(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 676 592 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.12.2013 Bulletin 2013/52

(51) Int Cl.:
A47L 9/04 *(2006.01)*

(21) Application number: **13171821.5**

(22) Date of filing: **13.06.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **21.06.2012 KR 20120066643**

(71) Applicant: **LG Electronics, Inc.**
Seoul, 150-721 (KR)

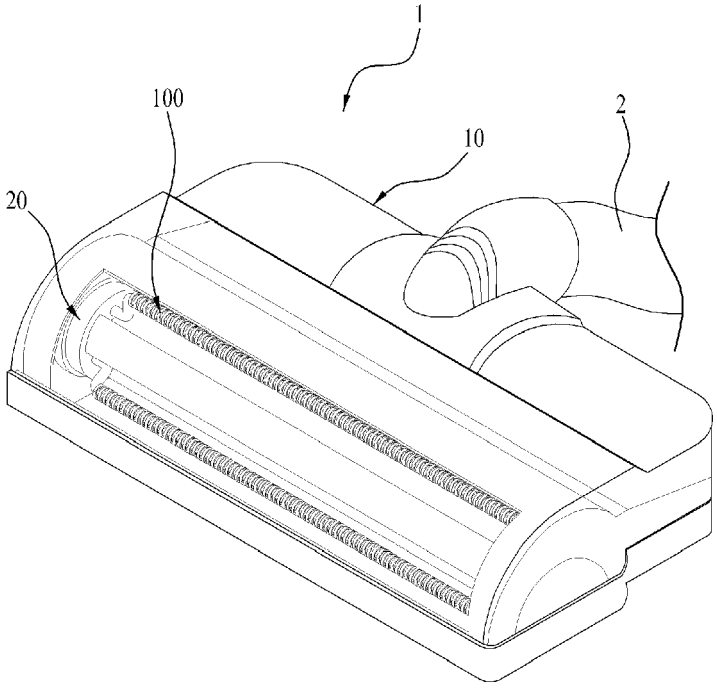
(72) Inventors:
- **Lee, Seungyeop**
  641-711 Gyeongnam (KR)
- **Kim, Jihwan**
  641-711 Gyeongnam (KR)
- **Hyun, Kietak**
  641-711 Gyeongnam (KR)

(74) Representative: **Urner, Peter**
Ter Meer Steinmeister & Partner
Mauerkircherstrasse 45
81679 München (DE)

(54) Vacuum cleaner and suction nozzle for vacuum cleaner with agitator and striking member

(57) There is disclosed a suction nozzle (1) and a vacuum cleaner that is able to efficiently perform cleaning for a cleaning surface by striking a cleaning surface, the suction nozzle (1) including a suction nozzle housing (10), an agitator (20) rotatably provided in the suction nozzle housing (10), a supporting member (150) extended from a center of the agitator (20) in a radial direction, the supporting member (150) configured to be rotatable with respect to the agitator (20), and a striking member (100) coupled to the supporting member (150) to strike a cleaning surface when the agitator (20) is operated.

FIG. 1



EP 2 676 592 A2

Description

[0001] This application claims the benefit of earlier filing date and right of priority to Korean Application No. 10-2012-0066643, filed on June 21, 2012, the contents of which are hereby incorporated by reference herein in their entirety.

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

[0002] The present invention relates to a vacuum cleaner and a suction nozzle for a vacuum cleaner, more particularly, to a vacuum cleaner that is able to efficiently perform cleaning for a cleaning surface by striking a cleaning surface.

Discussion of the Related Art

[0003] A vacuum cleaner is an electric appliance that is able to suck external air via a vacuum pressure generated by a motor provided therein to remove dust and other foreign substances.

[0004] A basic structure of such a vacuum cleaner is configured of a motor provided in a cleaner body to generate a vacuum pressure, a dust container configured to collect dust and other foreign substances therein, and a suction nozzle provided in the case to suck air and foreign substances.

[0005] With the structure, a user puts such the vacuum cleaner into operation in a state of putting the suction nozzle on a floor or a carpet. In this instance, air and foreign substances are sucked into the suction nozzle by the vacuum pressure generated by the motor and the sucked air and foreign substances are moved to a filter or a cyclone device provided in the cleaner body. After that, the foreign substances are collected in the dust container and the air is exhausted outside the cleaner body via the motor.

[0006] An agitator having a brush may be fixedly provided in the suction nozzle of the conventional vacuum cleaner. When the agitator is operated, hairs of the brush are brushed off foreign substances put on a cleaning surface to remove them from the cleaning surface.

[0007] However, in case human hair is wound around such the brush type agitator, the human hair is not moved to the cleaner body but wound around the agitator by rapid rotation of the agitator and bad suction force of the cleaner body. Accordingly, the user has to remove the wound hair by hand disadvantageously.

[0008] Moreover, in case the cleaning surface is a carpet, hairs are pulled out disadvantageously. In case hairs of the carpet are too long, the hairs of the brush provided in the agitator are stuck to the hair of the carpet and the agitator will not rotate disadvantageously.

SUMMARY OF THE DISCLOSURE

[0009] Accordingly, the present invention is directed to a vacuum cleaner and a suction nozzle for the vacuum cleaner that substantially obviates one or more problems due to limitations and disadvantages of the related art. An object of the present invention is to provide a vacuum cleaner and a suction nozzle for the vacuum cleaner that is able to prevent human hair and long foreign substances from being wound around an agitator.

[0010] Another object of the present invention is to provide a vacuum cleaner and a suction nozzle for the vacuum cleaner that is able to clean a cleaning surface efficiently and to prevent a motor from being overloaded.

[0011] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a suction nozzle for a vacuum cleaner includes a suction nozzle housing; an agitator rotatably provided in the suction nozzle housing; a supporting member extended from a center of the agitator in a radial direction, the supporting member configured to be rotatable with respect to the agitator; and a striking member coupled to the supporting member to strike a cleaning surface when the agitator is operated.

[0012] The striking member may be movable with respect to the supporting member.

[0013] The striking member may be arranged along a longitudinal direction of the agitator, and the striking member may be rotatable with respect to the supporting member.

[0014] The supporting member may include a first extended piece rotatably coupled to the agitator; a second extended piece bent extended from the first extended piece; and a third extended piece bent and extended from the second extended piece, and the striking member may be supportedly inserted in the third extended piece.

[0015] The second extended piece may be extended from the center of the agitator in a radial direction.

[0016] An inner diameter of the striking member may be larger than an outer diameter of the third extended piece.

[0017] A plurality of striking members may be provided in a ring or annular shape that is independently movable.

[0018] The striking member may include a hollow and a penetrating hole formed in an outer circumferential surface thereof to make the hollow communicate with the outside.

[0019] The agitator may include a recess configured to restrict a rotation space of the supporting member.

[0020] A plurality of striking member may be provided, and a predetermined number of the striking members may have brushes coupled to a predetermined portion thereof.

[0021] A plurality of supporting members configured to fix the plurality of the striking members, respectively, may be provided and a predetermined number of the supporting members configured to fix the striking members having the brushes may be extended shorter in a radial di-

rection than the other supporting members.

[0022] A distance from a center of the agitator to one end of the brush may be identical to a distance from the center of the agitator to the striking member having not brush.

[0023] The agitator may include a body part rotatably provided in the suction nozzle housing, and the body part may include lateral surface body parts spaced apart a predetermined distance from each other; a central body part arranged between the lateral surface supporting parts, and the supporting member connects the lateral surface supporting parts with each other and the supporting member is distant from the central body part.

[0024] The striking member maybe fixed to the supporting member.

[0025] In another aspect, a vacuum cleaner includes the suction nozzle according to one of claims 1 to 14; and a cleaner body connected with the suction nozzle.

[0026] According to at least one of the embodiments, when the agitator is rotated the auxiliary striking members are provided and they strike the cleaning surface. Dust or foreign substances may be floating and removed from the cleaning surface.

[0027] Especially, in case the cleaning surface is a carpet having hairs, foreign substances or dust deeply stuck in roots of the hairs are floated by the striking members striking and they can be removed effectively.

[0028] Furthermore, the striking members according to the embodiments may be movable with respect to an axis extended outer in a radial direction than the outer circumferential surface of the agitator. Even when the agitator is rotated at the same speed, the cleaning surface can be stroke with a stronger force generated by the centrifugal force. Accordingly, the cleaning performance can be enhanced.

[0029] Still further, long piled foreign substances easily wound around the agitator such as human hair might be wound around the agitator provided in the conventional suction nozzle and an auxiliary process for removing the wound substances has to be provided. However, according to the embodiments, the striking member is rotatably coupled to the agitator and it can be rotatable in a different direction from the rotation direction of the agitator. Accordingly, the foreign substances such as human hair can be prevented from being wound around the agitator and the process for removing the wound foreign substances can be omitted in the suction nozzle according to the embodiments.

[0030] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. The above and other aspects, features, and advantages of the present invention will become more apparent upon consideration of the following description of preferred embodiments, taken in conjunction with the accompanying drawing figures. In the drawings:

[0032] FIG. 1 is a perspective diagram of a suction nozzle according to one embodiment;

[0033] FIG. 2 is a perspective diagram of FIG. 1;

[0034] FIG. 3 is a perspective diagram of a coupling state among an agitator, a striking member and a driving motor provided in the suction nozzle according to the embodiment;

[0035] FIG. 4 is a side sectional diagram of the suction nozzle according to the embodiment;

[0036] FIG. 5 is an exploded perspective diagram of and striking member and the agitator provided in the suction nozzle according to the embodiment;

[0037] FIG. 6 is a diagram illustrating a variation type of the striking member applied to the first embodiment;

[0038] FIG. 7 is a side sectional diagram illustrating an operation of the first embodiment;

[0039] FIG. 8 is a side perspective diagram of a striking member and an agitator according to another embodiment;

[0040] FIG. 9 is a side sectional diagram of FIG. 8;

[0041] FIG. 10 is a side sectional diagram illustrating a variation type of the second embodiment; and

[0042] FIG. 11 is a side sectional diagram of FIG. 10.

DESCRIPTION OF SPECIFIC EMBODIMENTS

[0043] In the following detailed description, reference is made to the accompanying drawing figures which form a part hereof, and which show by way of illustration specific embodiments of the invention. It is to be understood by those of ordinary skill in this technological field that other embodiments may be utilized, and structural, electrical, as well as procedural changes may be made without departing from the scope of the present invention. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or similar parts.

[0044] As shown in FIG. 1, a suction nozzle according to one embodiment is applicable to a vacuum cleaner and the suction nozzle may be connected to a cleaner body (not shown) of the vacuum cleaner by a suction hose 2. At this time, the vacuum cleaner may include a motor configured to generate a vacuum pressure and a dust container configured to collect dust and other foreign substances.

[0045] In this instance, the vacuum cleaner connected with the suction nozzle 1 may be not only a canister type vacuum cleaner but also an upright type vacuum cleaner.

[0046] The suction nozzle according to this embodiment includes a housing 10 configured to define an ex-

terior thereof and an agitator 20 rotatably provided in the housing 10.

[0047] The agitator 20 is connected to a driving motor (30, see FIG. 3) mounted in the housing 10 and it may be rotatable by the operation of the driving motor 30.

[0048] Although it will be described later, the agitator 20 may be connected to the driving motor 30 directly or via an auxiliary power transmission member and examples of such a power transmission member include a belt.

[0049] The agitator 20 may include a body unit (21, see FIG. 3) rotatably supported by right and left inner surfaces of the housing 10. A striking member 100 rotatably connected to the agitator 20 may be provided in the body unit 21 to strike the cleaning surface when the agitator 20 is rotated.

[0050] Striking members 100 may be arranged on an outer circumferential surface of the agitator 20 along a right-and-left longitudinal direction of the agitator 20, spaced part a predetermined distance from each other.

[0051] As shown in FIG. 2, the body unit 21 of the agitator 20 may include lateral surface supporting parts 22 and 23 and a central body part 24 connected to the lateral surface supporting part 22 and 23. Here, the central body part 24 may be cylindrical-shaped.

[0052] A supporting member 150 may be rotatably coupled to the lateral surface supporting part 22 and 23. Accordingly, the supporting member 150 may be rotatable on an axis connected to the lateral surface supporting parts 22 and 23.

[0053] The striking member 100 may be rotatably coupled to the supporting member 150 and it may be relatively movable with respect to the agitator 20.

[0054] The striking member 100 may be arranged adjacent to an outer circumferential surface of the central body part 24. However, it is preferable that the striking member 100 is spaced apart a predetermined distance from the outer circumferential surface of the central body part 24. This is because the striking member 100 may be configured to be rotatable freely, without interfering with the central body part 24.

[0055] Moreover, the striking member 100 is arranged outer from the outer circumferential surface of the central body part 24 in a radial direction. Accordingly, when the agitator 20 is rotated, the striking member 100 is farther from a rotational center of the agitator 20 than the outer circumferential surface of the agitator 20. In other words, the striking member 100 has a larger radius than the agitator 20, such that it may generate a larger centrifugal force than a centrifugal force generated from the outer circumferential surface of the agitator 20. Accordingly, the striking member 100 may strike the cleaning surface with a stronger force than the force of the agitator 20.

[0056] Meanwhile, when the agitator 20 is rotated, the striking member can be moved along the same rotational direction of the agitator 20. However, the striking member can strike the cleaning surface, while being rotated on the supporting member 150 as its axis.

[0057] The unique characteristic of the striking member 100 according to this embodiment is that the revolution direction of the striking member 100 may not accord with the rotation direction of the striking member.

[0058] For that, the striking member 100 is arranged in a state of being inserted in the supporting member 150 connected to the lateral surface supporting parts 22 and 23. At this time, an inner diameter of the striking member is larger than an outer diameter of the supporting member 150.

[0059] Accordingly, the striking member 100 may be rotatable with respect to the supporting member 150.

[0060] Meanwhile, the distance between the supporting member 150 and the central body part 24 may be larger than the thickness of the striking member 100, such that the striking member 100 may be freely movable between the supporting member 150 and the central body part 24.

[0061] Alternatively, the inner diameter of the striking member 100 may be identical to the outer diameter of the supporting member 150. In this instance, the striking member 100 is forcibly inserted or fitted to the supporting member and the striking member 100 strikes the cleaning surface, in a fixed state without rotating with respect to the supporting member 150.

[0062] Meanwhile, the striking member 100 may be formed of a rubber material to increase a frictional force with the cleaning surface.

[0063] A plurality of supporting members 150 may be provided, spaced apart a predetermined distance from each other with respect to the outer circumferential surface of the central body part 24. Correspondingly, the striking members 100 may be spaced apart a predetermined distance from each other with respect to the outer circumferential surface of the central body part 24.

[0064] Accordingly, the striking members may form a plurality of rows with respect to the central body part 24 and it is preferred that the plurality of the rows may be spaced apart a predetermined distance from each other.

[0065] The striking members 100 forming one row may be configured of a plurality of rings 101. The rings 101 composing the striking members 100 pass the supporting member 150, not connected with each other, such that the positions of the rings can be maintained.

[0066] As shown in FIG. 3, the agitator 20 is connected to the driving motor 30 provided in the housing 30 of the suction nozzle.

[0067] The driving motor 30 and the agitator 20 may be connected with each other by a power transmission member 40 such as a driving belt. Alternatively, the driving motor 30 and the agitator 20 may be connected with each other directly.

[0068] As mentioned above, the striking members 100 may be arranged in the plurality of the rows and the plurality of the rows may be spaced apart a predetermined distance from each other. The striking members 100 composing each of the rows may be spaced apart from the outer circumferential surface of the central body part 24.

[0069] As shown in FIG. 4, the agitator 20 and the striking member 100 may be arranged adjacent to an inlet hole 11 and a guide hole 12 provided in the housing 10.

[0070] Dust and air can move to the cleaner body via the guide hole 12.

[0071] The striking member 100 may be formed in a ring or annular shape and each of the supporting members 150 can be inserted in the striking members 100 forming each of the rows.

[0072] It is preferred that an inner diameter of the striking member 100 is larger than an outer diameter of the supporting member 150. Also, it is preferred that the thickness of the striking member 100 is smaller than the distance between the central body part 24 and the supporting member 150. Accordingly, the striking member can loosely be treaded and supported by the supporting member 150. When the agitator 20 is moved, the striking members can be freely moved in a state of being thoroughly supported by the supporting member.

[0073] Such the free motion of the striking member makes it possible to strike the cleaning surface.

[0074] Alternatively, the inner diameter of the striking member may be identical to the outer diameter of the supporting member 150. At this time, the striking member 100 may be coupled to the supporting member 150 immovably. Even when the agitator 20 is moved, the striking member 100 can fix the state of being fixed to the supporting member 150.

[0075] The supporting members 150 may be spaced apart a predetermined distance from each other, seen from a side of the agitator 20. When the agitator 20 is rotated, the supporting member 150 can be farther from an outer circumferential surface of the agitator 20 by a centrifugal force generated by the rotation of the agitator 20. However, when the striking member 100 coupled to the supporting member 150 contacts with the cleaning surface, the supporting member 150 may be arranged adjacent to the outer circumferential surface of the agitator 20 temporarily.

[0076] Similarly, the striking members 100 may be spaced apart a predetermined distance from each other, see from the side of the agitator 20. When the agitator 20 is rotated, the striking member 100 can strike the cleaning surface, the striking member 100 can strike the cleaning surface by contacting with it repeatedly.

[0077] At this time, the striking member 100 can strike the cleaning surface, with being rotated independent from the motion of the supporting member 150.

[0078] As shown in FIG. 5, the supporting member 150 that is applicable to the embodiment may be extended from a lateral surface supporting part 22 in an opposite direction.

[0079] Especially, the supporting member 150 includes a first extended piece 152 coupled to the lateral surface supporting parts 22 and 23, a second extended piece 154 extended from the first extended piece and a third extended piece 156 extended from the second extended piece 154.

[0080] At this time, the first extended piece 152, the second extended piece 154 and the third extended piece 156 are bent at a predetermined angle with each other.

[0081] The first extended piece 152 may be extended from the lateral surface supporting parts 22 and 23 to be freely rotatable with respect to the lateral surface supporting parts 22 and 23. Accordingly, when the agitator 20, in other words, the lateral surface supporting parts 22 and 23 are rotated, the second extended piece 154 may be spread in a radial direction by the centrifugal force.

[0082] The striking member 100 may be supported in the third extended piece 156. A large number of the mass including the striking member 100 and the supporting member 150 is loaded in the third extended piece 156 where the striking member 100 is arranged. In other words, a center of the mass is formed adjacent to the third extended piece 156 and the striking member 100 is supplied a larger centrifugal force with respect to the rotation of the agitator 20, such that the cleaning surface can be stroke with a stronger force.

[0083] A plurality of supporting members 150 may be provided, distant from each other, and the plurality of the supporting members 150 may be distant from the central body part 24. The supporting member 150 may be bar-shaped.

[0084] The striking members 100 may be arranged in a plurality of rows and rings types or annular types of striking members 100 are adjacent to each other in a row. Such the striking members arranged in one row may be coupled to one supporting member 150, with the supporting member inserted therein.

[0085] In that state, a lateral surface supporting part 23 provided in the other portion of the central body part 24 is coupled to the striking members 100 and the lateral surface supporting part 23 is coupled to an end of the supporting member 150.

[0086] Accordingly, the striking members 100 may be prevented from separating from the supporting member 150.

[0087] FIG. 6 is a diagram illustrating a variation of the striking member according to one embodiment.

[0088] As shown in FIG. 6, an insertion hole is provided in a center of the striking member to insert the third extended piece 156 and it is preferred that an inner diameter of the insertion hole is larger than an outer diameter of the supporting member.

[0089] As shown in FIG. 6 (b), the striking member 500 may be a pipe type with no penetrating hole 502 formed therein. As shown in FIG. 6 (c), the striking member 500 may be a pipe type having a plurality of penetrating holes 502 formed therein. At this time, a plurality of penetrating holes may be formed along outer circumferential surface of the cylindrical striking member 500.

[0090] The reason why the penetrating holes 502 are formed is that the dust generated after striking the cleaning surface has to be separated from the cleaning surface rapidly to move.

[0091] In other words, if it were not for a space where the dust is moving even in case the striking member's striking of the cleaning surface tries to move the dust put on the cleaning surface, the dust cannot but be pressed. However, the penetrating holes 502 are provided and the dust can be moved into the penetrating holes 502 to be drawn into the striking members.

[0092] After that, the dust drawn into the striking members 500 may be sucked by a vacuum suction pressure of the cleanser case, only to be moved into the cleaner case.

[0093] Referring to the drawings, the operation of the suction nozzle according to the embodiment will be described as follows.

[0094] As shown in FIG. 7, the vacuum cleaner according to the embodiment is put into operation and the vacuum motor (not shown) provided in the cleaner case (not shown) is put into operation. Accordingly, dust and other foreign substances put on the cleaning surface (C) beneath the suction nozzle 1 can be sucked into the suction nozzle 1 by the vacuum suction pressure.

[0095] Simultaneously, the agitator 20 is rotated. At this time, it is preferred that the agitator 20 is rotated forward and that it moves the dust backward with respect to the suction nozzle.

[0096] In this instance, the supporting member 150 and the striking member 100 may be provided in the agitator 20. The supporting member 150 is movable with respect to the agitator 20 and the position of the striking member 100 is constantly changed according to the rotation of the agitator 20.

[0097] In other words, the centrifugal force is generated as the agitator 20 is rotated and the supporting member 150 is spread from the center of the agitator 20 when the striking member 100 is not in contact with the cleaning surface. In contrast, while the supporting member 150 is pressed by the striking member 100 in contact with the cleaning surface, the supporting member 150 is bent toward the agitator.

[0098] Hence, the striking member 100 is loosely supported by the supporting member 150 and it may be leaning toward an outer circumferential surface of the agitator 20 by the centrifugal force. In other words, the centrifugal force of the agitator 20 allows the striking member 100 to perform a separate motion as well as the supporting member 150.

[0099] When the agitator 20 is continuously moved in this state, the striking member is striking the cleaning surface (C) continuously and the foreign substances can be separated from the cleaning surface (C) accordingly.

[0100] Especially, the striking member 100 is striking the cleaning surface (C) in a state of rotating to be projected further than the outer circumferential surface of the agitator 20. Such that the foreign substances can be detached to the cleaning surface (C) more easily.

[0101] In case the cleaning surface (C) is a carpet having hairs, the striking member 100 can come off dust or foreign substances deeply stuck near roots of the hairs. Floating dust or foreign substances may be sucked into the suction nozzle 1 to be moved toward the cleaner body.

[0102] If the striking member 100 is immovably coupled to the agitator 20, long piled foreign substances such as human hair might be wound around circumferences of the striking member 100 and the agitator 20.

[0103] However, the supporting member 150 is rotatably coupled to the agitator 20 and the striking member 100 is rotatably coupled to the supporting member 150, such that long piled foreign substances such as human hair may not be wound around the agitator 20 and that they may be prevented from being wound around the outer circumferential surface of the striking member 100.

[0104] If the inner diameter of the striking member 100 is identical to the outer diameter of the supporting member 150, the striking member may not be rotated with respect to the supporting member. Accordingly, when the agitator 20 is rotated, the supporting member 150 may be movable with respect to the agitator 20 and the striking member 100 may be movable with respect to the agitator, together with the supporting member 150.

[0105] FIG. 8 is a side perspective diagram of a striking member and an agitator according to another embodiment. FIG. 9 is a side sectional diagram of FIG. 8. Referring to FIGS. 8 and 9, the second embodiment will be described as follows.

[0106] A recess 26 may be provided in a central body part 24 of the agitator 20 to provide an extra space where the supporting members 150 are moved or rotated. In other words, the supporting members 150 may be rotatable within a range of the recess 26.

[0107] The recess 26 may be longitudinally recessed from the outer circumferential surface of the central body part 24 continuously. Recesses 26 may be arranged in the outer circumferential surface along the rotation direction of the central body part 24, spaced apart a predetermined distance from each other.

[0108] Meanwhile, a portion of the recess 26 where one end of the second extended piece 154 is arranged may be recessed toward the central body part 24 more deeply than the other portion. In other words, a cross section of the recess 26 may be approximately arc-shaped.

[0109] It is preferred that the supporting member 150, especially, the first extended piece 152 (the position of the first extended piece 152 is the same as the position of one end of the second extended piece 154) is fixed adjacent to the groove 26. Accordingly, even if the supporting member 150 is rotated, a rotation range of the supporting member 150 can be limited by the recessed shape of the recess 26 and the supporting member is not interrupted.

[0110] The striking member 600 according to this embodiment may include a brush 50 fixed to a predetermined portion thereof. The brush 50 may be projected like a brush. As the striking member 600 is rotatable with respect to the supporting member 150, the striking mem-

ber 600 is rotated and the brush 50 scratches the cleaning surface to perform cleaning.

[0111] In other words, when the agitator 20 is rotated, the supporting members 150 are spread from the center of the agitator 20 in a radial direction. Also, the brush 50 may have a predetermined mass and it is spread outer from the agitator 20.

[0112] Meanwhile, when the striking member 600 contacts with the cleaning surface, the brush 50 contact with the cleaning surface. The brush 50 is bent and pressed and the pressure is relieved such that it may separate foreign substances efficiently by contacting with the cleaning surface strongly.

[0113] FIG. 10 is a side sectional diagram illustrating a variation type of the second embodiment. FIG. 11 is a side sectional diagram of FIG. 10. Referring FIGS. 10 and 11, the variation type of the second embodiment will be described.

[0114] According to the variation type of the second embodiment, a predetermined number of the striking members have a different shape, compared with the others, different from FIGS. 8 and 9.

[0115] In other words, striking members having the brushes 50 and striking members 600 having no brushes 50 are mixed used. The striking members having the brushes 50 are identical to the striking members mentioned in reference to FIGS. 8 and 9. The striking members 500 having no brushes identical to the striking members according to the first embodiment. Accordingly, different features will be described in this embodiment.

[0116] Supporting members 150 used in the striking members 500 having no brushes are different from supporting members 150 used in the striking members 600 having the brushes in the length of the second extended piece 154.

[0117] In other words, the supporting member 150 configured to fix the striking member 600 having the brush 50 is extended shorter in a radial direction of the agitator 20 than the other supporting members. Especially, a distance (R) from a center of the agitator 20 to one end of the brush 50 may be identical to a distance (R) from the center of the agitator 20 to the striking member 500 having no brush.

[0118] The centrifugal force is generated by the rotation of the agitator 20. At this time, a predetermined number of the striking members are different from the others, such that a center of the overall mass possessed by the agitator 20 is not located in the center of the agitator 20. Accordingly, when the agitator 20 is rotated, the center of the mass is changing continuously and shaking could be generated in the agitator 20.

[0119] To reduce the shaking generated by the rotation, the extended length (R) of the striking members 500 and 600 from the center of the agitator 20 is uniform. When the extended length of the striking members is restricted uniformly, each of the components may be arranged in the same length range and the center of the mass loaded to the agitator 20 can be prevented from getting far off from the center of the agitator 20.

[0120] In the variation type of the second embodiment, the striking members having the brushes 50 and the striking members 600 having no brushes are mixedly applied. Accordingly, the cleaning surface can be stroked variously and cleaning efficiency can be enhanced. After the striking members 600 having the brushes 50 strike the cleaning surface, the striking members 500 having no brushes strike the cleaning surface sequentially.

[0121] Meanwhile, according to the second embodiment, it is possible to scratch the cleaning surface when the striking members 600 having the brushes 50 are used. Especially, even if the cleaning is performed by using the striking members 600 having the brushes 50, long piled foreign substances such as human hair may not attached to the agitator 20 enough to difficult to tear off from the striking members 600. That is because the supporting member 150 supporting the striking member 600 is not fixed in a state where the position of the supporting member 150 is fixed. While the agitator is rotated, the supporting members 150 continuously perform various motions such as the rotation. Accordingly, such long piled foreign substances such as human hair is scratched by the brushes 50, the position of the foreign substances can be changed according to the time by the motion of the striking members 600. At this time, the foreign substances can be sucked into the vacuum cleaner by the suction force.

[0122] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

1. A suction nozzle (1) for a vacuum cleaner comprising:

   a suction nozzle housing (10);
   an agitator (20) rotatably provided in the suction nozzle housing (10);
   a supporting member (150) extended from a center of the agitator (20) in a radial direction, the supporting member (150) configured to be rotatable with respect to the agitator (20); and
   a striking member (100) coupled to the supporting member (150) to strike a cleaning surface when the agitator (20) is operated.

2. The suction nozzle for the vacuum cleaner according to claim 1, wherein the striking member (100) is movable with respect to the supporting member (150).

3. The suction nozzle for the vacuum cleaner according

to claim 1 or 2, wherein the striking member (100) is arranged along a longitudinal direction of the agitator (20), and
the striking member (100) is rotatable with respect to the supporting member (150).

4. The suction nozzle for the vacuum cleaner according to claim 3, wherein the supporting member (150) comprises,
a first extended piece (152) rotatably coupled to the agitator (20);
a second extended piece (154) bent extended from the first extended piece (152); and
a third extended piece (156) bent and extended from the second extended piece (154), and
the striking member (100) is supportedly inserted in the third extended piece (156).

5. The suction nozzle for the vacuum cleaner according to claim 4, wherein the second extended piece (154) is extended from the center of the agitator (20) in a radial direction.

6. The suction nozzle for the vacuum cleaner according to claim 4 or 5, wherein an inner diameter of the striking member (100) is larger than an outer diameter of the third extended piece (156).

7. The suction nozzle for the vacuum cleaner according to one of the claims 1 to 6, wherein a plurality of striking members (100) are provided in a ring or annular shape that is independently movable.

8. The suction nozzle for the vacuum cleaner according to one of the claims 1 to 7, wherein the striking member (500) comprises a hollow and a penetrating hole (502) formed in an outer circumferential surface thereof to make the hollow communicate with the outside.

9. The suction nozzle for the vacuum cleaner according to one of the claims 1 to 8, wherein the agitator (20) comprises a recess (26) configured to restrict a rotation space of the supporting member (150).

10. The suction nozzle for the vacuum cleaner according to one of the claims 1 to 9, wherein a plurality of striking member (100) are provided, and
a predetermined number of the striking members (100) have brushes (50) coupled to a predetermined portion thereof.

11. The suction nozzle for the vacuum cleaner according to claim 10, wherein a plurality of supporting members (150) configured to fix the plurality of the striking members (100), respectively, are provided and
a predetermined number of the supporting members (150) configured to fix the striking members having the brushes (50) are extended shorter in a radial direction than the other supporting members (150).

12. The suction nozzle for the vacuum cleaner according to claim 11, wherein a distance from a center of the agitator (20) to one end of the brush (50) is identical to a distance from the center of the agitator (20) to the striking member (500) having not brush.

13. The suction nozzle for the vacuum cleaner according to one of the claims 1 to 12, wherein the agitator (20) comprises a body part rotatably provided in the suction nozzle housing (10), and
the body part comprises,
lateral surface supporting parts (22, 23) spaced apart a predetermined distance from each other;
a central body part (24) arranged between the lateral surface supporting parts (22, 23), and
the supporting member (150) connecting the lateral surface supporting parts (22, 23) with each other and the supporting member (150) is distant from the central body part (24).

14. The suction nozzle for the vacuum cleaner according to claim 1, wherein the striking member (100) is fixed to the supporting member (150).

15. A vacuum cleaner comprising:

the suction nozzle (1) according to one of claims 1 to 14; and
a cleaner body connected with the suction nozzle (1).

FIG. 1

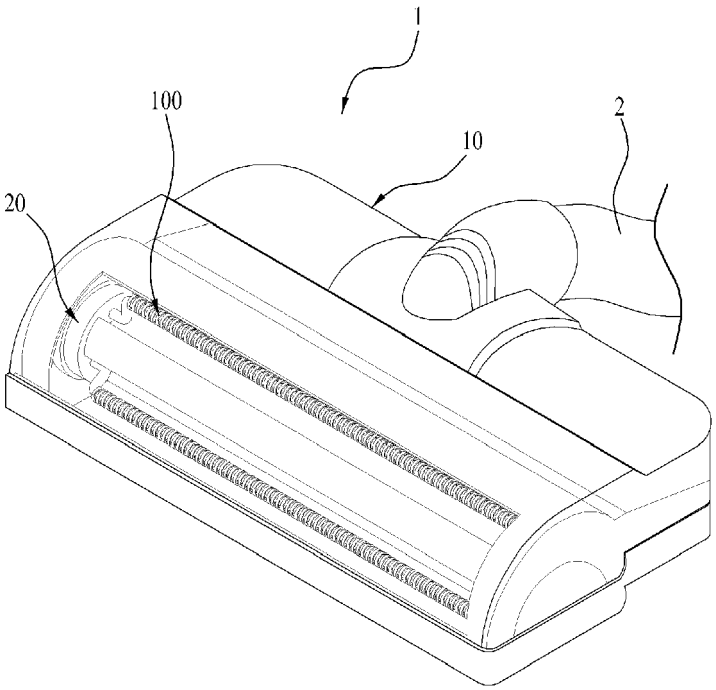


FIG. 2

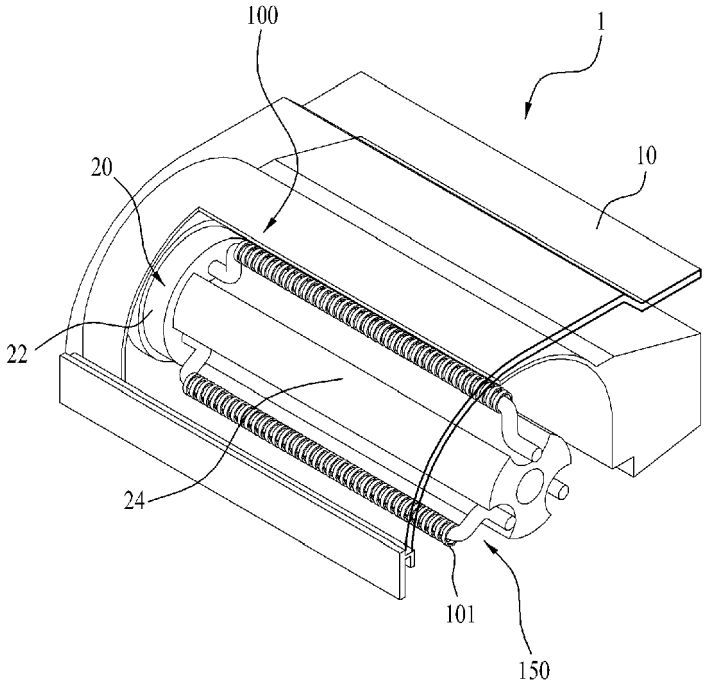


FIG. 3

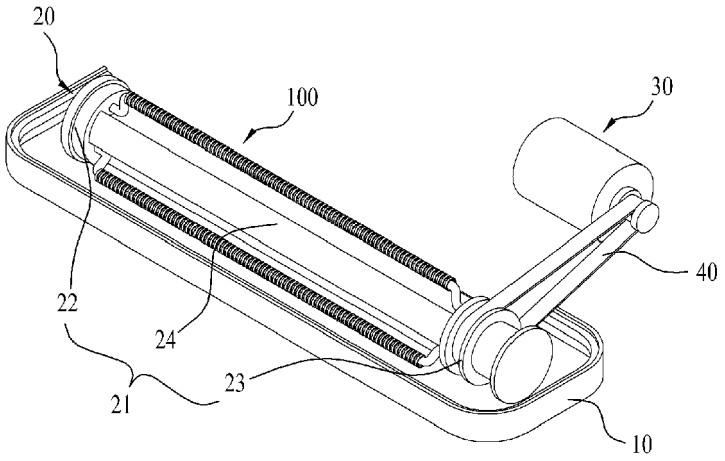


FIG. 4

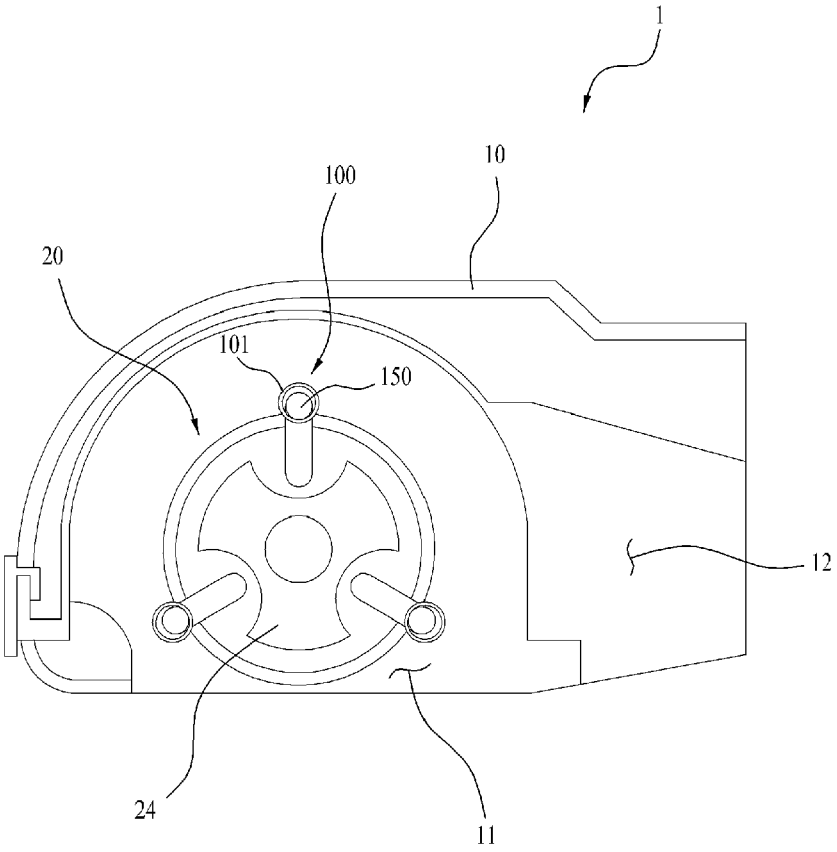


FIG. 5

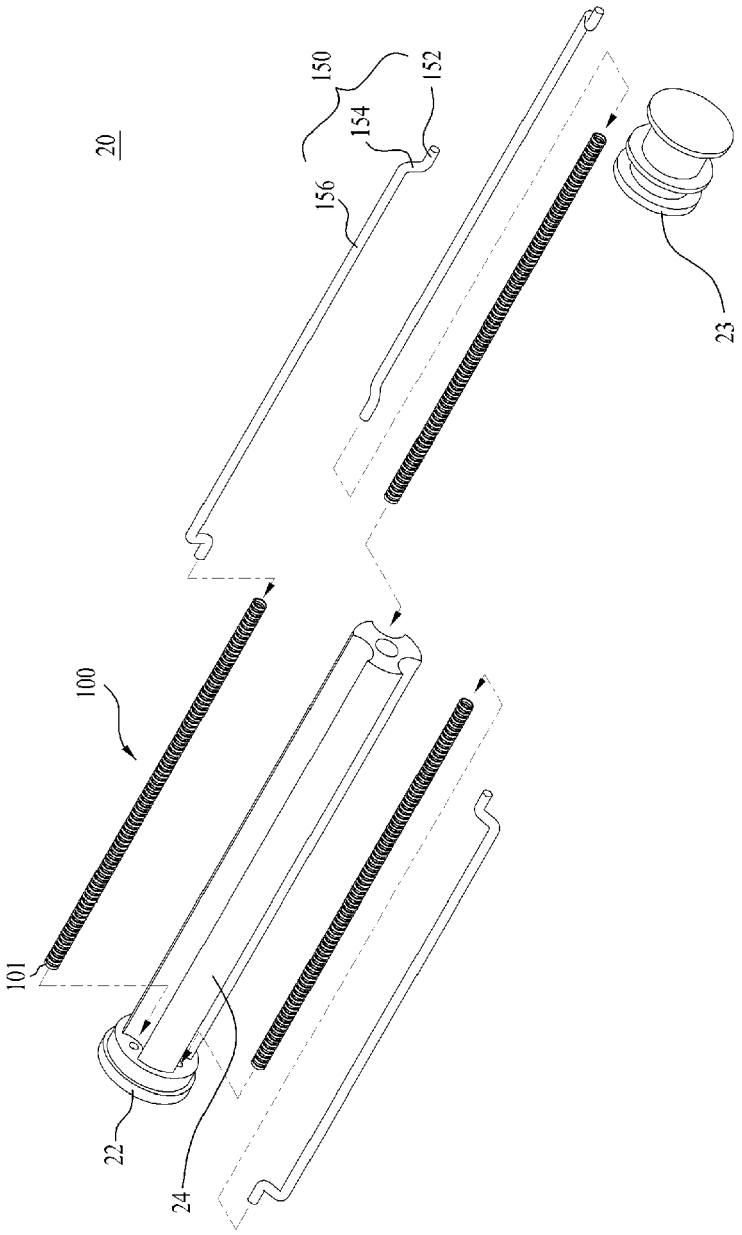


FIG. 6

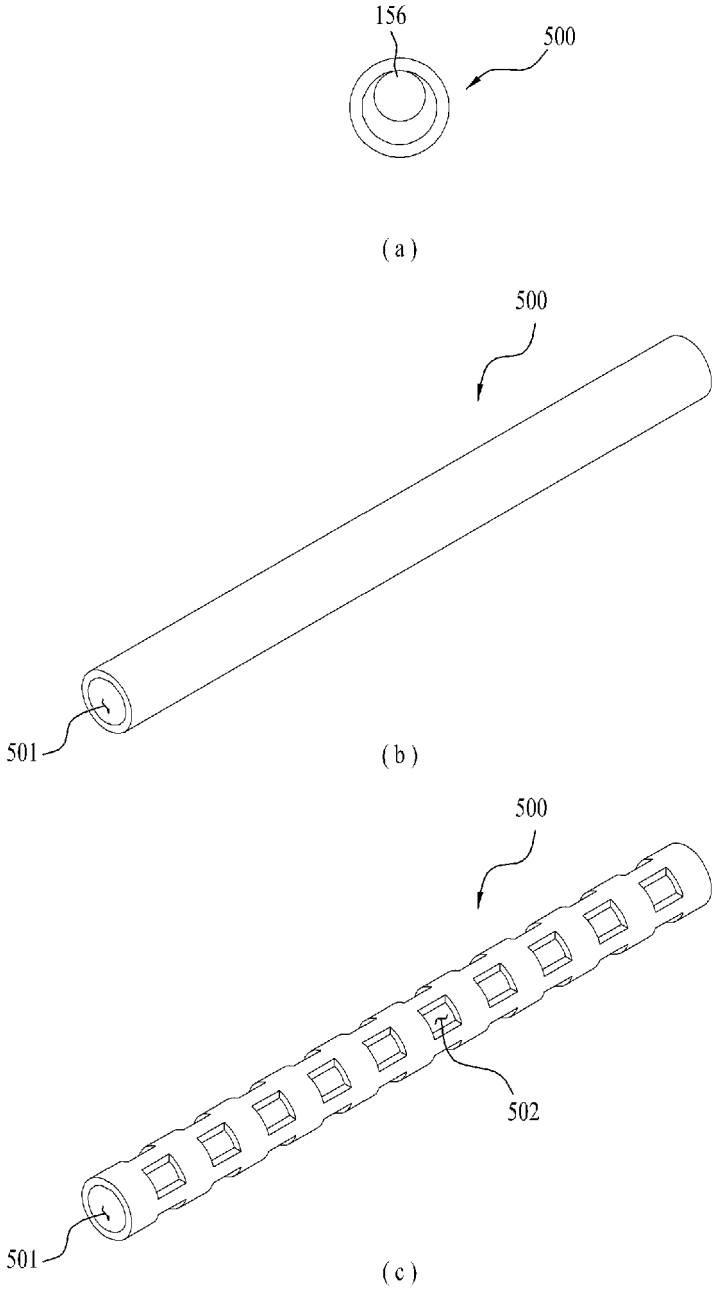


FIG. 7

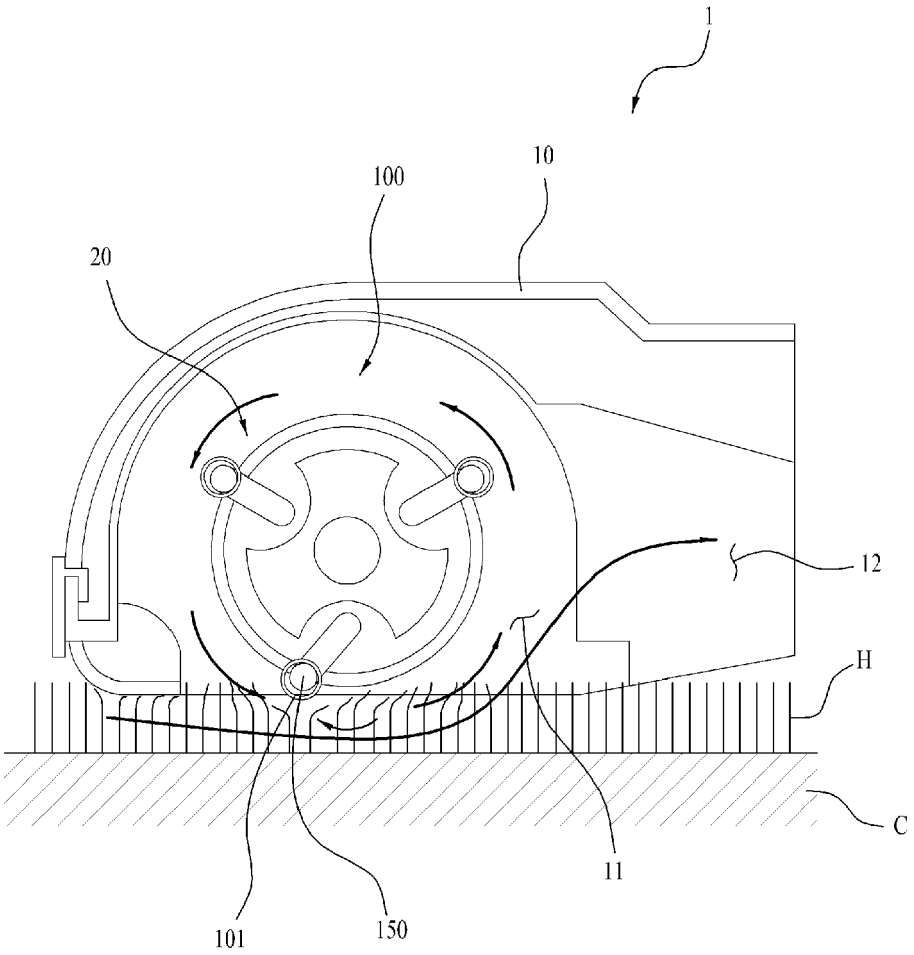


FIG. 8

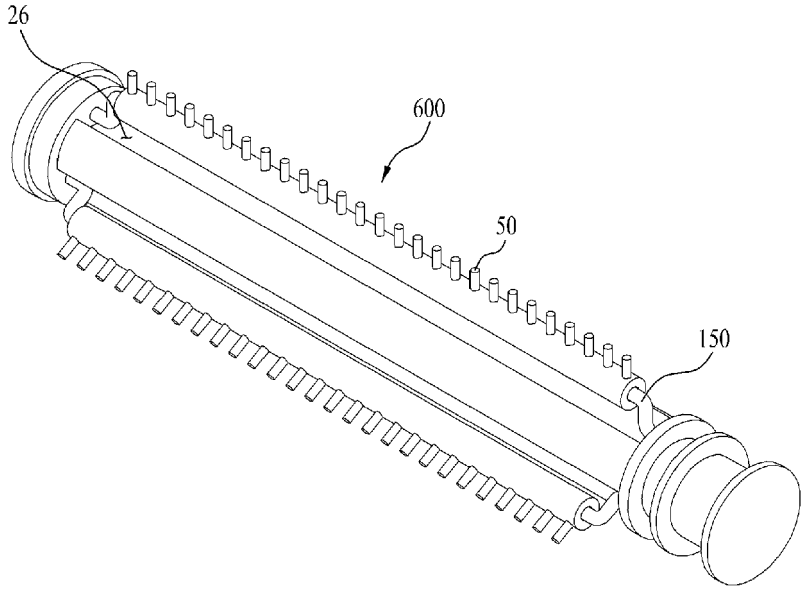


FIG. 9

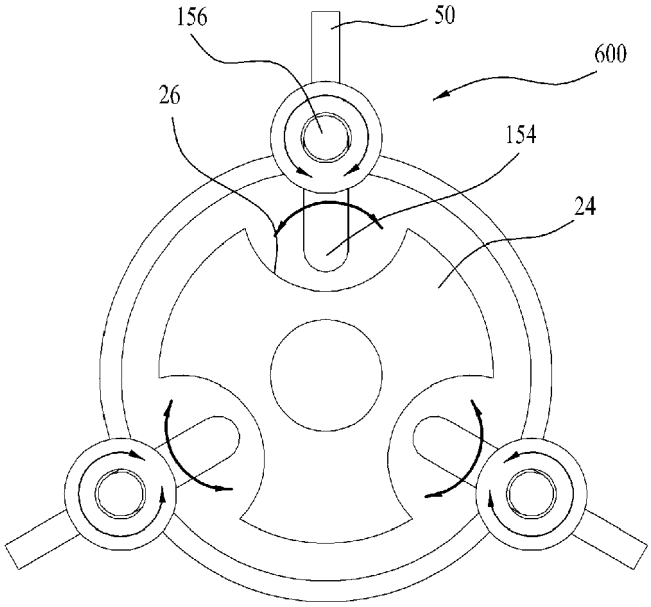


FIG. 10

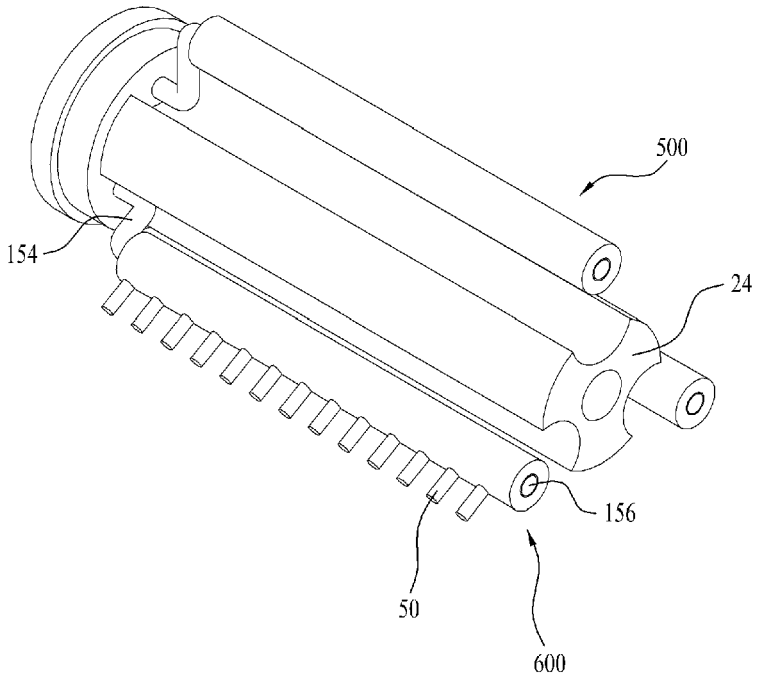
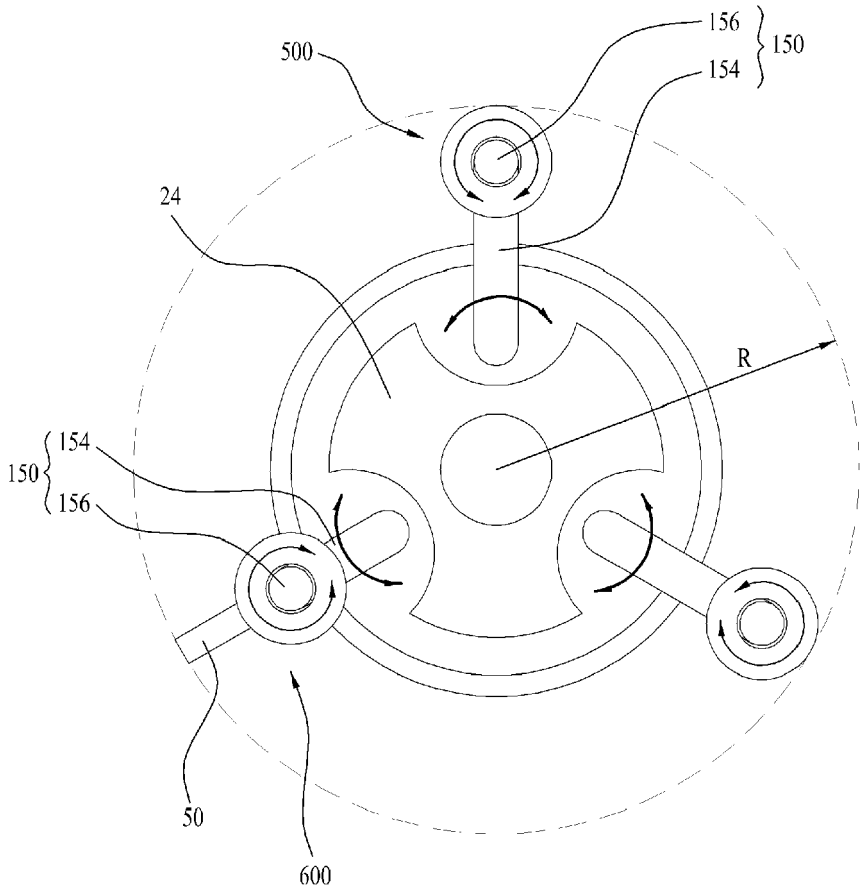


FIG. 11



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- KR 1020120066643 **[0001]**