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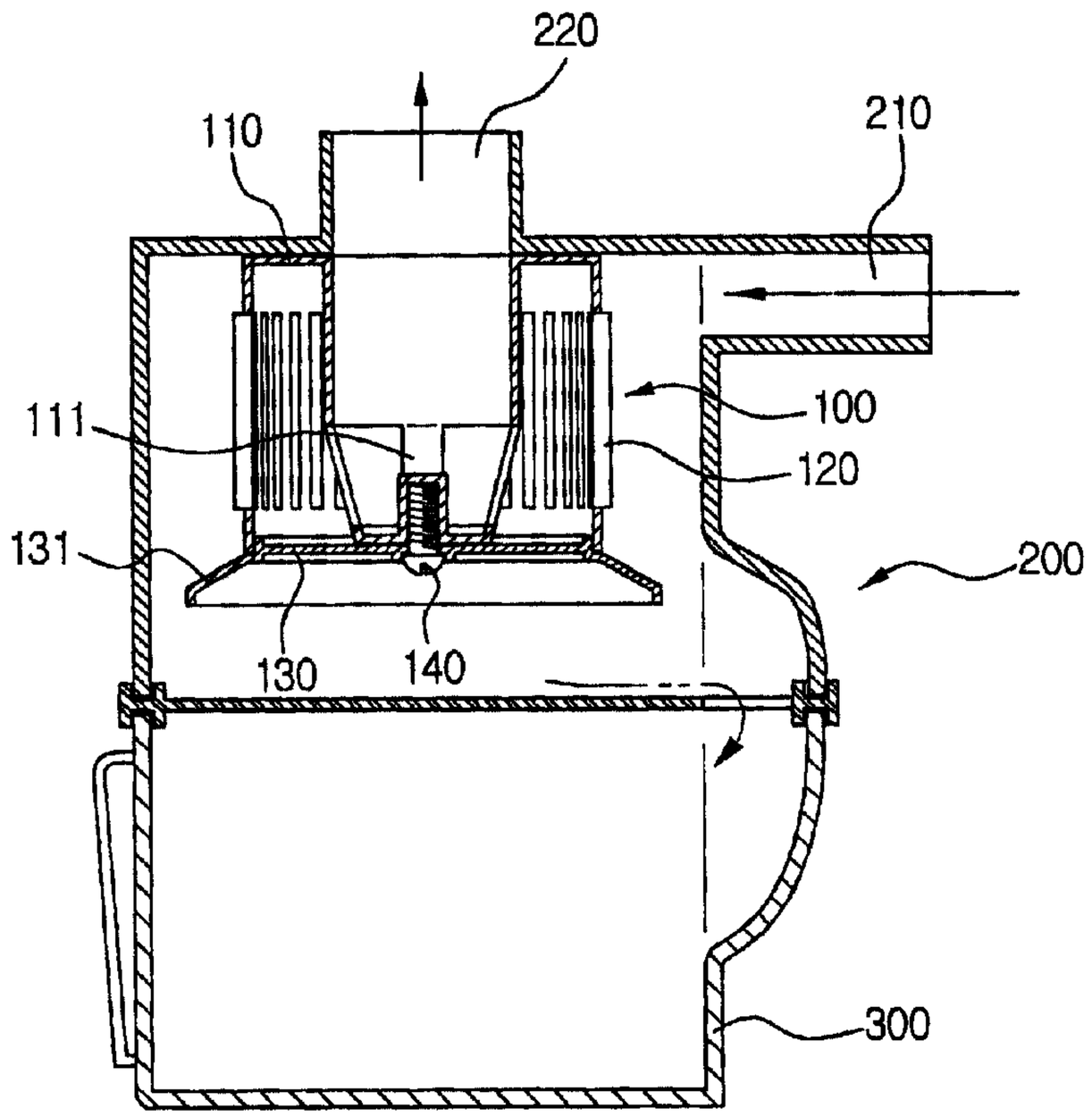

(57) Abrégé/Abstract:
A grill assembly for a cyclone dust collecting apparatus for a vacuum cleaner capable of improving the capability of dust collection of the vacuum cleaner by reducing the amount of the filth drawn into a filter protecting the vacuum-generating. The grill assembly is disposed at an upper part of an air discharging passage of the cyclone body that generates a whirling air current within the air drawn thereinto and separates filth from the whirling air by the centrifugal forces developed in the whirling air current. The grill assembly comprises a grill body, and a plurality of blades formed at a predetermined separation providing a passage along an outer circumference of the grill body. The passage is at an acute angle with the flow direction of the whirling air current, and each blade includes a protrusion member protruding outwardly from the outer circumference of the grill body.

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ABSTRACT OF THE DISCLOSURE.

A grill assembly for a cyclone dust collecting apparatus for a vacuum cleaner capable of improving the capability of dust collection of the vacuum cleaner by reducing the amount of the filth drawn into a filter protecting the vacuum-generating. The grill assembly is disposed at an upper part of an air discharging passage of the cyclone body that generates a whirling air current within the air drawn thereinto and separates filth from the whirling air by the centrifugal forces developed in the whirling air current. The grill assembly comprises a grill body, and a plurality of blades formed at a predetermined separation providing a passage along an outer circumference of the grill body. The passage is at an acute angle with the flow direction of the whirling air current, and each blade includes a protrusion member protruding outwardly from the outer circumference of the grill body.

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GRILL ASSEMBLY FOR A CYCLONE DUST COLLECTING APPARATUS FOR A VACUUM CLEANER

The present invention relates to a cyclone dust collecting apparatus for a vacuum cleaner, and more particularly to a grill assembly for a cyclone dust collecting apparatus for a vacuum cleaner capable of preventing back flow of a portion of the collected materials such as hair to the vacuum-generating device. In order to distinguish these materials from the dust collected by the cleaner, they are hereafter described as "filth".

In a conventional cyclone dust collecting apparatus for a vacuum cleaner, the dust collecting apparatus comprises a cyclone body, a filth-collecting portion, and a partition. An air suction passage - to which a brush assembly is attached - is located at an upper part of the cyclone body. The air drawn in through the air suction passage forms a whirling air current in the cyclone body.

An air discharging passage is located at an upper center of the cyclone body. A grill is provided for preventing filth such as hair being drawn to the vacuum-generating device. The grill includes a plurality of passages to allow the passage of cleaned air. With this form of construction, when the vacuum-generating device of the vacuum cleaner is operated, the air containing filth is drawn towards the cyclone body through the air suction passage and the brush assembly. The air drawn into the cyclone

body forms a whirling air current which is collected in the filth collecting portion and the cleaned air flows to the vacuum-generating device through the grill.

However, some of the filth material, which has not been separated from the air current, passes through the grill and flows to the vacuum-generating device and is trapped by a filter.
The cleaned air is discharged to the outside of the vacuum cleaner through the vacuum-generating device. Meanwhile, the dust collecting ability of the vacuum cleaner is diminished because the filth clogs the filter.

The present invention seeks to overcome these problems. Accordingly, the present invention seeks to provide a grill assembly for a cyclone dust collecting apparatus for a vacuum cleaner capable of improving the dust collecting function of the vacuum cleaner by reducing the amount of the filth that is drawn to the vacuum-generating device through the grill.

Thus in a broad embodiment this invention seeks to provide a grill assembly for a cyclone dust collecting apparatus for a vacuum cleaner, disposed at an upper part of an air discharging passage of a cyclone body that generates a whirling air current from the air drawn thereinto and separates filth from the drawn air by the centrifugal force of the whirling air current, the grill assembly comprising:

a grill body; and

a plurality of blades disposed along an outer circumference of the grill body and being formed so that adjacent blades are spaced and separated by a predetermined space thereby defining a passage between each two adjacent blades, the passage formed at

an acute angle with respect to a flow direction of the whirling air current, each blade including a protrusion member protruding from the outer circumference of the grill body in a radially outward direction.

Preferably, a separate shielding member, removably connected with the grill body, shields an end portion of an upper part of the grill body and also has the function of shifting the flow direction of the filth included in the air, which flows to the grill body, into the whirling air current.

Preferably, the height of the protrusion portion, the space between the blades, and the angle between the blades and the stream-line of the whirling air current are determined within the range that the images of the blades are not overlapped with each other when the blades are reflected to imaginary cylinder coaxial with the blades.

The invention will no be described with reference to the attached drawings in which:

Figure 1 shows a sectional view showing a conventional cyclone dust collecting apparatus in a vacuum cleaner;

Figure 2 shows a partial sectional view illustrating the flow of the air around the grill of the conventional cyclone dust collecting apparatus of the vacuum cleaner of Figure 1;

Figure 3 shows an exploded perspective view showing a grill assembly for a cyclone dust collecting apparatus for a vacuum cleaner according to the present invention;

Figure 4 shows a sectional view of the grill assembly of the cyclone dust collecting apparatus for the vacuum cleaner

constructed at the cyclone body according to the present invention; and

Figure 5 shows a partial sectional view indicating the flow of air around the grill assembly of the cyclone dust collecting apparatus of the vacuum cleaner according to the present invention.

Referring first to Figures 1, and 2, these show a typical assembly for a conventional cyclone vacuum cleaner.

Figure 1 shows one example of a conventional cyclone dust collecting apparatus for a vacuum cleaner. The conventional cyclone dust collecting apparatus 10 for a vacuum cleaner comprises a cyclone body 20, a filth-collecting portion 30, and a partition 40. An air suction passage 21, connected with the brush assembly (not shown) of the vacuum cleaner, is located at an upper part of the cyclone body 20. The air, which is drawn through the air suction passage 21, forms a whirling air current as it is drawn in the tangential direction of the cyclone body 20. An air discharging passage 22, connected with the vacuum-generating device of the vacuum cleaner, is located at an upper center of the cyclone body 20. A grill 23 is placed at the inlet of the air discharging passage 22 for preventing filth such as hair being drawn into the vacuum-generating device.

As shown in Figure 2, a plurality of passages 24 are formed in the grill 23 so the cleaned air can pass through it. The arrow A indicates the flow path of the whirling air current in the cyclone body 20.

For this conventional cyclone dust collecting apparatus 10 for a vacuum cleaner, when the vacuum-generating device of the vacuum cleaner is operated, the air containing various dust and filth is drawn into the cyclone body 20 through the air suction passage 21 from the brush assembly. The air drawn into the cyclone body 20 forms the whirling air current, which is collected in the filth collecting portion 30 by being separated by the centrifugal forces in the whirling air current. The cleaned air flows to the vacuum-generating device through the passages 24 in the grill 23 and the air discharging passage 22. But some of the filth, which has not been separated from the air current, also passes through the grill 23 with the air through the passages 24 of the grill 23, and flows through the air discharging passage 22 to the vacuum-generating device that has a filter (not shown) at an upper part therein.

The filth is separated from the air and captured on the filter, and the cleaned air is discharged to the outside of the vacuum cleaner through the vacuum-generating device. However, the dust collecting function of the vacuum cleaner is diminished because the filth clogs the filter and obstructs the air flow though it.

Figure 3 shows one example of a grill assembly for a cyclone dust collecting apparatus for a vacuum cleaner according to the present invention. The grill assembly 100 includes a grill body 110, a plurality of blades 120, and a shielding member 130. As shown in Figure 4, the cylinder type grill body 110 has openings at both its upper and lower ends. The upper opening is connected with the air discharge passage 220 of the cyclone body 200, and

the lower opening is shielded by the shielding member 130. The shielding member 130 is connected with a bracket 111, integrally formed with the grill body 110, by a screw 140. In other words, the shielding member 130 can be separated from the grill body 110 by unscrewing the screw 140, and thus maintenance and repair of the grill assembly 100 is simplified.

A filth backflow preventing portion 131 is located at the outer side of the circumference of the shielding member 130. The filth backflow preventing portion 131 shifts the flow direction of the filth included in the air flowing to the grill body 110 into a whirling air current in the cyclone body 200. The filth backflow preventing portion 131 includes a plate extending downwardly from the end of the grill body 110 to the outer part in a radial direction, and the flow direction of the air flow containing the filth is shifted as the filth hits against, and is deflected by, this plate.

The plurality of blades 120 are disposed along the outer circumference of the grill body 110 at a predetermined separation from each other so as to permit the passage of air. As shown in Figure 5, passages 121 are formed between the blades 120. Each blade 120 includes a protruding portion 122 extending from the outer circumference of the grill body 110 to the outer part. The protruding portion 122 shifts the advancing direction of the filth included in the air current indicated by the arrow C around the grill body 110 into the whirling air current. In other words, the advancing direction of the filth, included in the air current flowing in the direction C drawn into the grill assembly 100 through the passage 121 by the air pressure difference across

the grill assembly 100, is shifted by being hit against the protruding portion 122 (see the arrow D in Figure 5).

It is important that the center-line of the blades 120 and the flow path shown by arrow B of the whirling air current are disposed at an acute angle θ. so that the angle between the passage 121 and the flow path shown by the arrow B of the whirling air current is an acute angle. In other words, for the filth whirled in the air to flow into the passages 121 between the blades 120, there should be a directional shift of more than 90^0. The result is that it is very difficult for the filth to flow through the passage 121 since it would have to flow in a reverse direction to the whirling direction of the whirling air current. This effect becomes greater when the angle θ is smaller, the height of the protruding portion is higher, and the space between the blades 120 is narrower (in other words, the width of the passage is narrower), but this will also mean that the resistance to flow for the air passing through the passage 121 also increases. Consequently, the noise made by the cleaner increases and the efficiency of the vacuum cleaner decreases due to a lowered suction power. Accordingly, the angle θ and the separation between the blades 120 should be set to optimize air flow and to minimize noise.

It is preferable that the angle θ, the height of the protruding portion, and the space between the blades 120 are determined within the range that the images of the blades are not overlapped with each other when the blades are reflected onto an imaginary cylinder coaxial with the blades 120. Figure 4 shows the grill assembly 100, having the above construction, mounted on

the cyclone body 200. The grill assembly 100 is removably connected with the cyclone body 200 by a connection member such as a screw (not shown).

If the vacuum-generating device of the vacuum cleaner is operated, the whirling air current is formed in the cyclone body 200. The various filth materials, included in the whirling air current, are separated from the air current by the centrifugal forces developed in the air flow, and the separated filth is collected in a filth-collecting portion 300. The filth, separated from the air current but uncollected at the stage of filth collecting by the centrifugal force, is moved to the grill assembly 100 by the uprising air current whirling along the center of the cyclone body 200. At this time, some filth included in the air current is reflected after being hit against the filth backflow preventing portion 131 of the shielding member 130, and the advancing direction of the filth is shifted again to the whirling air current. Thus, the filth is whirled again in the whirling air current.

The filth that has not been separated from the uprising air current by the filth back flow-preventing portion 131 flows through the passages 121 of the grill assembly 100. The air is drawn into the grill assembly 100 through the passage 121 because of the pressure difference across the grill assembly 100. At that time, some filth included in the air current moving in the direction of the arrow C is reflected after being hit against the protruding portions 122, and, it is whirled again into the whirling air current (see arrow D in Figure 5) due to its

directional shift so that the amount of the filth passing through the passage 121 decreases.

On the other hand, as described above, the passages 121, formed by a plurality of blades 120, are disposed at an acute angle with the flow direction indicated by arrow B for the whirling air current, and the filth has a greater inertia than the air because the filth has a greater gravity than the air. In other words, for the filth, whirled in the air current, to enter the passages 121 between the blades 120, the filth has to overcome its greater gravity and also divert its whirling direction more than 90^0. It is thus difficult for the filth to pass through the passages 121, and thus, the amount of filth flowing toward the vacuum-generating device decreases. The deterioration of dust collecting function, which is caused by clogging of the filter disposed at the upper part of the vacuum-generating device, is diminished.

As described above, using the grill assembly 100 of the cyclone dust collecting apparatus for the vacuum cleaner of the present invention, the amount of the filth, flowing to the vacuum generating device of the vacuum cleaner through the air discharging passage of the cyclone body 200 along the air current, decreases and thus, the dust collecting function of the vacuum cleaner is improved.

1. A grill assembly of a cyclone dust collecting apparatus for a vacuum cleaner, disposed at an upper part of an air discharging passage of a cyclone body that generates whirling air current from the air drawn thereinto and separates filth materials from the drawn air by the centrifugal forces in the whirling air current, the grill assembly for preventing the filth from being drawn into a vacuum-generating device of the vacuum cleaner comprising:

a grill body; and

a plurality of blades disposed along an outer circumference of the grill body and being formed so that adjacent blades are spaced and separated by a predetermined space thereby defining a passage between each two adjacent blades, the passage formed at an acute angle with respect to a flow direction of the whirling air current, each blade including a protrusion member protruding from the outer circumference of the grill body in a radially outward direction.

2. The grill assembly according to Claim 1, wherein an upper end of the grill body is shielded by a separate shielding member, which is removably connected with the grill body.

3. The grill assembly according to Claim 2, wherein the shielding member shifts the moving direction of the filth included in the air which flows to the grill body into the whirling air current.

4. A grill assembly according to Claim 1 wherein the height of the protrusion member, a space between the blades, and the acute angle between the blades and the flow direction of the whirling air current comprise predetermined values within a range wherein the radial projections of the blades do not overlap each other when the radial projections are projected onto an imaginary cylinder coaxial with the blades.

FIG.1

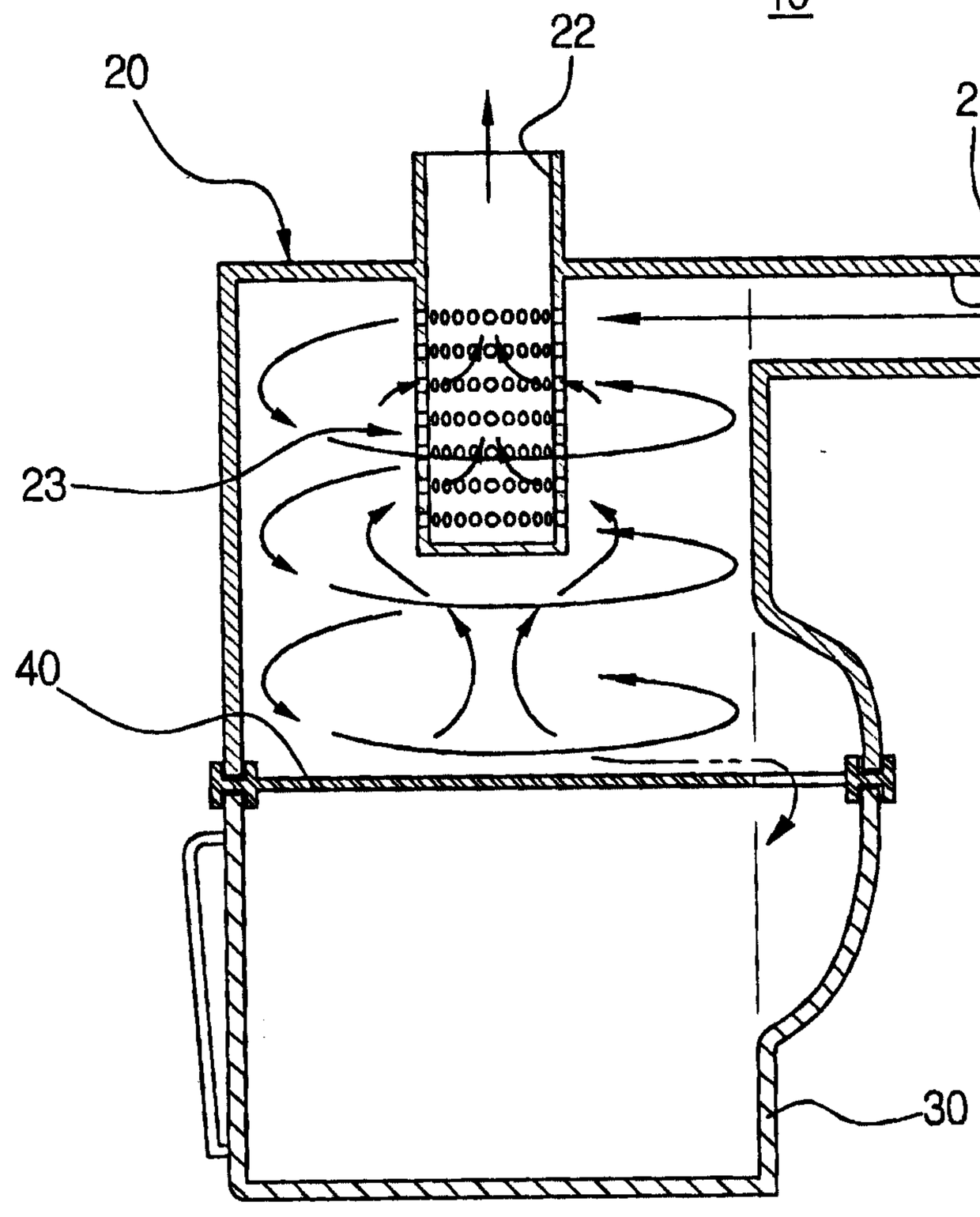


FIG.2

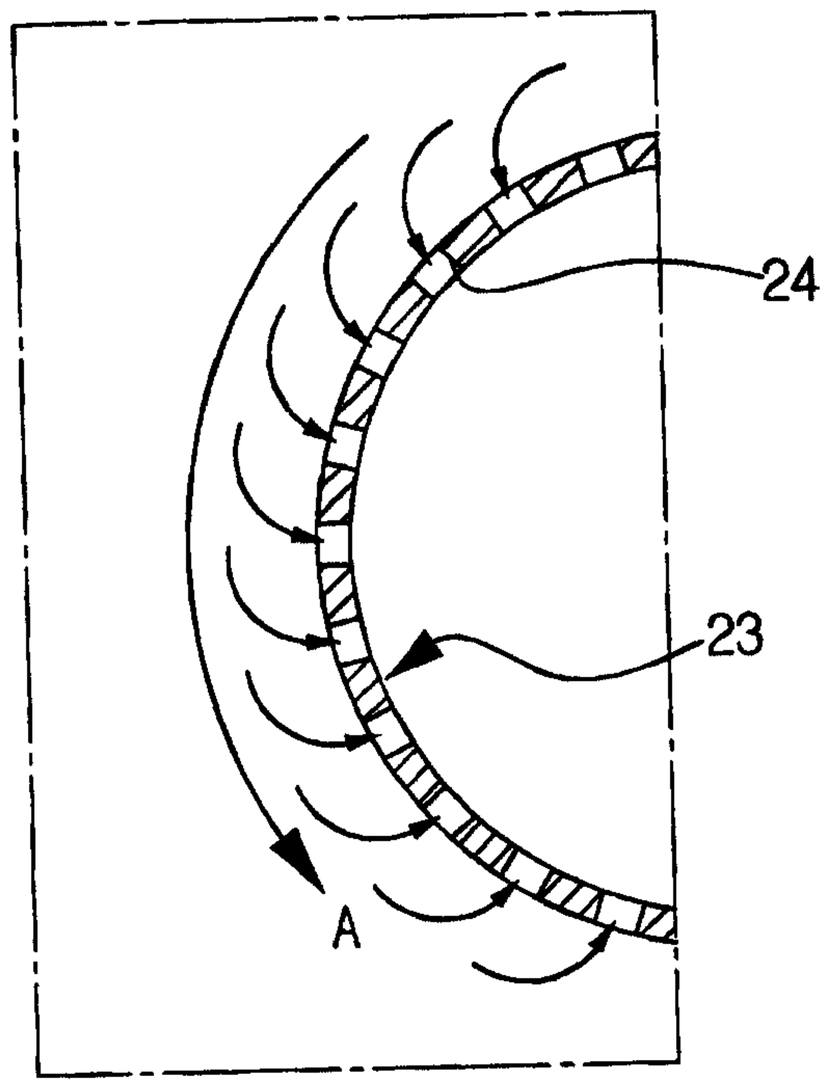


FIG.3

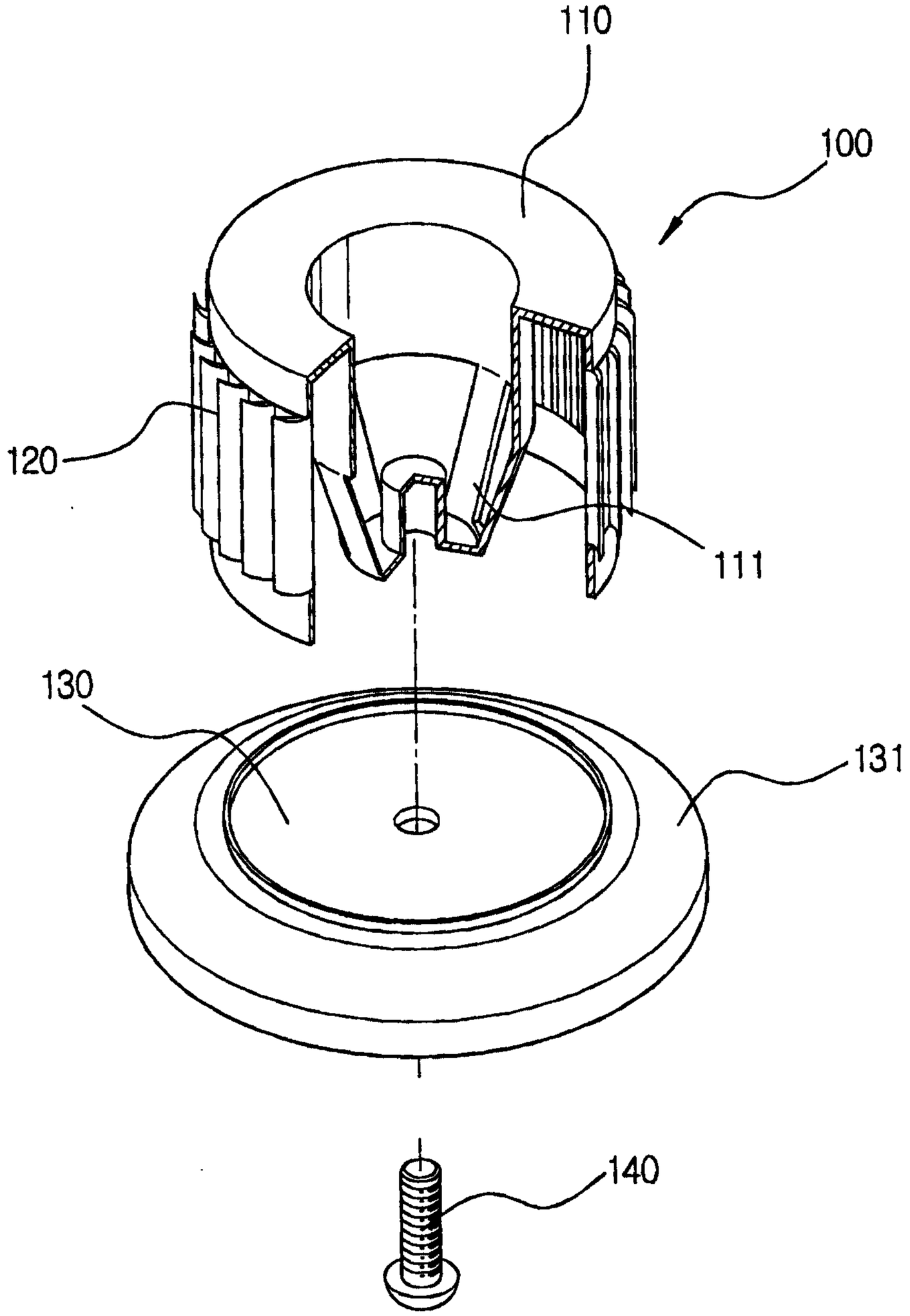


FIG.4

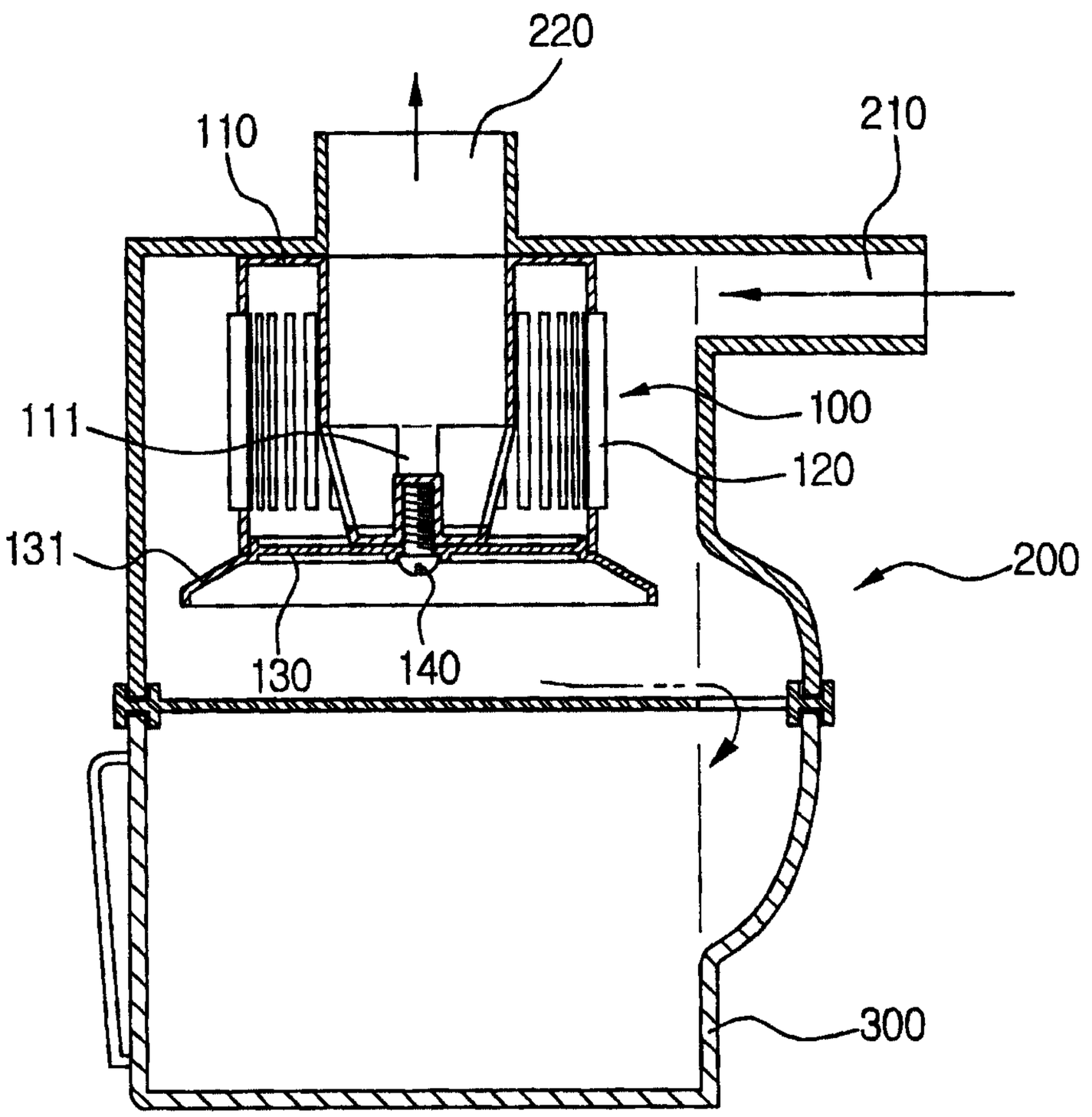
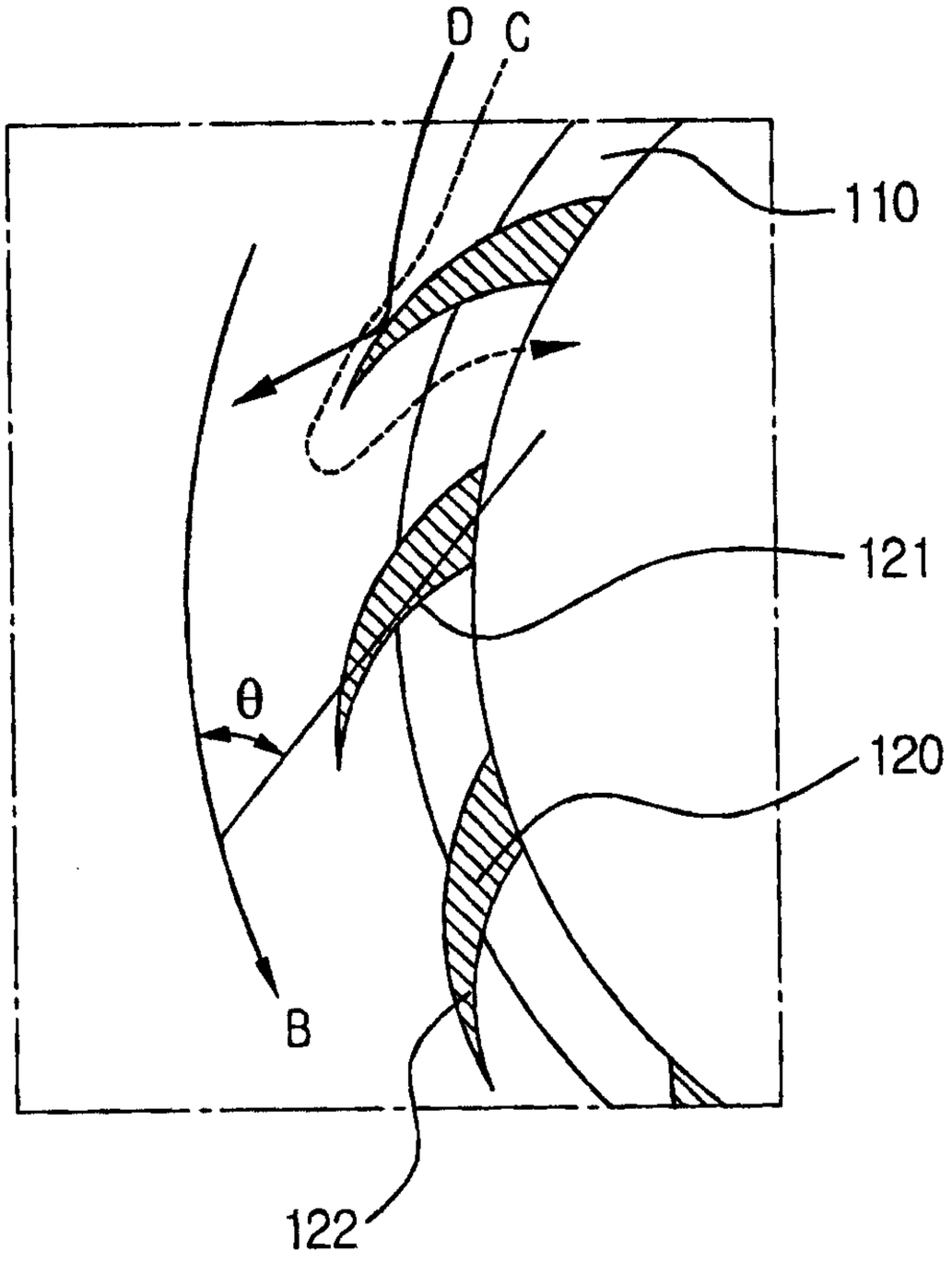
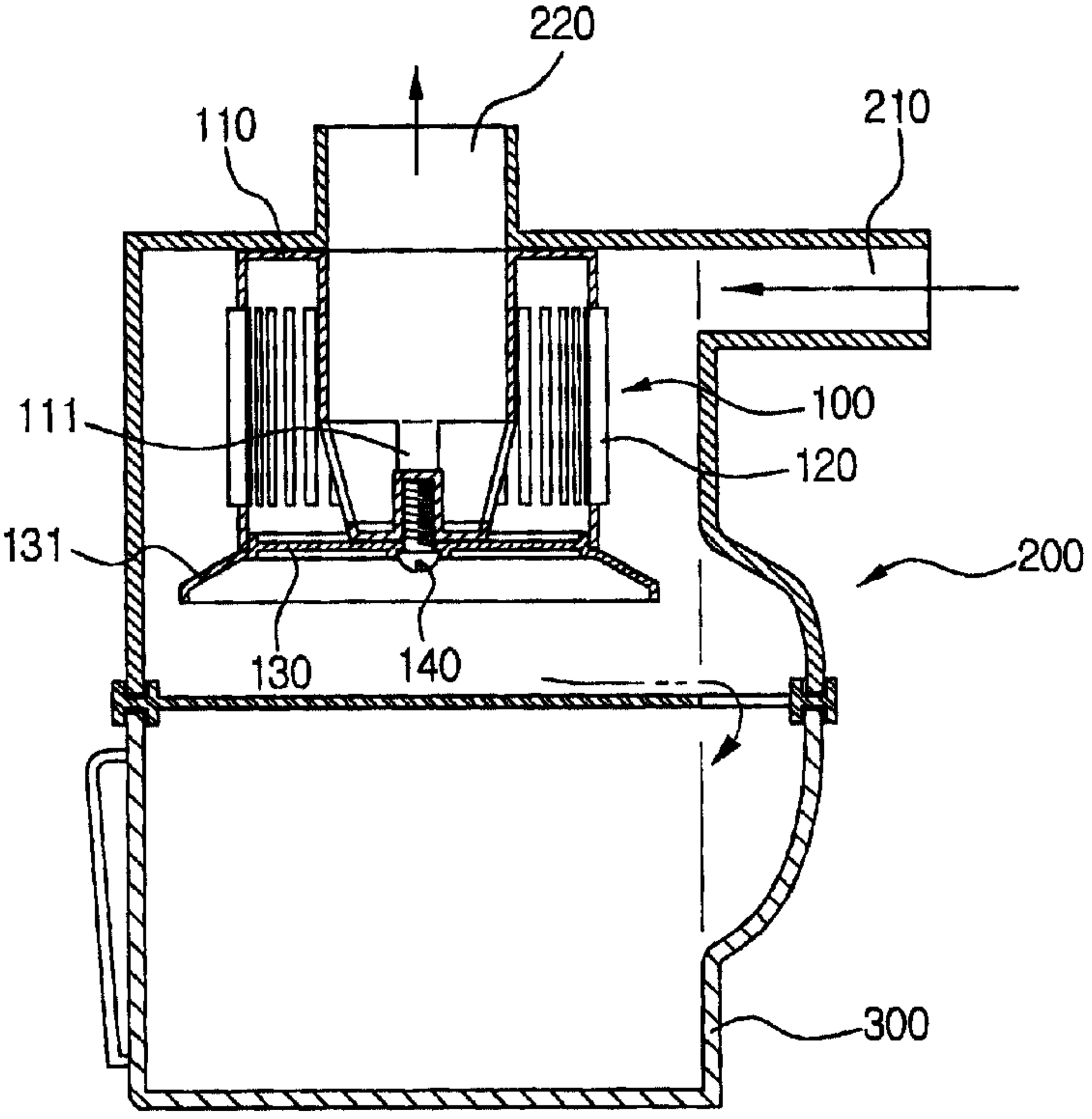


FIG.5

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