaner that a lid of housing chamber, which houses a paper bag, is not closed when the paper bag is not attached, and in JP 3297224B an electric vacuum cleaner that a vacuum cleaner body can not be set when a dust-collecting bag is not attached. The electric vacuum cleaners described in these publications can not be used in a state that the paper bag and dust-collecting bag are not attached. However, the lid is not closed and the body is not set in this unattached state, so there has a problem that the carrying of electric vacuum cleaner body is inconvenience in the above unattached state.

[0006] US 3,745,965 A discloses a vacumm cleaner having signal for indicating absence of a dust bag.

[0007] US 4,733,431 A discloses a vacuum cleaner with a performance monitoring system.

[0008] DE 28 48 750 A1 discloses a vacuum cleaner according to the preamble of claim 1.

DISCLOSURE OF THE INVENTION

[0009] The present invention has been made in view of the above conventional arts, and an object of the present invention is to provide an electric vacuum cleaner capable of preventing suction of dust when a dust suction switch is turned on without installing a dust-collecting case in a vacuum cleaner body in an electric vacuum cleaner having a dust-collecting case of an installation type.

[0010] Another object of the present invention is to provide an electric vacuum cleaner capable of housing a dust-collecting case in a vacuum cleaner body completely and capable of carrying a vacuum cleaner body if a dust-collecting case is not housed in a vacuum cleaner body.

[0011] In order to achieve the above objects, an electric vacuum cleaner according to one embodiment of the present invention comprises a vacuum cleaner body in which a connection port communicating with a suction inlet is formed and a dust-collecting case chamber communicated with the connecting port is formed, a dust-collecting case, which is detachably installed into the dust-collecting case chamber, has a suction port communicating with the connection port and accumulates dust sucked from the suction port, an electric blower fan having a suction opening communicating with the dust-collecting case installed into the dust-collecting case chamber, and a structure, which controls suction of the dust from the suction inlet, when the electric blower fan is driven in a state that the dust-collecting case is not installed into the dust-collecting case chamber.

[0012] In one embodiment, the structure, which controls suction of the dust from the suction inlet, comprises a mechanism, which flows external air into the dust-col-

lecting case chamber when the electric blower fan is driven.

The mechanism, which flows external air into the dust-collecting case chamber, includes a hole communicating the dust-collecting case chamber with the external air, is configured such that the hole is not communicated with the suction opening of the electric blower fan, when the dust-collecting case is installed into the dust-collecting case chamber, and is configured to control the suction of the dust from the suction inlet by the communication of the external air with the dust-collecting case chamber via the hole in accordance with the driving of the electric blower fan, when the dust-collecting case is not installed into the dust-collecting case chamber.

[0013] Moreover, the structure, which controls suction of dust from the suction inlet, in another embodiment, includes a hole communicating the dust-collecting case chamber with the external air and an opening and closing member openably and closably disposed in the hole, and when the dust-collecting case is installed into the dust-collecting case chamber, the opening and closing member closes the hole such that the dust-collecting case chamber is not communicated with the external air, and when the dust-collecting case is not installed into the dust-collecting case chamber, the opening and closing member moves downward by negative pressure with the driving of the electric blower fan to open the hole, and controls the suction of the dust from the suction inlet by the communication of the dust-collecting case chamber with the external air.

[0014] According to the present invention, if the electric blower fan is driven in a state that the dust-collecting case is not installed in the vacuum cleaner body, the suction of dust from the suction inlet can be prevented from occurring. In addition, even though the dust-collecting case is not disposed in the vacuum cleaner body, the lid of dust-collecting case chamber can be easily closed. Therefore, the vacuum cleaner body can be carried.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

[FIG. 1] A perspective view showing an external appearance of an electric vacuum cleaner according to the present invention.

[FIG. 2] A partial cross sectional view showing the structure of vacuum cleaner body shown in FIG. 1.

[FIG. 3] A cross section view showing a part of the vacuum cleaner body that a dust-collecting case is removed.

[FIG. 4] An explanation view showing a state when a button is pressed.

[FIG. 5] A cross section view illustrating a part of the vacuum cleaner body on which the dust-collecting case is mounted.

[0013] [FIG. 6] A perspective view illustrating the dust-collecting case.

[FIG. 7] A perspective view showing the dust-collecting case from which a cover case is removed.

[FIG. 8] A cross section view illustrating the structure of dust-collecting case.

[FIG. 9] A partial cross section view showing the housing portion of dust-collecting case.

[FIG. 10] A perspective view showing a structure of interlocking mechanism.

[FIG. 11] A perspective view illustrating a lower portion of a rod of the interlocking mechanism.

[FIG. 12] A side view showing a part of pushing plate.

[FIG. 13] A plan view illustrating a part of the pushing plate shown in FIG. 12.

[FIG. 14] A cross section view showing a state that the rod is attached to the pushing plate.

[FIG. 15] Another cross section view showing a state that the rod is attached to the pushing plate.

[FIG. 16] A transverse sectional view illustrating the dust-collecting case.

[FIG. 17] A perspective view illustrating a part of the structure of the interlocking mechanism.

[FIG. 18] An explanation view showing the interlocking mechanism that a part of the dust-collecting case is omitted.

[FIG. 19] An explanation view showing an opening and closing mechanism.

[FIG. 20] An explanation view showing a state when the button is pressed.

[FIG. 21] An explanation view showing a state when a lever is pressed down.

[FIG. 22] An explanation view showing a state that the pushing plate is moved downward by pressing down the lever.

[FIG. 23] A longitudinal sectional view of the dust-collecting case illustrating a state when the pushing plate is moved downward.

[FIG. 24] An explanation view showing a major portion of another example of dust-collecting case.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Hereinafter, a preferred embodiment of an electric vacuum cleaner according to the present invention will be exampled in details based on embodiments shown in figures.

[0017] FIG. 1 illustrates an electric vacuum cleaner 10 showing one embodiment of an electric vacuum cleaner according to the present invention. This electric vacuum cleaner 10 comprises a vacuum cleaner body 11 having a connection port 10A, a dust-collecting hose 12 having one end thereof detachably connected to the connection port 10A of the vacuum cleaner body 11 and the other end thereof provided with a hand-held operation pipe 13, an extension tube 14 detachably connected to the hand-held operation pipe 13, and a suction inlet 15 detachably connected to the leading end portion of the extension tube 14.

[0018] The hand-held operation pipe 13 is provided with an operation portion 13A. This operation portion 13A is provided with operation switches 13a such as ON, OFF, level of dust suction power, etc.

[0019] The suction inlet 15 is formed with a suction chamber (not shown) having a suction opening or dust suction inlet (not shown) on the bottom surface thereof for sucking dust. This suction chamber is communicated with a suction port 52 of a dust-collecting case 50 (reference to FIG. 2) disposed in the vacuum cleaner body 11 via the extension tube 14 and dust-colleting hose 12.

[0020] The vacuum cleaner body 11 comprises a body case 20, a dust-collecting case chamber 21, which is provided in this body case 20 and detachably houses the dust-collecting case 50, and a lid body 40 capable of opening and closing the dust-collecting case camber 21, as shown in FIG. 2. The backside of this lid body 40 is hinged to the body case 20, such that the front side, i.e., a side closer to the dust-collecting hose 12 can move in the up and down direction.

[0021] The dust-collecting case chamber 21 is disposed in the front side of the body case 20, for example. After the dust-collecting case 50 is installed into the dust-collecting case camber, an upper opening 22 of the dust-collecting case camber 21 is sealed by the lid body 40. In addition, the back side of body case 20 is provided with an electric blower fan 23, and a suction opening 24 of the electric blower fan 23 is communicated with a rear opening 51 (reference to FIG. 8) of the dust-collecting case 50 (reference to FIG. 5) via a connection air trunk G.

[0022] When the dust-collecting case 50 is installed into the dust-collecting case camber 21, a suction air trunk communicating the connection port 10A of vacuum cleaner body 11, the dust-collecting case 50, the connection air trunk G and the suction opening 24 of the electric blower fan 23 is formed. When the dust-collecting case 50 is not installed into the dust-collecting case camber 21, a suction air trunk communicating the connection port 10A of the vacuum cleaner body 11, the dust-collecting case camber 21, the connection air trunk G and the suction opening 24 of electric blower fan 23 is formed.

[0023] Moreover, the body case 20 is formed with many exhaust holes 25, and a rear wheel 26 is also formed with many exhaust holes 27. As a result, air, which is sucked from the suction opening 24 with the electric blower fan 23 and is discharged from a vent (not shown), is discharged from those exhaust holes 25, 27.

[0024] The dust-collecting case 50 is detachably attached on the way of the suction air trunk from the connection port 10A of the vacuum cleaner body 11 to the suction opening 24 of the electric blower fan 23.

[0025] The electric vacuum cleaner according to the present invention is provided with a structure, which does not suck dust from the suction opening of the suction inlet 15 when the electric blower 23 is driven in a state that the dust-collecting case 50 is not installed into the dust-collecting case chamber 21. In one embodiment, this structure comprises a mechanism that external air directly flows into the dust-collecting case chamber, i.e., external air directly flows into the dust-collecting case chamber without passing the suction inlet 15 and the dust-collecting hose 12, when the electric blower fan 23 is driven.

[0026] This mechanism is configured that the dust-collecting case chamber 21 is communicated with external air via the suction inlet 15 and dust-colleting hose 12 such that the dust-collecting case chamber 21 is not directly communicated with the external air, when the dust-collecting case 50 is installed into the dust-collecting case chamber 21, and such that dust is not sucked from the suction inlet 15 with the dust-collecting case chamber 21 directly communicated with air by controlling the negative pressure acting on the suction inlet 15, when the dust-collecting case 50 is not installed into the dust-collecting case chamber 21.

[0027] This mechanism, in a specific example, comprises, for example, a hole or an intake air port 41 formed in the lid body 40 and an opening and closing member, which functions as an opening and closing lid for opening and closing this hole 41, for example, a button 42, as shown in FIG. 3. This button 42 is the after-mentioned operation button of dust compression mechanism and closes the hole 41 by being biased upward with a spring (not shown). When the dust-collecting case 50 is not installed into the dust-collecting case chamber 21, if the electric blower fan 23 is driven in a state that the lid body 40 is closed, the dust-collecting case chamber 21 becomes negative pressure. Thereby, if the button 42 moves downward against the biasing force of the spring to open the hole 41 as shown in FIG. 4, the dust-collecting case chamber 21 is directly communicated with the external air. More particularly, when the dust-collecting case 50 is not installed into the dust-collecting case chamber 21, the intake air trunk communicating the hole 41 for flowing external air into the dust-collecting case chamber 21 and the dust-collecting case chamber 21 is formed.

[0028] This dust-collecting case camber 21 is communicated with the suction opening 24 of the electric blower fan 23 via the connection air trunk G when the dust-collecting case 50 is not installed. In this case, when the dust-collecting case 50 is installed into the dust-collecting case chamber 21, the communication between the dust-collecting case chamber 21 and the suction opening 24 of the electric blower fan 23 is blocked; thereby, the suction opening 24 is communicated with the dust-collecting case 50.

[0029] A guide tube 43 extending up and down is formed in the lower side of the hole 41 of the lid body 40. A shaft 44 provided in the lower surface of the button 42 is inserted into a guide hole 43A of the guide tube 43 in an upwardly and downwardly movable manner. Thereby, the button 42 can move up and down. Moreover, a projection 45 is formed in the lower surface of the button 42. The projection 45 has contact with the after-mentioned lever 85 as shown in FIG. 5. If the button 42 is pushed

down, the lever 85 is pushed down.

[0030] The dust-collecting case 50 comprises a dust-collecting case body 53 having a suction inlet 52 in the front side (left side in FIG. 8) and formed with a filter mounting portion 58 having a rear opening 51 in the rear side, a holding portion 54 provided in the upper portion of the dust-collecting case body 53, a pair of interlocking mechanisms 70, 70 (reference to FIG. 10) provided in the both sides of the dust-collecting case body 53, an opening and closing mechanism 90, which opens and closes a bottom lid 59 openably and closably provided in the bottom portion of the dust-collecting case body 53, a cover case 71, 71, which covers each of the interlocking mechanisms 70 and the opening and closing mechanism 90 and a compression operation portion, for example, a bridge like lever 85, disposed in the upper side of the holding portion 54 in an upwardly and downwardly movable manner,.

[0031] The filter mounting portion 58 is formed in a tube shape having a square shape in cross section, and a pleat filter body P shown in FIG. 9 is detachably attached in the filter mounting portion 58. The suction inlet 52 of the dust-collecting case body 53 is communicated with the connection port 10A of the vacuum cleaner body 10 as shown in FIG. 2.

[0032] The dust-collecting case body 53 comprises a dust separation portion (first separation device) 60, which separates the dust and air sucked from the suction inlet 52 into dust and air, a dust-collecting camber portion 55 formed in the lower side of the dust separation portion 60 for accumulating the dust separated by the dust separation portion 60, a guide air trunk portion 56, which guides the dust separated by the dust separation portion 60 into the dust-collecting chamber portion 55 and a negative pressure camber 57 integrally formed on the dust-collecting camber portion 55.

[0033] The dust separation portion 60 comprises a frame body 61 formed with a plurality of openings 61A, and a net filter F1 attached to each of the openings 61A. The inner side surrounded by this net filter F1 is a trumpet shaped air trunk 62. This air trunk 62 linearly extends in the front and back direction.

[0034] The flame body 61 includes a front end opening 61a facing the suction inlet 52 and having a diameter larger than the suction inlet 52 and a rear end opening 61b having a diameter substantially same as the diameter of the suction inlet 52.

[0035] A guide air trunk portion 56 is communicated with the rear end opening 61b of the frame body 62 and an introduction opening 55d provided in a rear portion of a ceiling wall 55A of the dust-collecting chamber 55.

[0036] The negative pressure camber 57 is communicated with the rear end opening 51. The dust separation portion 60 and guide air trunk 56 are formed in the negative pressure chamber 57. The air trunk 62 of dust separation portion 60 is communicated with the negative pressure chamber 57 via each of the openings 61A of the frame body 61.

[0037] An opening 55Ha is formed in a rear wall 55H of the dust-collecting chamber portion 55, and the dust-collecting chamber portion 55 is communicated with the negative pressure chamber 57 via the opening 55Ha. A filter F2 is attached to the opening 55Ha.

[0038] A pushing plate or a pushing member 100 is disposed under the ceiling wall 55A of the dust-collecting chamber portion 55 in an upwardly and downwardly movable manner. This pushing plate 100 is integrally formed with a domy guide wall portion 101 disposed along the inner side of the guide air trunk portion 56 as shown in FIG. 10.

[0039] In addition, the pushing plate 100 is formed with an opening 102 facing the rear end opening 61 of the dust separation portion 60 and an opening 103 facing the introduction opening 55d of the dust-collecting chamber portion 55. A dust elimination mechanism, for example, a blade 107, which slides a filter surface F2a of the upstream side of the filter F2, is attached to the rear end portion of the pushing plate 100. Moreover, rods 104, 104 extending up and down, are detachably mounted on the both side portions of the pushing plate 100.

[0040] A lower portion 104A of the rod 104 is formed with a pair of projections 120, 120, which project in the diameter direction and extend in the up and down direction. Each of the lower portions of the projections is formed with projecting portions 120A, 120A, which project in the diameter direction. The upper positions of the projections 120, 120 are also provided with a flange 121.

[0041] On the other hand, the pushing plate 100 is formed with a hole 110 for installing the lower portion 104A of the rod 104 as shown in FIGs. 12, 13. A rib 111 is formed around the hole 110. A C-ring 112 is attached in the circumference of the rib 111. The C-ring 112 is not removed due to projecting portions 111A, 111B, etc., provided in the rib 111.

[0042] A pair of concave portions 110A, 110A extending in the diameter direction are formed in the hole 110. This concave portion 110A, 110A slightly extends from the outside of the C-ring 112. Moreover, a circular concave portion 115 having a diameter larger than the diameter of the hole 110 is formed in the upper portion of the hole 110.

[0043] If the lower portion 104A of the rod 104 is fitted into the hole 110 by inserting the projections 120, 120 of the lower portion 104A of the rod 104 into the concave portions 110A, 110A of the hole 110 of the pushing plate 100, the projecting portions 120A, 120A of the projections 120, 120 expand the C-ring 1121 to overcome the inner side of the C-ring 112, and then, as shown in FIGs. 14, 15, the projecting portions 120A, 120A of the projections 120, 120 engage with the C-ring 112, and the flange 121 of the lower portion 104A of the rod 104 is inserted into the concave portion 115 of the hole 110.

[0044] As described above, the rods 104, 104 are attached to the holes 110, 110, respectively. If the rods 104, 104 are pulled up with strength more than predeter-

mined strength, the C-ring 112 expands such that the projecting portions 120A, 120A of the projections 120, 120 disengage from the C-ring 112. Thereby, the rods 104, 104 can be removed from the holes 110, 110 of the pushing plate 100. More particularly, the pushing plate 100 can be removed from the rods 104, 104.

[0045] Moreover, the rods 104, 104 penetrate holes 55f, 55f provided in the both end portions of the ceiling wall 55A of the dust-collecting chamber portion 55 in an upwardly and downwardly movable manner, as shown in FIG. 16.

[0046] The upper ends of rods 104, 104 are provided with rack portions 105, 105 extending in the up and down direction. The rack portions 105, 105 are formed with racks 106, 106.

[0047] On the contrary, leg portions 86, 86, which extend downward, and are inserted into holes 71A, 71A provided in the cover cases 71, 71 (reference to FIG. 6) in an upwardly and downwardly movable manner, are disposed in the both end portions of the lever 85. The leg portions 86, 86 are formed with racks 72, 72. In addition, the lower portions of the leg portions 86, 86 are provided with shafts 87, 87, which project downward, and the upper portions of the shafts 87, 87 are formed with flanges 87F, 87F.

[0048] Springs S1, S1 are mounted on the shafts 87, 87 as shown in FIG. 7. The upper portions of the springs S1, S1 are locked to the flanges 87F, 87F, and the lower portions of the springs S1, S1 are locked to the upper surface of the ceiling wall 55A of the dust-collecting chamber portion 55. The lever 85 is biased upward by the biasing force of the springs S1, S1, and projecting portions 85A, 85A provided in the both end portions of the lever 85 have contact with the lower surfaces of the cover cases 71, 71. Thereby, the lever 85 is controlled not to move upward at a predetermined amount or more.

[0049] The interlocking mechanism 70 comprises, as shown in FIG. 10, a rack 72 disposed in the leg portion 86 of the lever 85, a fan-shaped gear 73 engaged with the rack 72, a fan-shaped gear 75 attached to a shaft 74 of the gear 73 as shown in FIG. 17, a rack 106 engaged with the gear 75 and the like.

[0050] The gear 73 is rotatably mounted on the cover case 71. The diameter of gear 75 is set larger than the diameter of the gear 73.

[0051] If the lever 85 is pushed down against the biasing force of springs S1, S1, the gears 73, 73 rotate in the counterclockwise direction (in FIG. 9), and the gears 75, 75 rotate in the counterclockwise direction together with the gears 73, 73. The racks 106, 106 move downward together with the rods 104, 104 by the counterclockwise rotation of the gears 75, 75.

[0052] Since the diameters of gears 75 are set larger than the diameters of gears 73, the rods 104, 104 move downward larger than the pushing down amount of the lever 85.

[0053] The pushing plate 100 is pushed down by the downward movement of the rods 104, 104.

[0054] As just described, if the lever 85 is pushed down, the pushing plate 100 is pushed down by the interlocking mechanisms 70, 70.

[0055] The opening and closing mechanism 90 comprises an arm 91 disposed in the vicinity of the interlocking mechanism 70 in an upwardly and downwardly movable manner, a link member 93, which rotates about a shaft 92 by the upward and downward movement of the arm 91 and the like as illustrated in FIGs. 7 and 18.

[0056] The arm 91 is held in the inner side of the cover case 71 in an upwardly and downwardly movable manner, and a top portion 91A of the arm 91 penetrates the hole 71B provided in the cover case 71 to project upward as shown in FIG. 6. The top portion 91A of the arm 91 is formed in an operation portion, which opens and closes the bottom lid 59. The arm 91 is biased upward by a spring (not shown), such that the operation portion 91A of the arm 91 constantly projects from the cover case 71 as shown in FIG. 6.

[0057] The link member 93 is supported by a shaft 92 disposed in a side wall portion 55S of the dust-collecting chamber portion 55. As shown in FIG. 19, a hook 94 is formed in the lower portion of the link member 93. If the hook 94 is locked to a locking portion (not shown) provided in the bottom lid 59, the bottom lid 59 does not open.

[0058] If the arm 91 moves downward against the biasing force of the spring by pushing the operation portion 91A of the arm 91, the link member 93 rotates in the clockwise direction as shown in FIG. 19. Thereby, the hook 94 of the link member 93 is unlocked from the locking portion of the bottom lid 59, so as to open the bottom lid 59.

[0059] The bottom lid 59 opens by rotating in the arrow P1 direction centering on an axis line J1 in the left side as shown in FIG. 6.

[0060] As described above, if the operation portion 91A of the arm 91 is pushed, the bottom lid 59 opens by the opening and closing mechanism 90.

[Operation]

[0061] Next, operation of an electric vacuum cleaner constructed as described above will be explained.

[0062] At first, as shown in FIG. 2, the dust-collecting case 50 is installed into the dust-collecting case chamber 21 of the vacuum cleaner body 11, and as shown in FIG. 1, the dust-collecting hose 12 is connected to the connection port 10A of the vacuum cleaner body 11 and also the suction inlet 15 is connected to the hand-held operation pipe 13 via the extension tube 14.

[0063] If the switch 13a of operation portion 13A of the hand-held operation pipe 13 is operated, the electric blower fan 23 is driven. By this driving of the electric blower fan 23, air is sucked from the suction opening 24 of the electric blower fan 23, and the air acts on the rear opening 51 of the dust-collecting case 50 via the connection air trunk G, and then the negative pressure chamber 57 of the dust-collecting case 50 becomes negative pres-

sure through the pleat filter body P. In this case, the communication state between the hole 41 and the suction opening 24 of electric blower fan 23 is blocked. Therefore, the negative pressure does not act on the hole 41, so the button 42 does not move downward.

[0064] The negative pressure by the driving of the electric blower fan 23 acts on the dust-collecting camber portion 55 via the filter F2 of the dust-collecting camber portion 55 and acts on the air trunk 62 of the dust separation 60 via the net filter F1. This negative pressure acts on the dust-collecting hose 12, extension tube 14 and suction inlet 15 through the suction port 52 of the dust-collecting case 50; thereby, dust is sucked from the suction inlet 15 with air.

[0065] This sucked dust and air are sucked into the suction port 52 of the dust-collecting case 50 through the extension tube 14 and the dust-collecting hose 12. The dust and air sucked into the suction port 52 is sucked into the air trunk 62 of the dust separation portion 60.

[0066] A part of the air sucked into the air trunk 62 is sucked into the negative pressure chamber 57 of the dust-collecting case 50 via the net filter F1 of the dust separation portion 60, and is sucked into the suction opening 24 of the electric blower fan 23 via the pleat filter F1 of the rear opening 51 of the dust-collecting case 50 and the connection air trunk G.

[0067] On the other hand, since the dust sucked into the air trunk 62 of the dust separation portion 60 has mass larger than air, the dust goes straight ahead the air trunk 62 by the inertia, and is guided to the guide wall portion 101 of the pushing plate 100 to be introduced into the dust-collecting camber portion 55. More particularly, the air and dust are separated by the dust separation portion 60, and the separated dust is collected in the dust-collecting chamber portion 55.

[0068] In addition, the air, which has gone through the air trunk 62, is guided into the guide wall portion 101 of the pushing plate 100 to be introduced into the dust-collecting chamber portion 55. The air introduced into the dust-collecting chamber portion 55 is sucked in the negative pressure chamber 57 of the dust-collecting case 50 through the filter F2 of the rear wall 55H of the dust-collecting chamber portion 55, and is sucked in the suction opening 24 of the electric blower fan 23 through the pleat filter body P of the rear opening 51 of the dust-collecting case 50 and the connection air trunk G.

[0069] When cleaning is finished, the driving of electric blower fan 23 is stopped by operating the switch 13a of the operation portion 13A. Next, if the button 42 of vacuum cleaner body 11 is pressed down, the lever 85 is pushed down against the biasing force of the springs S1, S1 as shown in FIGs. 20-22.

[0070] If the lever 85 is pushed down, the pushing plate 100 is pushed down by the interlocking mechanism 70.

[0071] When the pushing plate 100 is pushed down, the blade 107 of the pushing plate 100 slides the filter surface F2a of the filter F2, so as to scrape the dust attached to the filter surface F2a. In addition, the dust accumulated in the dust-collecting chamber portion 55 is compressed by the pushing down of the pushing plate 100. Therefore, a large amount of dust can be accumulated in the dust-collecting chamber portion 55.

[0072] If a hand is released from the button 42, the lever 85 gets back to the original position by the biasing force of the springs S1, S1, and the pushing plate 100 and the button 42 get back to the original positions in conjunction with the lever 85 as shown in FIG. 5.

[0073] Next, it will be explained when throwing away dust accumulated in the dust-collecting chamber portion 55.

[0074] At first, the lid body 40 of the vacuum cleaner body 11 is opened to remove the dust-collecting case 50. Next, if the operation portion 91A shown in FIG. 6 is pressed, the bottom lid 59 rotates in the arrow P1 direction centering on the axis line J1 to be opened by the opening and closing mechanism 90.

[0075] Next, if the lever 85 is clasped together with the holding portion 54, the lever 85 is pushed down toward the holding portion 54 as shown in FIG. 23, and by this pushing down of the lever 85, the pushing plate 100 is pushed down by the interlocking mechanism 70 up to a position sufficient to discharge the dust as shown in FIG. 10. Thereby, the dust in the dust-collecting chamber portion 55 is pushed out of the bottom portion opening of the dust-collecting case 50. Accordingly, the dust can be easily thrown away.

[0076] If the dust-collecting case 50 is not disposed in the dust-collecting case chamber 21 of the vacuum cleaner body 11, the suction opening 24 of the electric blower fan 23 is directly communicated with the dust-collecting case chamber 21 of the vacuum cleaner body 11 via the guide air trunk G. In this sate, if the switch 13a of the operation portion 13A of the hand-held operation pipe 13 is operated, the electric blower fan 23 is driven, and the dust-collecting case chamber 21 becomes negative pressure.

[0077] As shown in FIG. 4, the button 42 of the lid body 40 is pushed down against the biasing force of the spring (not shown) by this negative pressure, and the hole 41 of the lid body 40 is opened. Thereby, external air is directly introduced into the dust-collecting chamber 21 of the vacuum cleaner body 11 through the hole 41, and air is hardly sucked from the suction inlet 15 to be operated on the cleaning surface having a lot of dust. More particularly, dust can be prevented from sucking from the suction inlet 15.

[0078] Therefore, a defect that the dust sucked from the suction inlet 15 is directly sucked into the electric blower fan 23 can be prevented. Moreover, when a secondary filter (not shown) is disposed in the upstream side of the electric blower fan 23, immediate clogging of the secondary filter is prevented. Furthermore, a defect that a solid foreign material sucked by the suction inlet 15 is sucked into the electric blower fan 23 by breaking the secondary filter to brake down the electric blower fan can be prevented.

[0079] Since external air is directly communicated with the dust-collecting case chamber 21 through the hole 41 provided in the lid body 40 in a state that the dust-collecting case 50 is not installed, the lid body 40 can be closed in a state that the dust-collecting case 50 is not installed. Therefore, it is convenience for carrying and the like.

[0080] Furthermore, since the hole 41, which projects the operation button 42 for compressing dust, also serves as the hole for introducing external air into the dust-collecting case chamber 21, the structure of vacuum cleaner body 11 is simplified.

[0081] In addition, the pushing plate 100 can be removed from the rods 104, 104, dust entered on the pushing plate 100 can be cleaned.

[0082] FIG. 24 shows a part of dust-collecting case 150 of another example. In this dust-collecting case 150, a pushing plate 207 rotates about a shaft 201 by the interlocking mechanism 70 up to a position shown by a chained line. The filter F2 is formed in a circular arc, and a dust-removing mechanism, i.e., the blade 107 slides the filter surface F2a of the filter F2 when rotating the pushing plate 200, and also the dust of dust-collecting chamber portion 55 is pushed out by the pushing plate 200. Reference number 202 denotes an opening.

[0083] By the way, if the button 42 of the lid body 40 moves downward by the negative pressure of the dust-collecting case chamber 21 to open the hole 41. However, when external air flows through the hole 41, the button 42 can be vibrated up and down by setting scale of biasing force of a spring (not shown), which biases the button 42, to a predetermined scale. Annunciation sound may be generated by the vibration of this button 42. In this case, an annunciation mechanism comprises the button 42 and the spring.

[0084] Moreover, a vibration member or an alert member, which vibrates by external air flowing through the hole 41 to generate sound, may be provided in the hole 41, so as to warn that the dust-collecting case 50, 150 is not disposed.

[0085] In the above embodiments, the dust of dust-collecting chamber portion 55 is pushed out by the pushing plate 100, 200; however, the dust is not necessary to be pushed. More particularly, the pushing plate 100, 200 may be configured to remove the dust adhered to the filter F1 by the blade 107. In this case, a dust-removing mechanism comprises the pushing plate 100 (200), blade 107 and interlocking mechanism 70. Where, the button 42 is a button dedicated for driving the dust-removing mechanism.

[0086] According to the present invention, if the electric blower fan is driven in a state that the dust-collecting case is not installed, the suction of dust from the suction inlet can be substantially stopped. Therefore, the dust sucked into the dust-collecting case chamber or electric blower fan can be prevented from occurring.

[0087] In addition, according to the present invention, if the dust-collecting case is not installed, the vacuum cleaner body can be carried while the lid body of the dust-collecting case chamber is closed. Therefore, the structure of the present invention is different from the arts such as the above JP H01-291821A and JP 3297224B, which disclose structures that the vacuum cleaner body can not be set and the lid of dust-collecting case chamber is not closed when a paper bag and dust-collecting bag is not installed. Moreover, according to the present invention, external air is flowed into the dust-collecting case chamber with the driving of electric blower fan when the dust-collecting case is not installed. Therefore, the structure of the present invention is different from the structure disclosed in JP H11-9526B, which intakes external air when the dust-collecting case is clogged with dust. The present invention is not limited to the above embodiments, and various changes and modifications can be applied to those embodiments.

[0088] For example, in the above embodiments, the opening and closing member constantly closes the hole by the biasing force of spring (not shown), regardless of the installing of the dust-collecting case 50 into the dust-collecting case chamber 21. However, the opening and closing member may close the hole when the dust-collecting case is installed into the dust-collecting case chamber, and the opening and closing member may open the hole when the dust-collecting case is not installed into the dust-collecting case chamber.

Claims

1. An electric vacuum cleaner, comprising:

a vacuum cleaner body (11) in which a connection port (10A) communicating with a suction inlet (15) is formed and a dust-collecting case chamber (21) communicated with the connecting port (10A) is formed;

a dust-collecting case (50), adapted to be detachably installed into the dust-collecting case chamber (21), has a suction port (52) communicating with the connection port (10A) and accumulates dust sucked from the suction port (52);

an electric blower fan (23) having a suction opening (24) adapted to communicate with the dust-collecting case (50) if installed into the dust-collecting case chamber (21); and

a structure adapted to control suction of the dust from the suction inlet (15), when the electric blower fan (23) is driven in a state that the dust-collecting case (50) is not installed into the dust-collecting case chamber (21), the structure comprising a mechanism (41, 42), adapted to cause external air to flow into the dust-collecting case chamber (21) when the electric blower fan (23) is driven, **characterized in that**

said structure includes a hole (41) communicat-

ing the dust-collecting case chamber (21) with the external air and an opening and closing member (42) openably and closably disposed in the hole (41), and when the dust-collecting case (50) is installed into the dust-collecting case chamber (21), the opening and closing member (42) is adapted to close the hole (41) such that the dust-collecting case chamber (21) is not communicated with the external air, and when the dust-collecting case (50) is not installed into the dust-collecting case chamber (21), the opening and closing member (42) is adapted to move downward by negative pressure with the driving of the electric blower fan (23) to open the hole (41), and to control the suction of the dust from the suction inlet (15) by the communication of the dust-collecting case chamber (21) with the external air.

2. The electric vacuum cleaner according to claim 1, further comprising an annunciation mechanism adapted to inform that the electric blower fan (23) is driven in a state that the dust-collecting case (50) is not installed into the dust-collecting case chamber (21), when the electric blower fan (23) is driven in a state that the dust-collecting case (50) is not installed into the dust-collecting case chamber (21).

3. The electric vacuum cleaner according to claim 2, wherein the annunciation mechanism comprises a spring adapted to bias the opening and closing member (42), such that the opening and closing member (42) is adapted to close the hole (41), and the spring is set such that the opening and closing member (42) is adapted to vibrate when the external air flows through the hole (41).

4. The electric vacuum cleaner according to claim 1 or 2, wherein the dust-collecting case (50) comprises a compression mechanism adapted to compress the collected dust by operation of a compression operation portion (85), and an opening and closing mechanism (90) comprising the compression operation portion (85).

5. The electric vacuum cleaner according to any preceding claim, wherein the dust-collecting case (50) comprises a filter and a dust-removing mechanism adapted to remove dust adhered to the filter by operation of an operation portion for removing dust, and the opening and closing member (42) comprises the operation portion for removing dust.

Patentansprüche

1. Elektrischer Staubsauger, mit
einem Staubsaugerkörper (11), in dem ein Verbindungsanschluss (10A), der mit einer Ansaugeinlassöffnung (15) in Verbindung steht, gebildet ist, und in dem eine Staubsammelbehälterkammer (21), die mit dem Verbindungsanschluss (10A) in Verbindung steht, gebildet ist,
einem Staubsammelbehälter (50), der angepasst ist, lösbar in der Staubsammelbehälterkammer (21) installiert zu werden, und der einen Ansauganschluss (52) aufweist, der mit dem Verbindungsanschluss (10A) in Verbindung steht und Staub sammelt, der von dem Ansauganschluss (52) angesaugt wird,
einem elektrischen Lüftergebläse (23), das eine Ansaugöffnung (24) aufweist, die angepasst ist, mit dem Staubsammelbehälter (50), wenn dieser in der Staubsammelbehälterkammer (21) installiert ist, in Verbindung zu stehen, und
einer Anordnung, die zum Steuern des Ansaugens des Staubes von der Ansaugeinlassöffnung (15), wenn das elektrische Lüftergebläse (23) in einem Zustand angetrieben wird, in welchem der Staubsammelbehälter (50) nicht in der Staubsammelbehälterkammer (21) installiert ist, wobei die Anordnung einen Mechanismus (41, 42) aufweist, der angepasst ist, externe Luft dazu zu bringen, in die Staubsammelbehälterkammer (21) zu strömen, wenn das elektrische Luftgebläse (23) angetrieben wird, **dadurch gekennzeichnet, dass**
die Anordnung ein Loch (41), das die Staubsammelbehälterkammer (21) mit der externen Luft verbindet, und eine ein Öffnungs- und Schließbauteil (42) enthält, das öffenbar und schließbar in dem Loch (41) angeordnet ist, und, wenn der Staubsammelbehälter (50) in der Staubsammelbehälterkammer (21) installiert ist, das Öffnungs- und Schließbauteil (42) zum Schließen des Lochs (41) angepasst ist, so dass die Staubsammelbehälterkammer (21) nicht mit der externen Luft in Verbindung steht, und, wenn der Staubsammelbehälter (50) nicht in der Staubsammelbehälterkammer (21) installiert ist, das Öffnungs- und Schließbauteil (42) angepasst ist, sich durch den negativen Druck mit dem Antreiben des elektrischen Lüftergebläse (23) zum Öffnen des Lochs (41) nach unten zu bewegen, und das Ansaugen des Staubs von der Ansaugeinlassöffnung (15) durch in Verbindungsstehen der Staubsammelbehälterkammer (21) mit der externen Luft zu steuern.

2. Elektrischer Staubsauger nach Anspruch 1, der weiter einen Anzeigemechanismus aufweist, der zum Informieren angepasst ist, dass das elektrische Lüftergebläse (23) in einem Zustand angetrieben wird, in welchem der Staubsammelbehälter (50) nicht in der Staubsammelbehälterkammer (21) installiert ist, wenn das elektrische Lüftergebläse (23) in einem Zustand angetrieben wird, in dem der Staubsammelbehälter (50) nicht in der Staubsammelbehälterkammer (21) installiert ist.

3. Elektrischer Staubsauger nach Anspruch 2, bei dem der Anzeigemechanismus eine Feder aufweist, die zum Vorspannen des Öffnungs- und Schließbauteils (42) angepasst ist, so dass das Öffnungs- und Schließbauteil (42) angepasst ist, das Loch (41) zu schließen, und die Feder ist so eingestellt, dass das Öffnungs- und Schließbauteil (42) zum Vibrieren angepasst ist, wenn die externe Luft durch das Loch (41) strömt.

4. Elektrischer Staubsauger nach Anspruch 1 oder 2, bei dem der Staubsammelbehälter (50) einen Komprimiermechanismus, der zum Komprimieren des gesammelten Staubs durch Betätigung eines Komprimierbetätigungsteils (85) angepasst ist, und einen Öffnungs- und Schließmechanismus (90) aufweist, der den Komprimierbetätigungsteil (85) aufweist.

5. Elektrischer Staubsauger nach einem der vorangegangenen Ansprüche, bei dem der Staubsammelbehälter (50) einen Filter und einen Staubentfernungsmechanismus aufweist, zum Entfernen des an dem Filter anhaftenden Staubs durch Betätigung eines Betätigungsteils zum Staubentfernen angepasst ist, und das Öffnungs- und Schließbauteil (42) den Entfernungsteil zum Staubentfernen aufweist.

Revendications

1. Aspirateur électrique, comprenant :

un corps d'aspirateur (11) dans lequel un orifice de raccordement (10A) communiquant avec une entrée d'aspiration (15) est formé et une chambre (21) de caisse collectrice de poussière en communication avec l'orifice de raccordement (10A) est formée ;
une caisse collectrice de poussière (50) adaptée pour être installée de manière amovible dans la chambre (21) de la caisse collectrice de poussière, qui présente un orifice d'aspiration (52) communiquant avec l'orifice de raccordement (10A) et accumule la poussière aspirée par l'orifice d'aspiration (52) ;
une soufflerie électrique (23) ayant une ouverture d'aspiration (24) adaptée pour communiquer avec la caisse collectrice de poussière (50) si elle est installée dans la chambre (21) de la caisse collectrice de poussière ; et
une structure adaptée pour commander l'aspiration de la poussière de l'entrée d'aspiration (15), lorsque la soufflerie électrique (23) est entraînée dans un état où la caisse collectrice de poussière (50) n'est pas installée dans la chambre (21) de la caisse collectrice de poussière,
la structure comprenant un mécanisme (41, 42) adapté pour faire entrer de l'air externe dans la chambre (21) de la caisse collectrice de poussière lorsque la soufflerie électrique (21) est entraînée, **caractérisé en ce que**
ladite structure comprend un orifice (41) faisant communiquer la chambre (21) de la caisse collectrice de poussière avec l'air externe et un élément d'ouverture et de fermeture (42) disposé de manière à pouvoir s'ouvrir et se fermer dans l'orifice (41) et, lorsque la caisse collectrice de poussière (50) est installée dans la chambre (21) de la caisse collectrice de poussière, l'élément d'ouverture et de fermeture (42) est adapté pour fermer l'orifice (41) de sorte que la chambre (21) de la caisse collectrice de poussière ne communique pas avec l'air externe et, lorsque la caisse collectrice de poussière (50) n'est pas installée dans la chambre (21) de la caisse collectrice de poussière, l'élément d'ouverture et de fermeture (42) est adapté pour se déplacer vers le bas par pression négative avec l'entraînement de la soufflerie électrique (23) pour ouvrir l'orifice (41) et commander l'aspiration de la poussière de l'entrée d'aspiration (15) par la communication de la chambre (21) de la caisse collectrice de poussière avec l'air externe.

2. Aspirateur électrique selon la revendication 1, comprenant en outre un mécanisme d'annonce adapté pour informer que la soufflerie électrique (23) est entraînée dans un état où la caisse collectrice de poussière (50) n'est pas installée dans la chambre (21) de la caisse collectrice de poussière, lorsque la soufflerie électrique (23) est entraînée dans un état où la caisse collectrice de poussière (50) n'est pas installée dans la chambre (21) de la caisse collectrice de poussière.

3. Aspirateur électrique selon la revendication 2, dans lequel le mécanisme d'annonce comprend un ressort adapté pour solliciter l'élément d'ouverture et de fermeture (42), de sorte que l'élément d'ouverture et de fermeture (42) soit adapté pour fermer l'orifice (41) et le ressort est réglé de sorte que l'élément d'ouverture et de fermeture (42) soit adapté pour vibrer lorsque l'air externe s'écoule à travers l'orifice (41).

4. Aspirateur électrique selon la revendication 1 ou 2, dans lequel la caisse collectrice de poussière (50) comprend un mécanisme de compression adapté pour comprimer la poussière recueillie par fonctionnement d'une portion de commande de compression (85) et un mécanisme d'ouverture et de fermeture (90) comprenant la portion de commande de compression (85).

5. Aspirateur électrique selon l'une quelconque des revendications précédentes, dans lequel la caisse col-

lectrice de poussière (50) comprend un filtre et un mécanisme d'élimination de poussière adapté pour éliminer la poussière accrochée au filtre par fonctionnement d'une portion de commande pour éliminer la poussière et l'élément d'ouverture et de fermeture (42) comprend la portion de commande pour éliminer la poussière.

FIG. 1

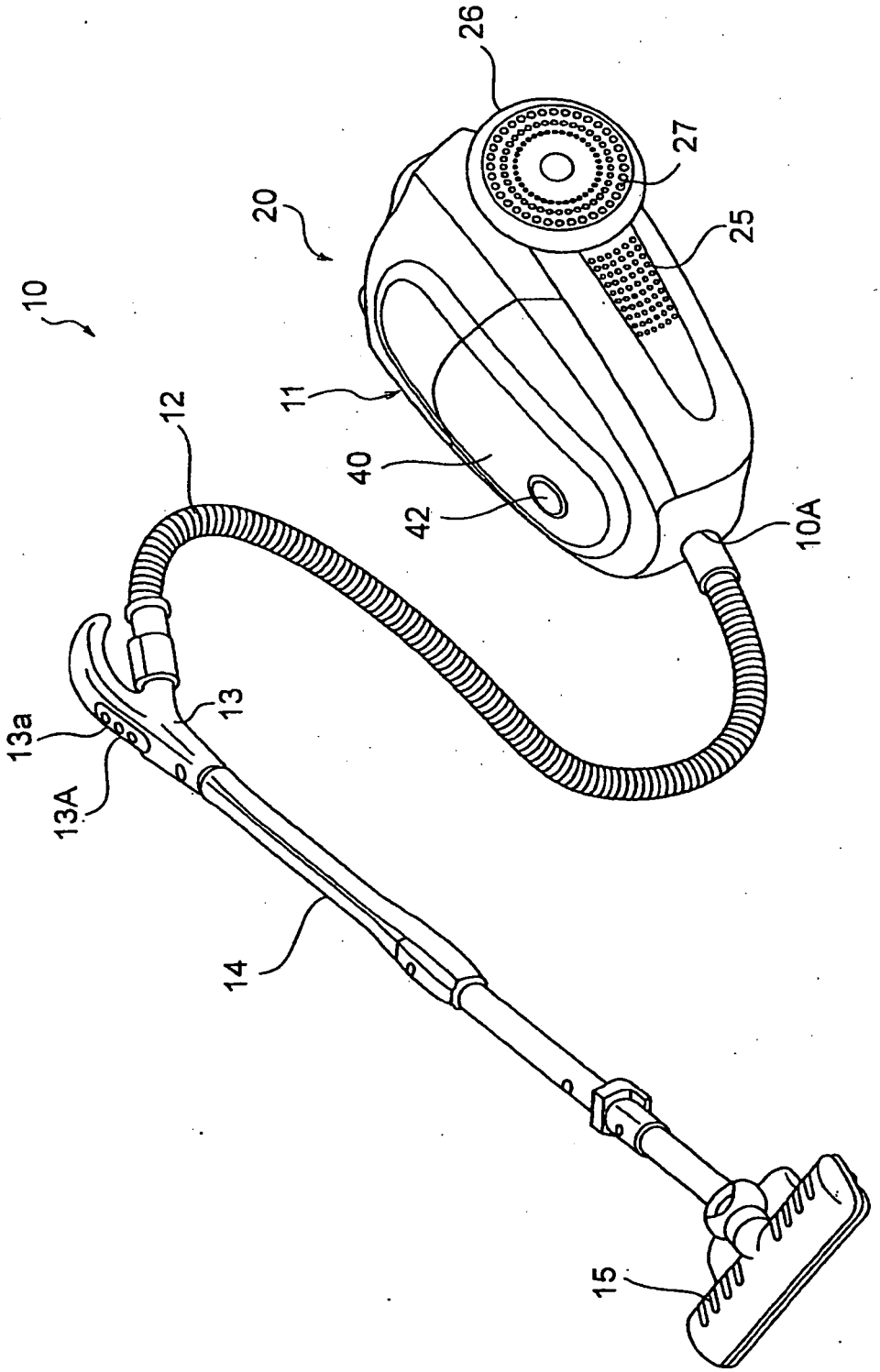


FIG. 2

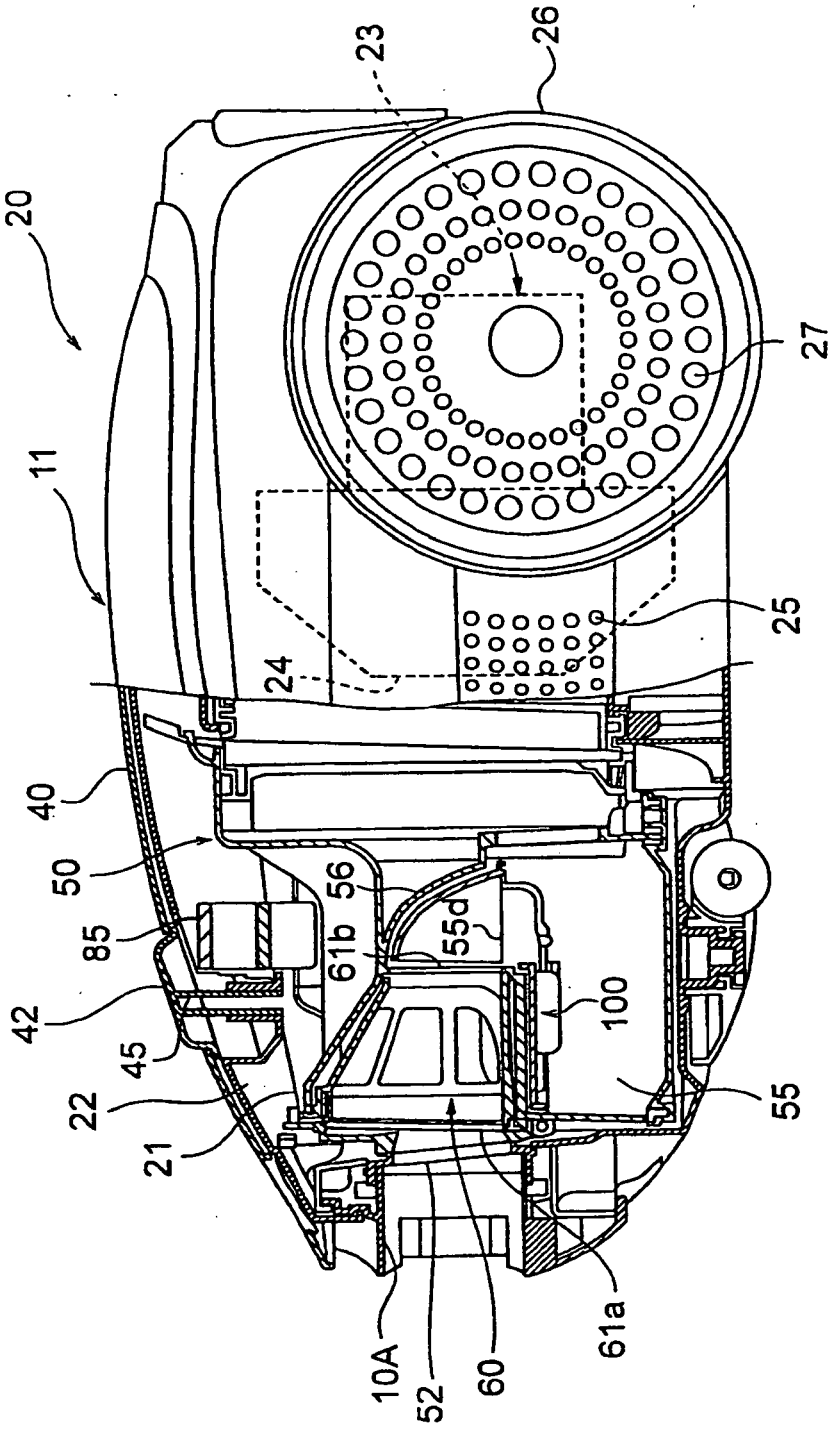

23
26
20
27
11
25
24
40
50
56
55d
61b
85
42
100
45
22
55
21
10A
52
60
61a

FIG. 3

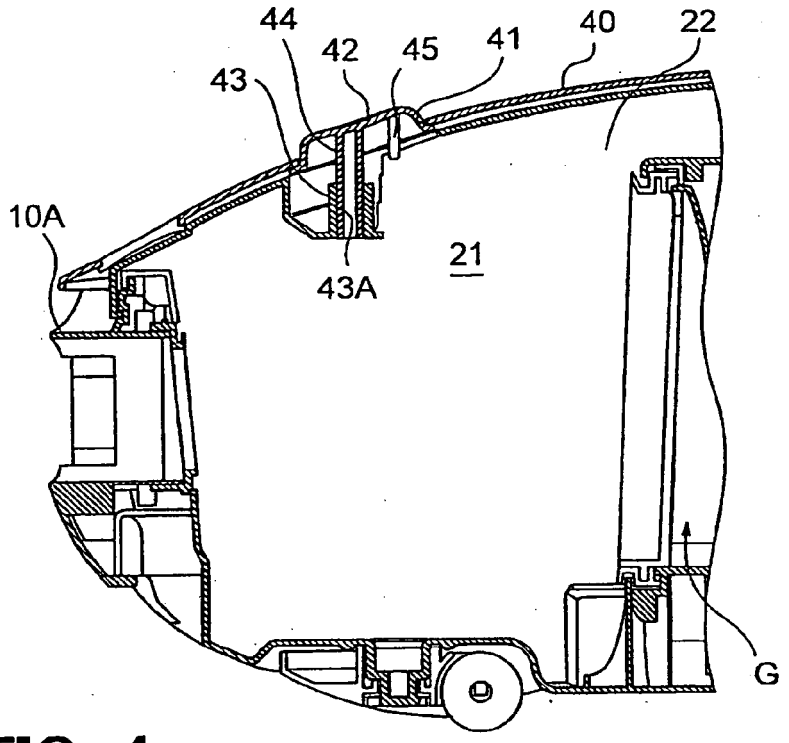


FIG. 4

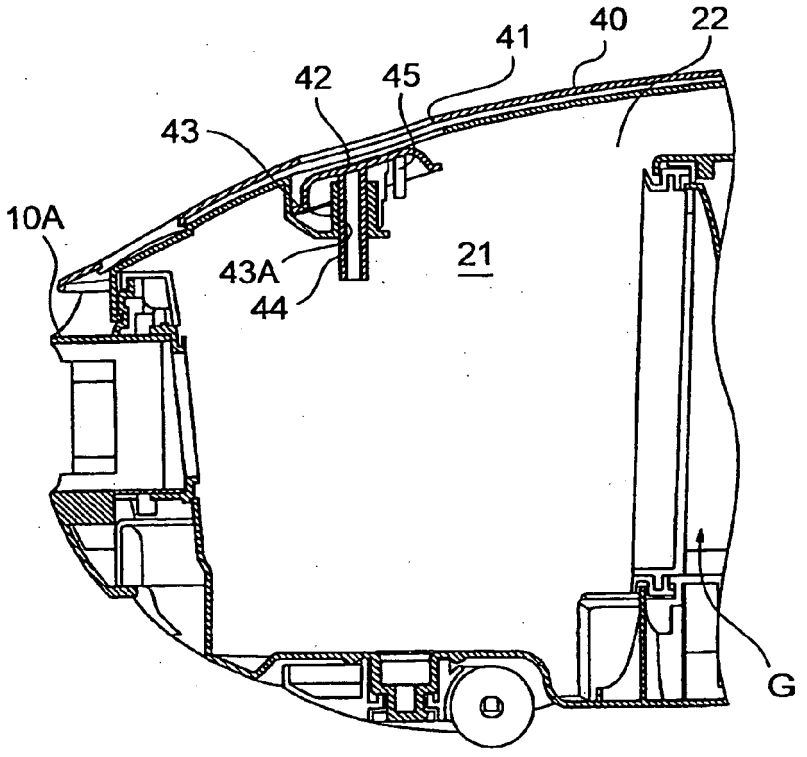


FIG. 5

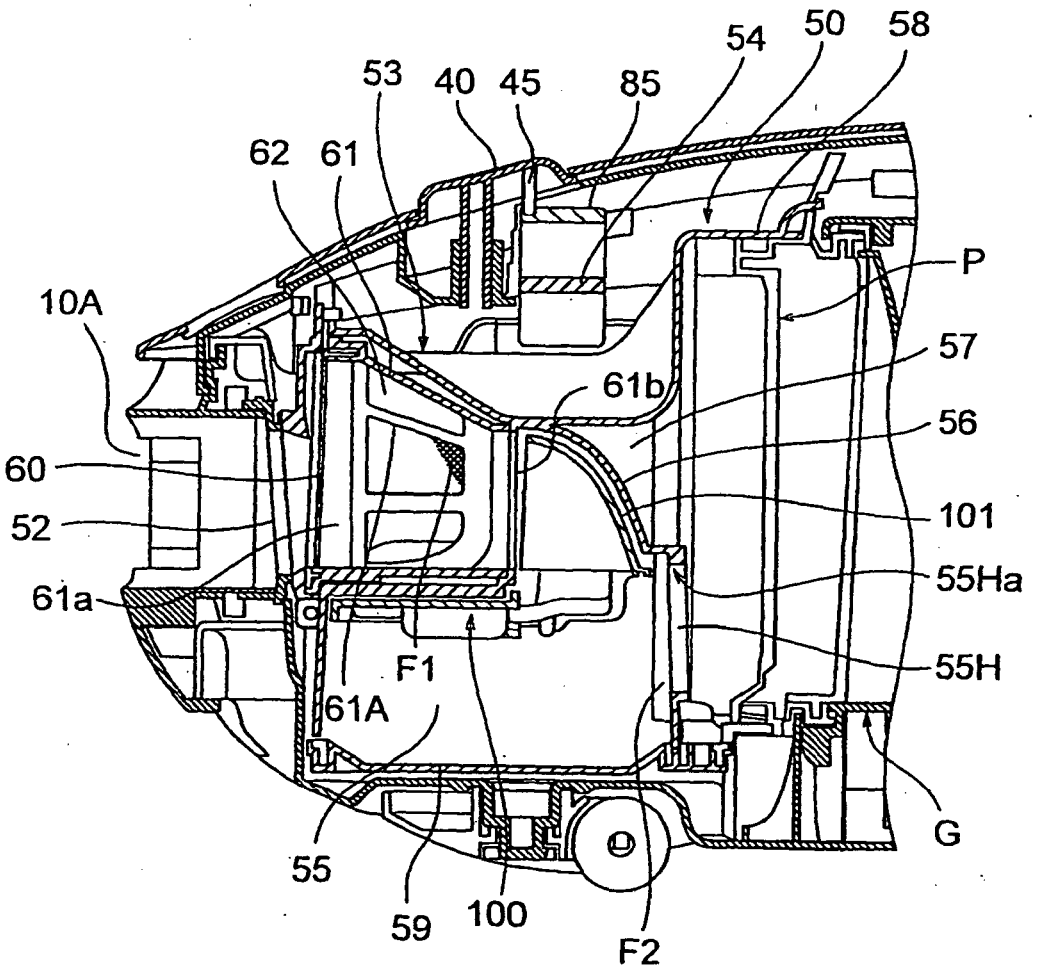

54
50
58
53
40
45
85
62
61
P
10A
57
61b
56
60
101
52
55Ha
61a
F1
55H
61A
G
55
59
100
F2

FIG. 6

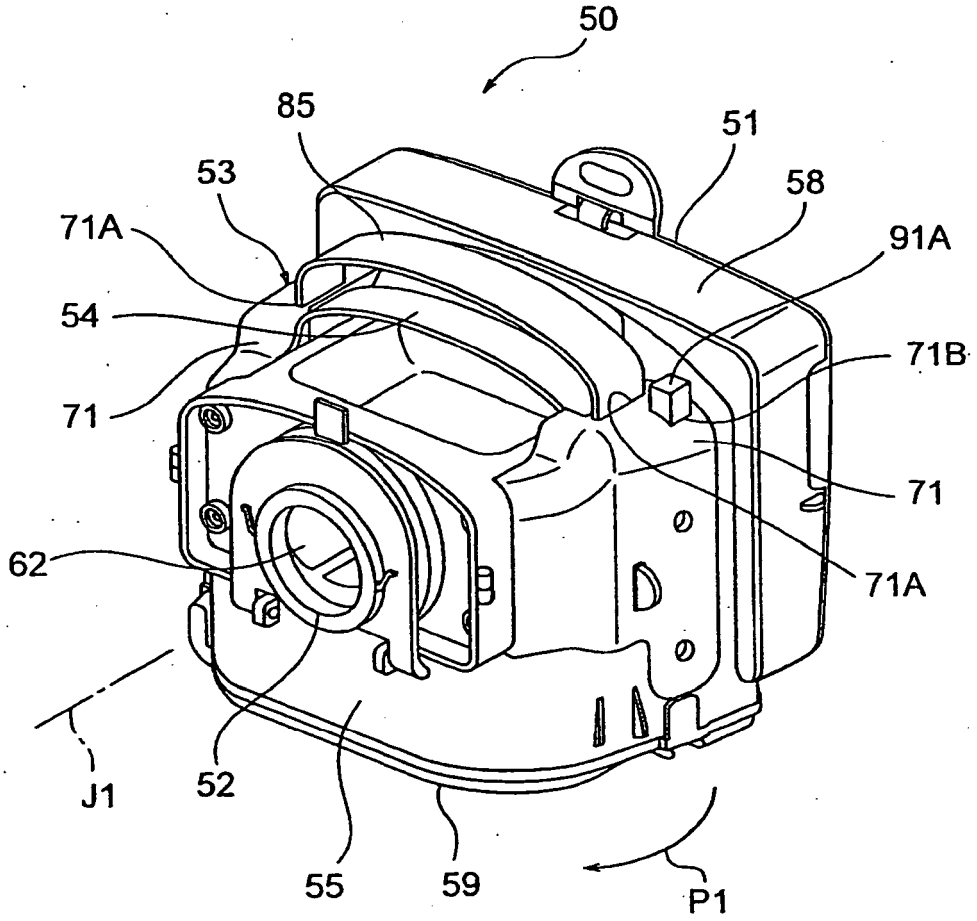


FIG. 7

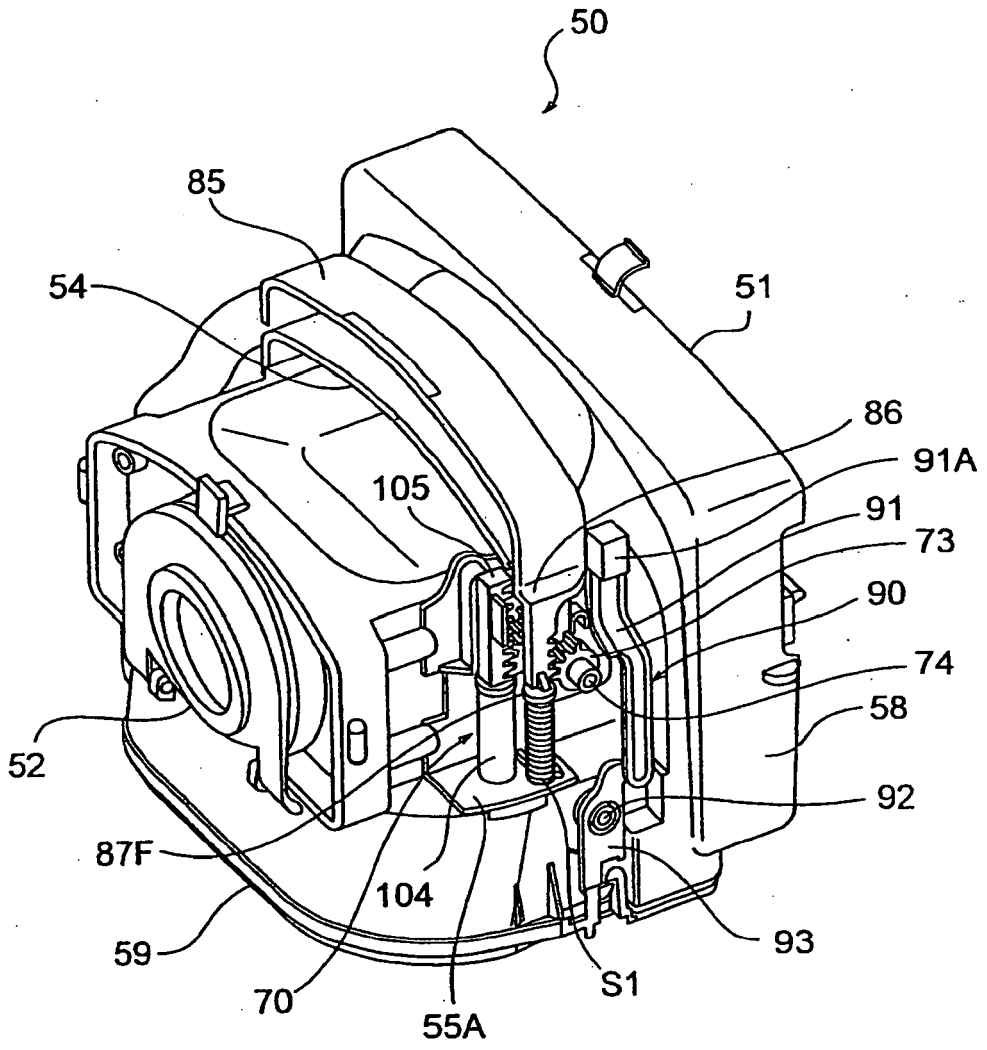


FIG. 8

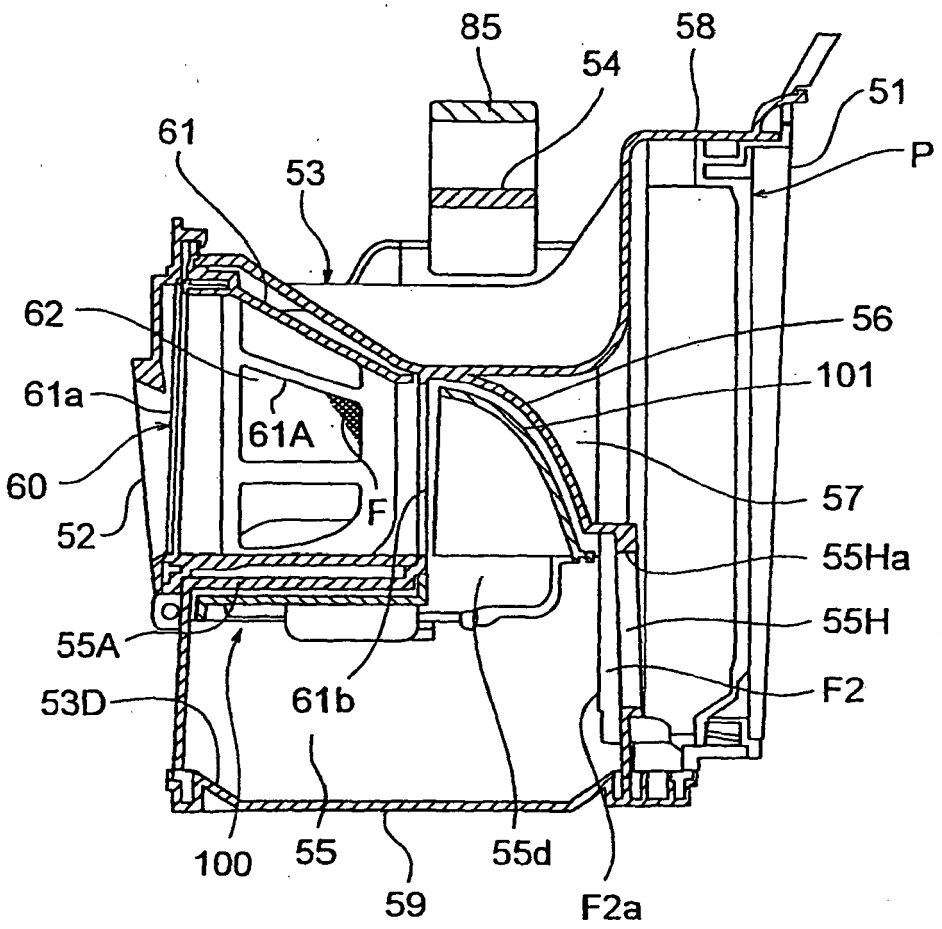

85
58
54
51
61
53
P
62
56
61a
101
61A
60
57
F
52
55Ha
55H
55A
F2
53D
61b
100
55
55d
59
F2a

FIG. 9

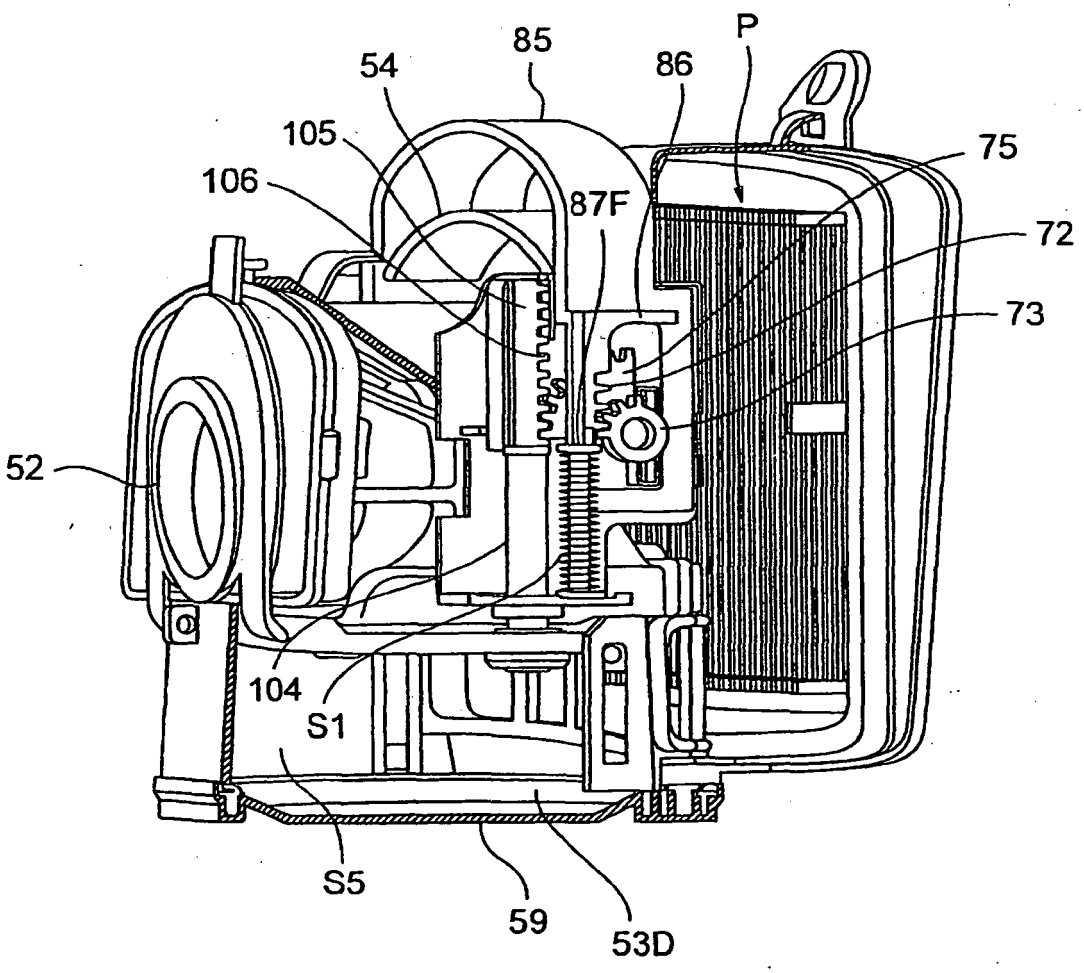


FIG. 10

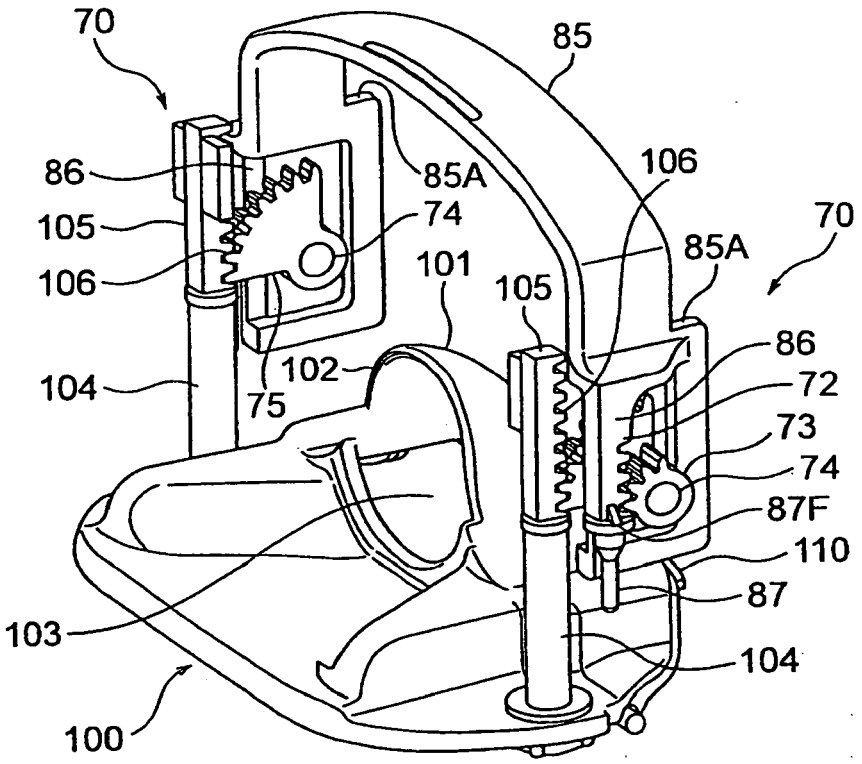

70
85
86
85A
106
105
74
70
106
85A
101
105
86
102
72
104
75
73
74
87F
110
87
103
104
100

FIG. 11

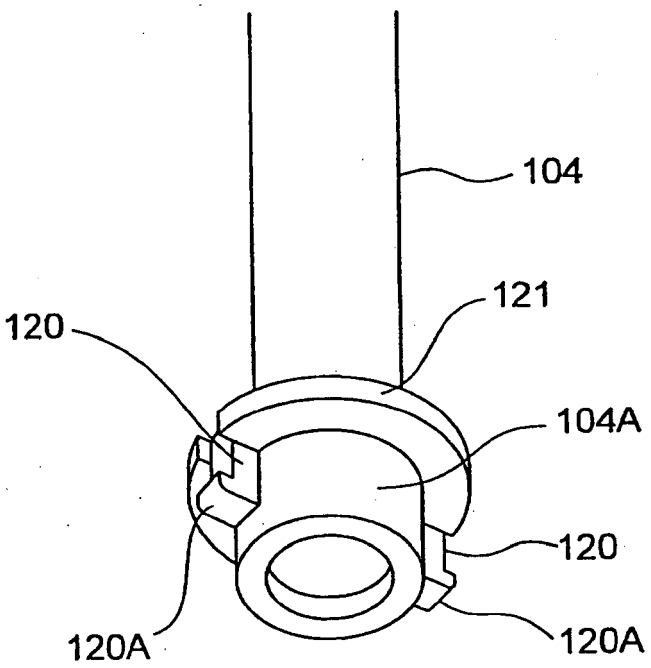


FIG. 12

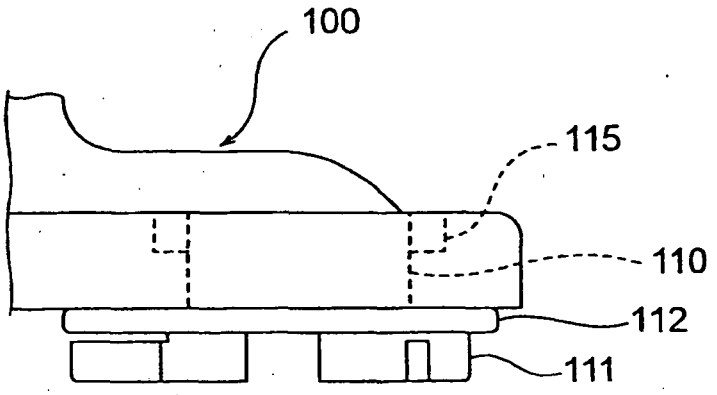


FIG. 13

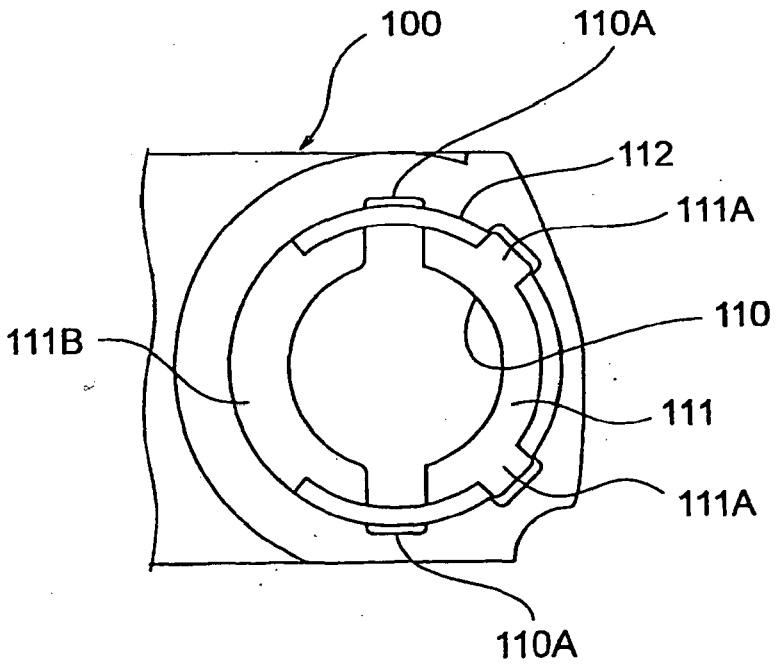


FIG. 14

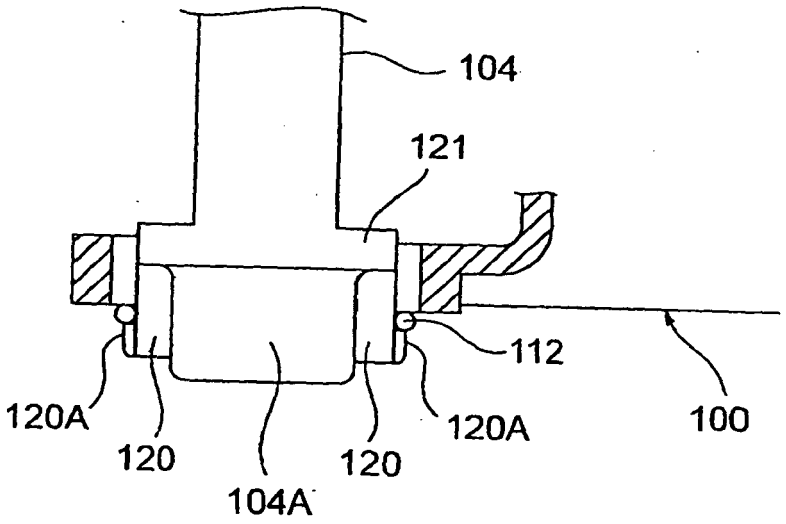

104
121
112
120A
120
104A
120
120A
100

FIG. 15

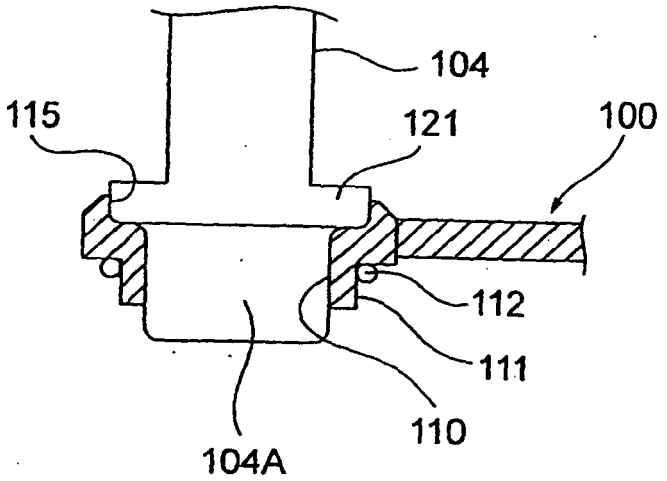

104
115
121
100
112
111
110
104A

FIG. 16

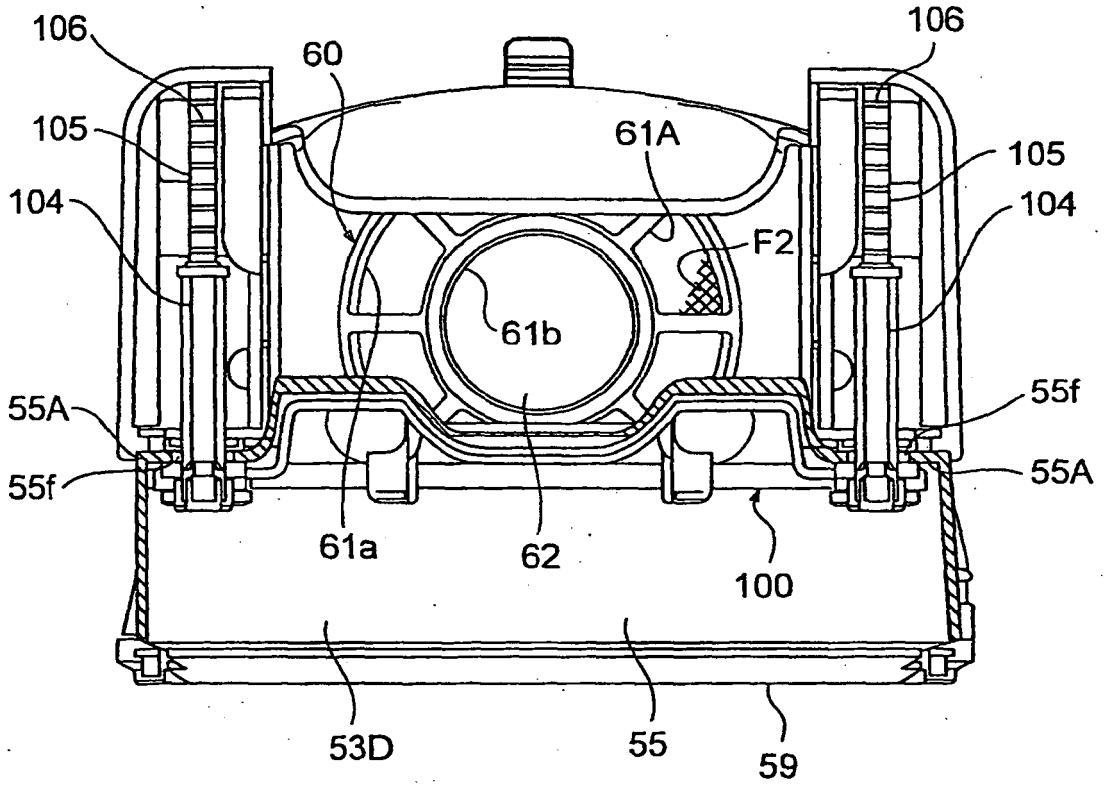

106
60
106
105
61A
105
104
F2
104
61b
55A
55f
55f
55A
61a
62
100
53D
55
59

FIG. 17

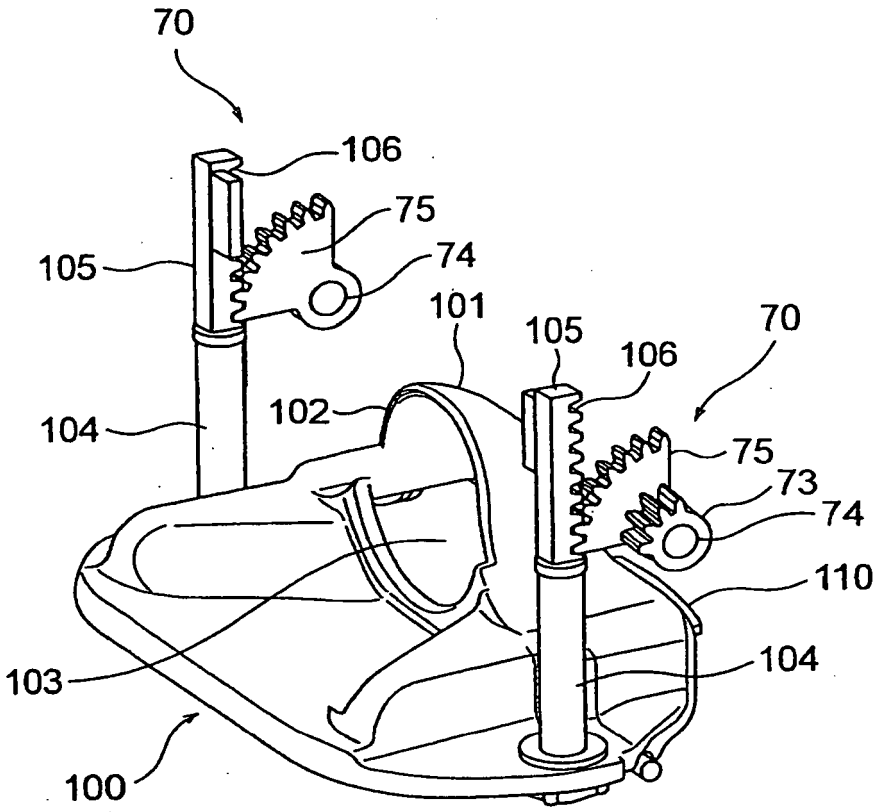
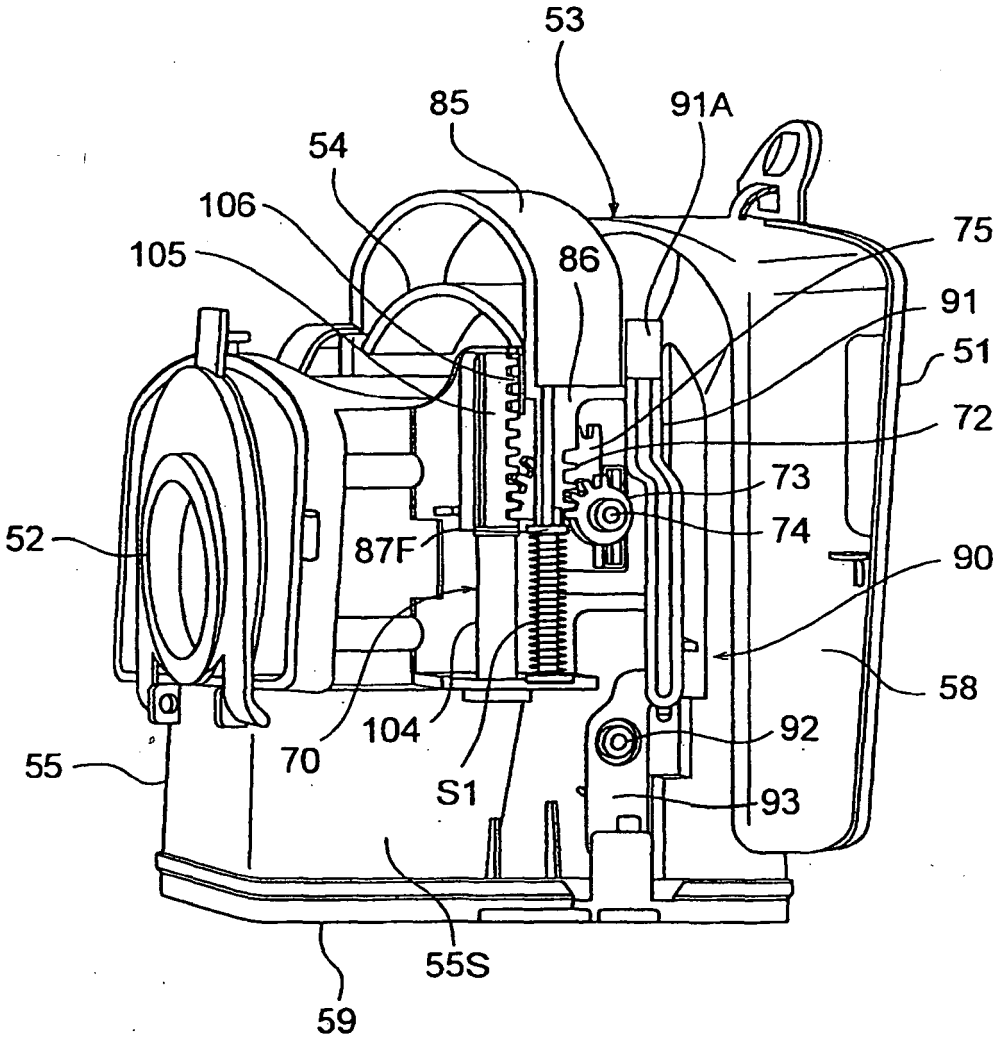


FIG. 18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106
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86
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87F
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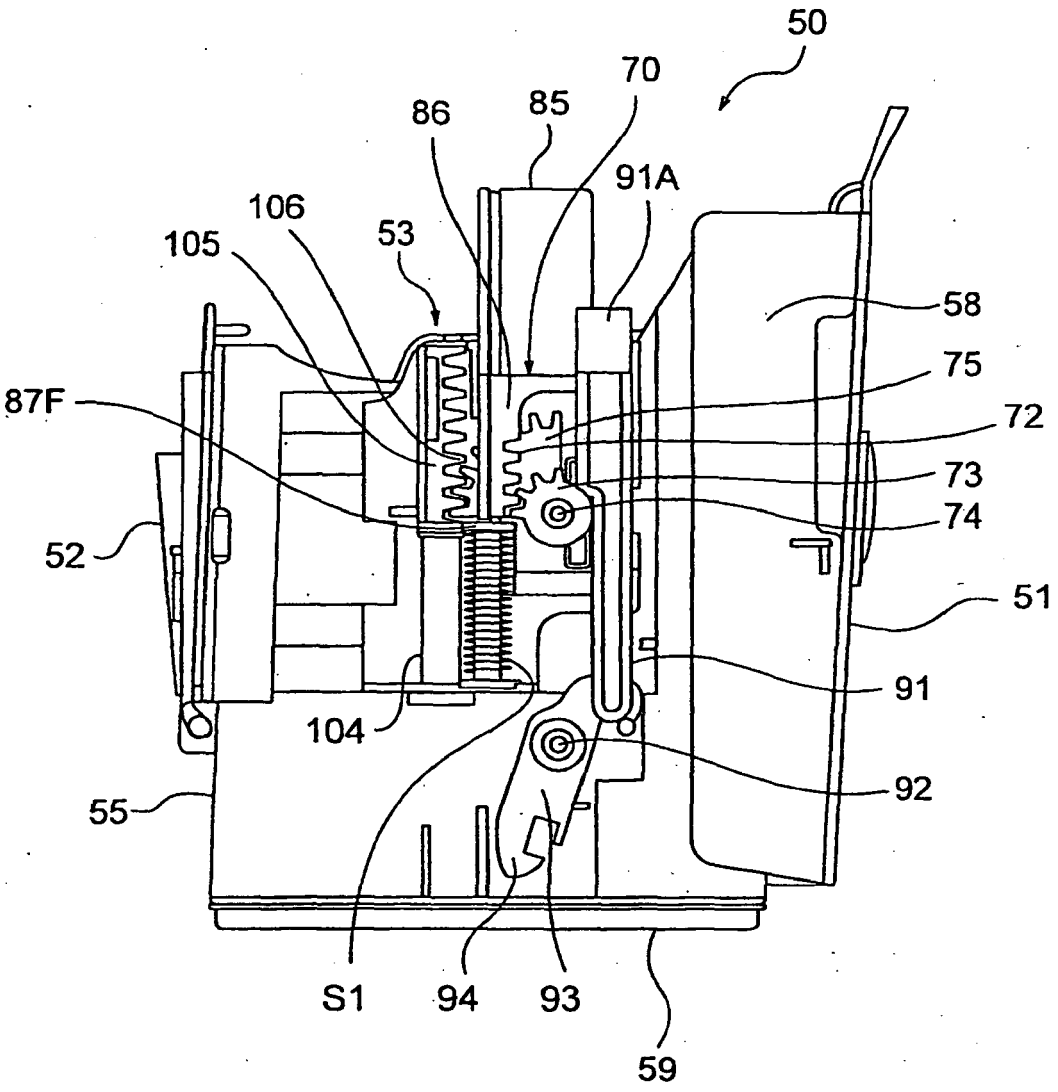
92
104
70
55
S1
93
55S
59

FIG. 19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91A
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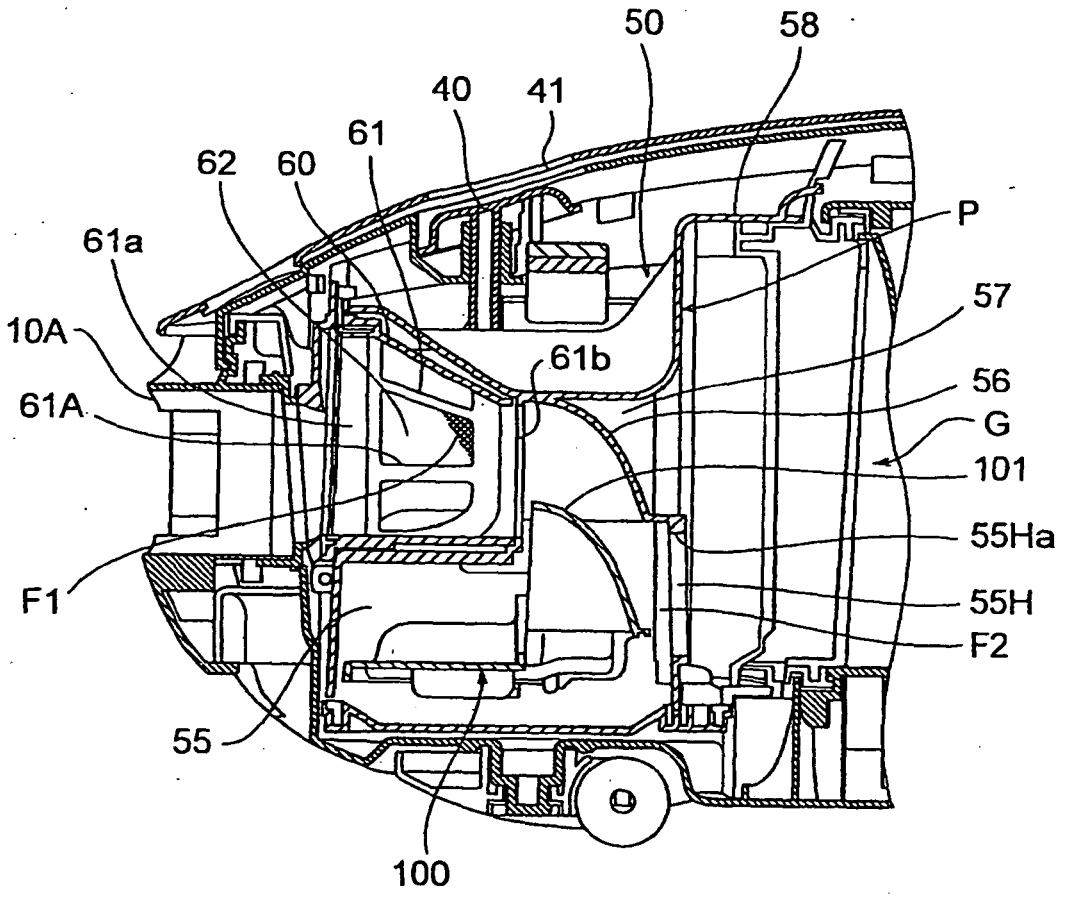
S1
94
93
59

FIG. 20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10A
61b
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61A
G
101
55Ha
F1
55H
F2
55
100

FIG. 21

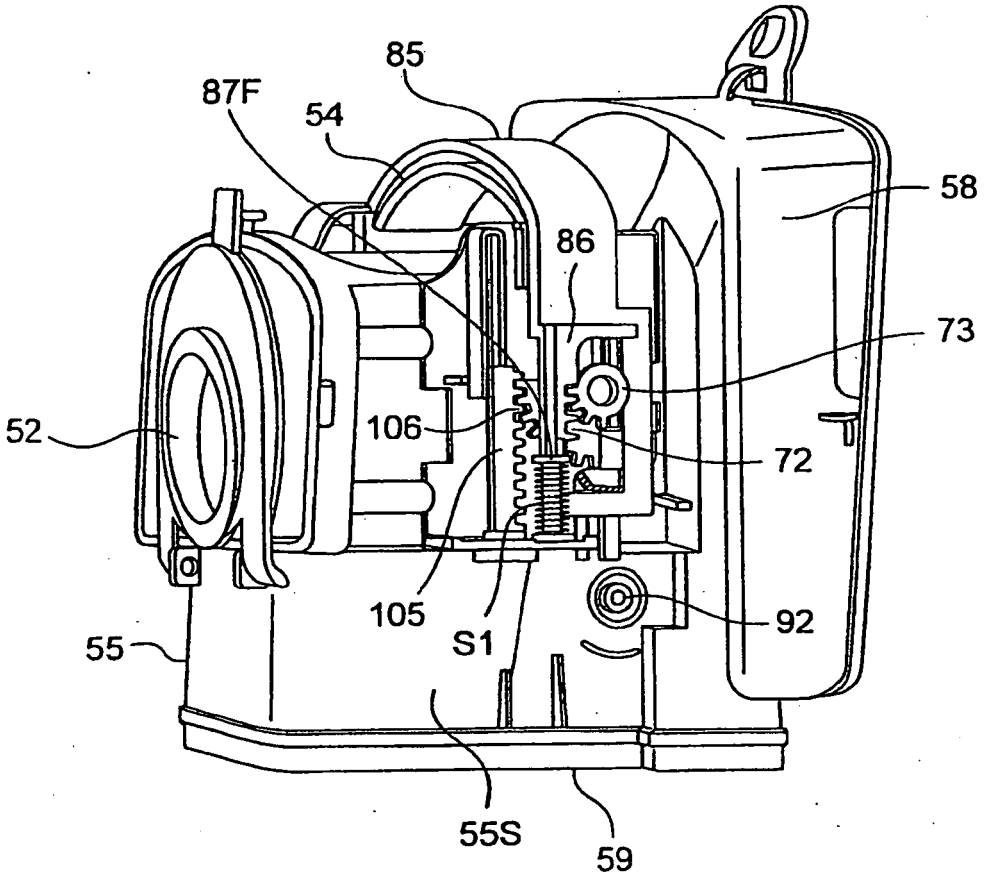


FIG. 22

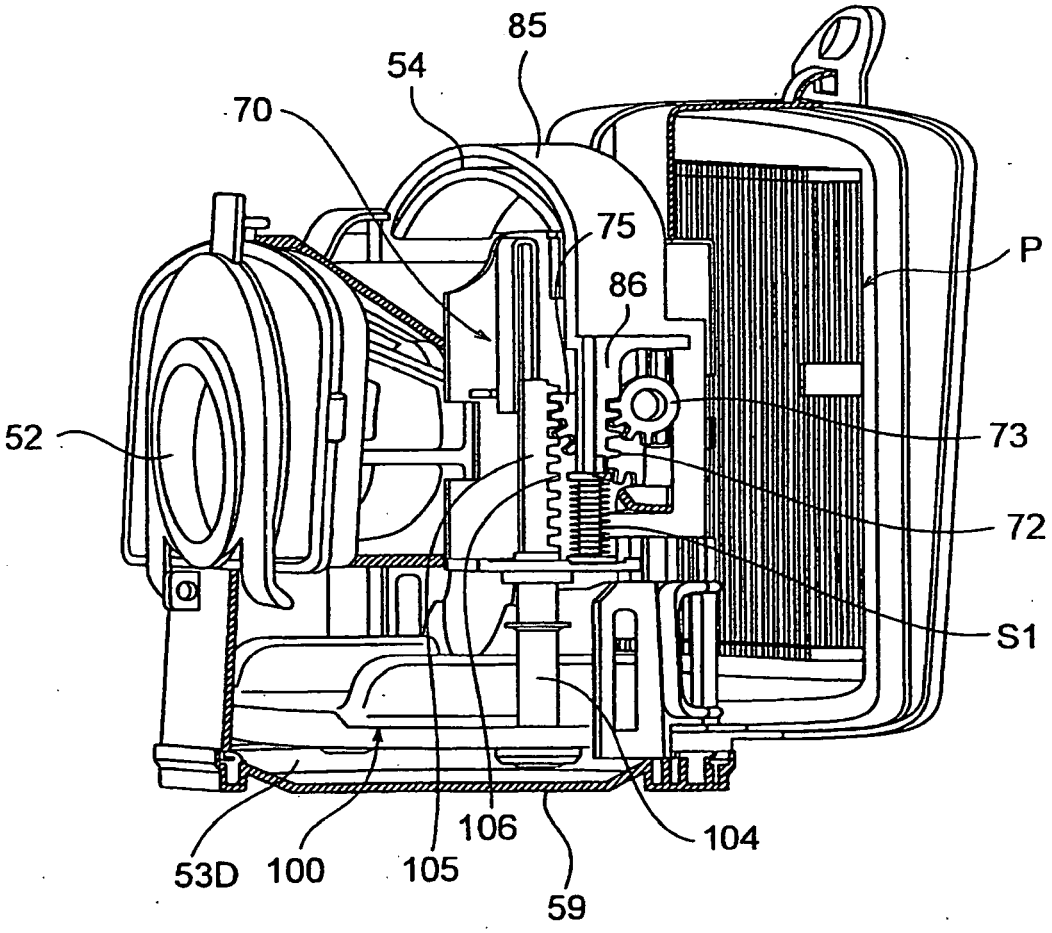
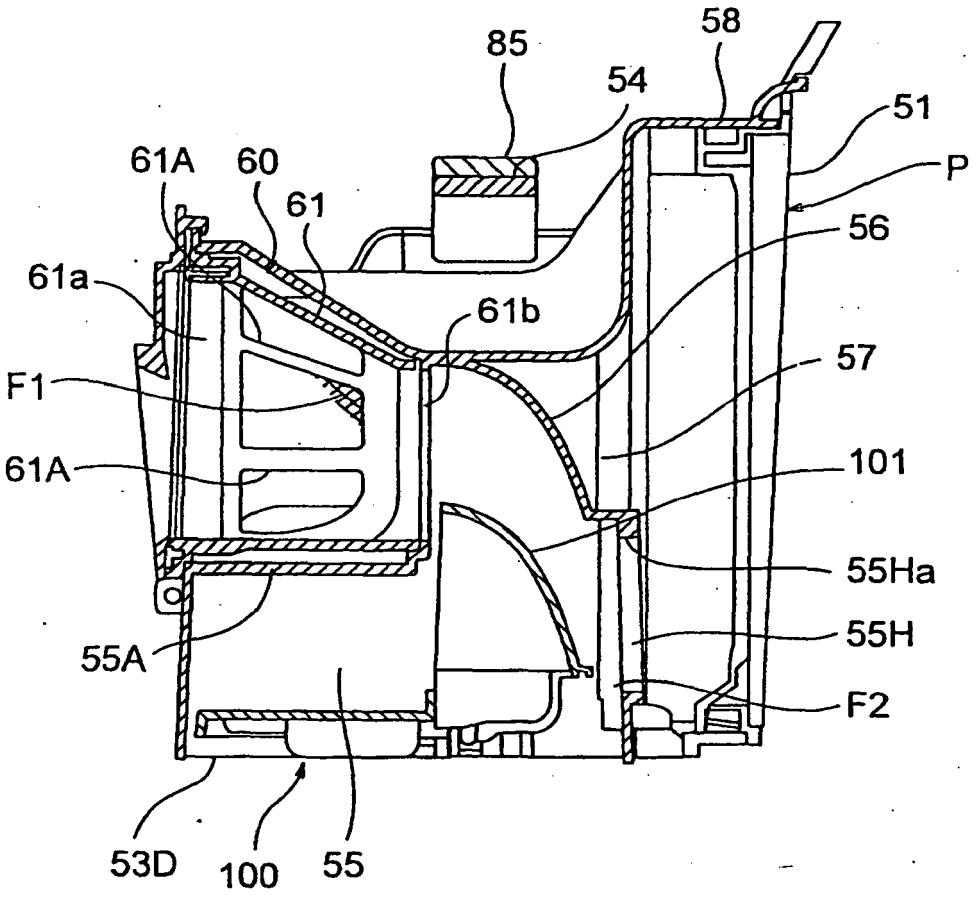


FIG. 23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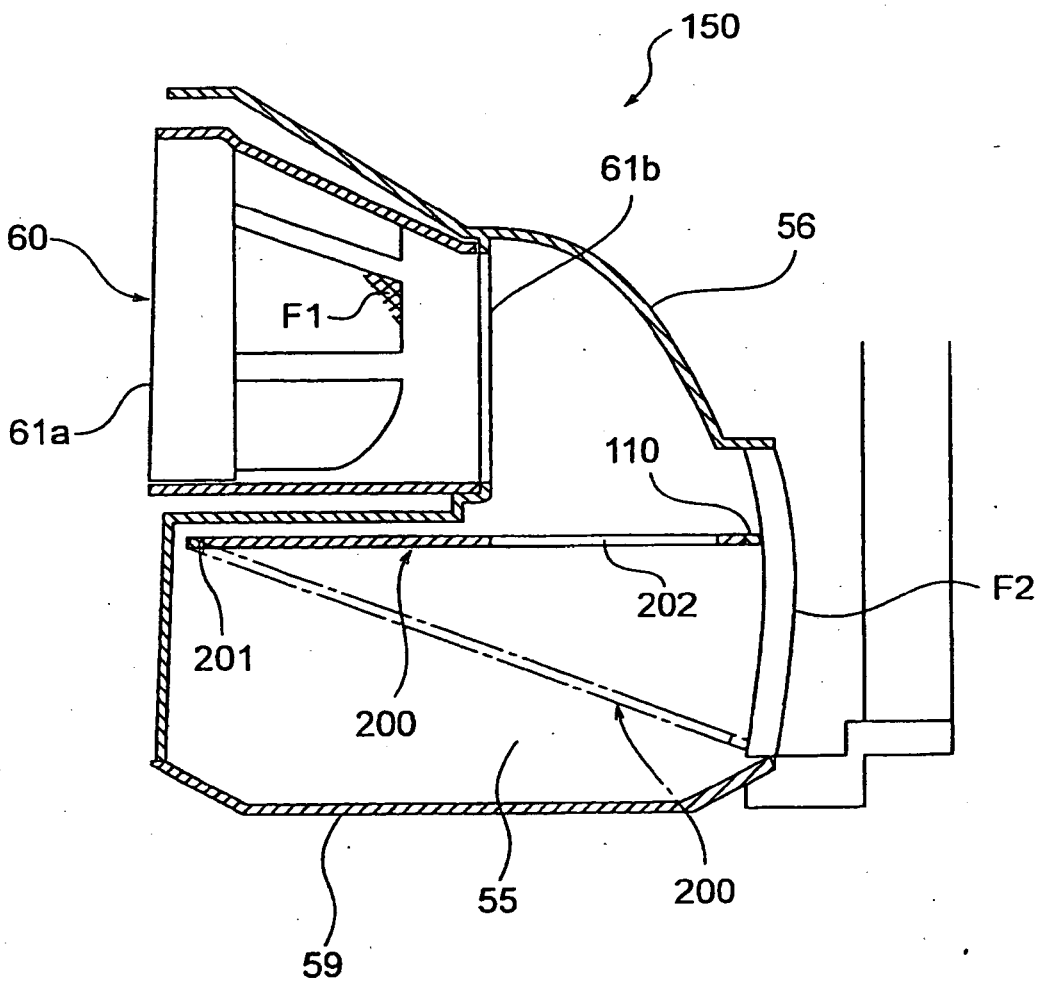
61b
F1
57
61A
101
55Ha
55H
55A
F2
53D
100
55

FIG. 24



REFERENCES CITED IN THE DESCRIPTION

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