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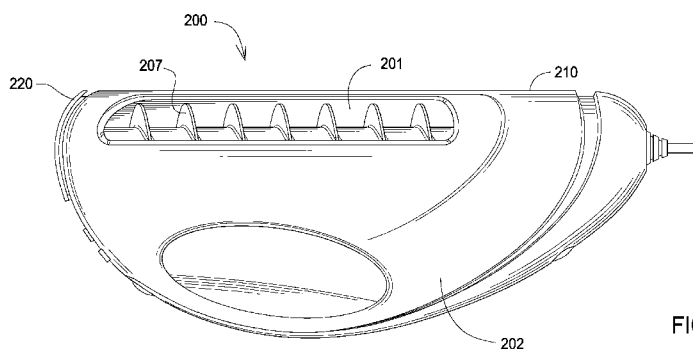


FIG.5

(57) Abstract: A hair styling device dry and/or to curl a hair strand by suctioning hair into a hair styling chamber is disclosed. The device has a main styling chamber and air flow channel parallel to the styling chamber. The device has a vacuum impeller mounted in a fan chamber. The fan chamber is aerodynamically connected to the main styling chamber and to the air flow channel. The styling chamber has a styling form, which in the depicted embodiment is a spiral for forming spiral curls. The styling form can be heated directly by a heater and the air flow channel can have heating elements to heat the air flowing through it. At the opposite end of the body from the impeller, there is a hair inlet with a mixing tip through which hair is drawn into the styling chamber around the styling form by suction of the air flow.



## Hair Styling Device

**CROSS REFERENCE APPLICATIONS**

[0001] This application is a non-provisional application claiming the benefits of provisional  
5 application no. 61/511,778 filed July 26, 2011 and provisional application no. 61/558,385  
filed November 10, 2011, which are hereby incorporated by reference for all purposes.

**BACKGROUND**

[0002] Many types of hair styling devices exist. One of the ongoing challenges is to curl hair  
without causing damage to the hair. Most hair curling devices work by applying heat to the  
10 hair with a heating element, such as a standard curling iron. This can dry and even burn the  
hair strands and cause damage. Styling the hair with a styling brush and a hair dryer is  
known, but this requires the user to manipulate both the brush and the hair dryer at the same  
time which is often difficult and tiring. Further, the user has to wind and unwind the hair  
strand to be styled from the brush multiple times. This can be difficult to do on the hair on  
15 the back of the user's head. Also there is the risk that the hair will get tangled in the brush,  
causing breakage of the hair and slowing the process down. Hair styling devices that suction  
the hair into a chamber to dry are also known. The known versions of these have several  
disadvantages. First the devices tend to be primarily designed to straighten hair, curling the  
hair is a secondary thought if at all. Second, many of the known devices are primarily  
20 designed for salon installations, with personal use devices as a secondary consideration.  
Therefore, the devices tend to be bulky and expensive to manufacture. None of the prior art  
discloses a small, hand held device that efficiently and easily dries and/or curls hair. Also,  
many of the prior art devices the air flow into the hair styling/drying chamber is uneven, with  
less than optimal flow to pull the hair in to the chamber and hold it in the chamber while  
25 being dried and/or curled.

[0003] The foregoing example of the related art and limitations related therewith are intended  
to be illustrative and not exclusive. Other limitations of the related art will become apparent  
to those of skill in the art upon a reading of the specification and a study of the drawings.

**SUMMARY**

[0004] The following embodiments and aspects thereof are described and illustrated in  
30 conjunction with systems, tool and methods which are meant to be exemplary and illustrative,  
not limiting in scope. In various embodiments, one or more of the above described problems  
have been reduced or eliminated, while other embodiments are directed to other  
improvements.

[0005] One aspect of the present disclosure is to provide a hair curling device that the user does not have to wind the hair around the styling implement.

[0006] One aspect of the present disclosure is to provide a hair styling device for curling hair that uses suction to pull the hair around a hair styling core.

5 [0007] One aspect of the present disclosure is to provide for styling of hair without having to press a heated element directly against the hair to be styled, which can cause damage to the hair.

[0008] One aspect of the present disclosure is to provide a hair styling device that can have interchangeable hair styling shapes.

10 [0009] One embodiment of a hair styling device has a hollow hair styling chamber having a first end and a second end forming a first flow path. The hair styling chamber is aerodynamically connected with a fan chamber having a means to induce an airflow at the second end. The means to induce an air flow can create an air flow along the flow path from the first end to the second end of the hair styling chamber and the fan chamber. The fan  
15 chamber also being aerodynamically connected to an air channel forming a second flow path, said air channel being roughly parallel to the hair styling chamber from the second end to the first end. The air channel is aerodynamically connected to a mixing tip, the mixing tip being aerodynamically connected to the hair styling chamber by an intake channel. The mixing tip is located on the first end of the hair styling chamber from the fan chamber. The mixing tip  
20 functions to mix a first air flow of outside air with a second air flow from the air channel to form a combined air flow in the hair styling chamber and creating a suction that functions to draw a lock of hair into the hair styling chamber. The mixing tip has a generally cone shaped hair inlet narrowing towards the inlet channel functioning to increase a flow rate of the air to pull a lock of hair into the styling chamber.

25 [0010] In one embodiment the hair styling device to form a hair strand into a curl has a body with a handle. The body has a main styling chamber and air flow channel parallel to the styling chamber. The body is attached to the handle, which has a vacuum impeller mounted in a fan chamber. The fan chamber is aerodynamically connected to the main styling chamber and to an air flow channel. The styling chamber can have a styling form, which in  
30 the depicted embodiment is a spiral for forming spiral curls. The styling form can be heated directly by a heater and the air flow channel can have heating elements to heat the air flowing through it. At the opposite end of the body from the impeller, there is a hair inlet through which hair is drawn into the styling chamber around the styling form by suction of the air flow.

[0011] Another description of the device is a hair styling device having a first chamber defining an air flow path from a first end to a second end, a second chamber having a first end and a second end, said second chamber defining a respective flow path, a blower having an input and an output, the input of the blower coupled with the second end of the first chamber, the output of the blower connected with the first end of the second chamber and with an exit port, a mixing tip, the mixing tip having a mouth of a first diameter and a throat of a second diameter, the second diameter smaller than the first diameter, the throat coupled with the first end of the first chamber, and the second end of the second chamber coupled with a plurality of openings between the mouth of the mixing tip and the throat of the mixing tip.

[0012] In addition to the exemplary aspects and embodiments described above, further aspects and embodiments will become apparent by reference to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

#### 15 **BRIEF DESCRIPTION OF THE DRAWINGS**

[0013] Figure 1 is a schematic drawing of the hair styling device  
[0014] Figure 2 is a front elevation view of the front of the hair styling device.  
[0015] Figure 3 is a close up of the front of the hair styling device in a schematic drawing.  
[0016] Figure 4 is a perspective drawing of a hair strand drawn into the hair styling device.  
20 [0017] Figure 5 is a side plan view of an alternate embodiment of the hair styling device.  
[0018] Figure 6 is a partial cut away view of Figure 5.  
[0019] Figure 7 is a partial cut away view of Figure 5.  
[0020] Figure 8 is a front elevation view of the alternate embodiment.  
[0021] Figure 9 is a schematic view of the air flow in the mixing tip.  
25 [0022] Figure 10 is a perspective view of the front cap being removed.  
[0023] Figure 11 is a perspective view of a partial cut away view showing the front cap removed.  
[0024] Figure 12 is a close up view of one end of the style form and the connection piece.  
[0025] Figure 13 is a close up view of one end of the style form and the connection piece.  
30 [0026] Figure 14 is an exploded view of Figure 13.  
[0027] Figure 15 is a close up of the locking tab disengaged.  
[0028] Figure 16 is a close up of the locking tab engaged.  
[0029] Figure 17 is a perspective view of a possible style form embodiment.  
[0030] Figure 18 is a perspective view of a possible style form embodiment.

[0031] Figure 19 is a perspective view of a possible style form embodiment.

[0032] Figure 20 is a perspective view of a possible style form embodiment.

[0033] Before explaining the disclosed embodiment of the present invention in detail, it is to be understood that the invention is not limited in its application to the details of the particular arrangement shown, since the invention is capable of other embodiments. Exemplary  
5 embodiments are illustrated in referenced figures of the drawings. It is intended that the embodiments and figures disclosed herein are to be considered illustrative rather than limiting. Also, the terminology used herein is for the purpose of description and not of limitation.

### 10 DETAILED DESCRIPTION OF THE DRAWINGS

[0034] The disclosed hair styling device is used to form a hair strand or strands into a desired curl or other shape. Referring first to Figure 1, the hair styling device 100 has a body 110 and a handle 102. The body 110 has a hollow main styling chamber 101 and an air channel 106 that runs parallel to the styling chamber 101 for at least a portion of the length of the  
15 styling chamber, 101. The length of the main styling chamber 101 will depend on the length of hair to be styled and the desired total weight of the device. For hand held units, there will be a practical limit of the length that is comfortable for most users to hold. The air channel 106 in the depicted embodiment is a similar length to the styling chamber, but this is not required, or even particularly likely on versions for longer hair. In the depicted embodiment  
20 the air channel 106 is also a heating chamber for heating the air. A heating chamber could also be located around the hair inlet 111. The body 110 is attached to the handle 102 at one end. The handle 102 has a vacuum impeller 103 powered by a motor 104 mounted in a fan chamber 105. The fan chamber 105 is aerodynamically connected to the main styling chamber 101 and to the air chamber 106. The styling chamber 101 has a styling form 107 in  
25 the depicted embodiment. It is not necessary for the operation of the device to have the style form 107 in the style chamber 101. If a person only wished to dry their hair in a generally straight style, then they could use the device with no style form in the chamber. The depicted embodiment of the style form is a spiral for forming spiral curls. A large number of possible shapes of the styling form could be used with the present device. The hair could be formed  
30 into looser or tighter spiral curls, zigzag shapes, flips and other styles are possible with the disclosed device. The styling form can vary in diameter of the cylindrical core, pitch of the vanes, thickness of the vanes, or even discard the vanes in favor of shapes, pegs and other methods for imparting form to hair. If desired the disclosed device could also be used to dry

the hair straight if the styling form 107 is removed or a specific straightener/dryer form is used.

[0035] The styling form 107 is heated by heater 108 in the depicted embodiment. In the depicted embodiment the styling form 107 is made of aluminum for good heat transfer. A heated style form 107 could also have an aluminum or other metal core with a thermally conduction plastic or ceramic over molded cover. It is possible to have an unheated styling form 107, in which case it could be formed of plastic. The heating chamber 106 has heating elements 109. The heater 108 and the heating elements 109 could be wire coils or ceramic heating elements. At the opposite end of the body from the handle 102, there is a hair inlet 111, through which hair H is drawn into the styling chamber 101 around the styling form 107 by the air flow described below.

[0036] In use, the impeller 103 creates an air flow when powered by motor 104. The air is pulled into impeller 103 as shown by arrow A. This creates an air current that draws air through the styling chamber 101, as shown by arrow B. The air leaving the impeller is split into two air streams; one is exhausted out of the styling device, shown by arrow C, and the other stream flows into the air channel 106 and over heating elements 109, shown by arrow D. The heating elements 109 are not required in all embodiments. Depending on the heating capacity required any given embodiment could have a heated style form 107 and heating elements 109, or just one of the heating means. The choice of heating the style form, the air flow or both will depend on a number of design considerations including desired hair style or body, desired physical embodiment of production product or creation of multiple product using different heating system but utilizing the same vacuum impeller system. The air flowing over the heating elements 109 is heated and exits the heating chamber at the mixing tip 112, shown by arrow E. Outside air is drawn into the unit 101 at hair inlet 111, shown by arrow F.

[0037] Figures 2 and 3 show the hair inlet 111 and mixing tip 112 of the first embodiment. The hair inlet 111 is cone shaped in the depicted embodiment to provide smooth gathering of the hair and to utilize increasing the speed of the air flow caused by the narrowing of the flow path created by the cone and an intake channel to provide maximum air velocity at the point the hair and air is drawn into the styling chamber. The hair inlet 111 could also be pyramidal shaped or other similar shapes. Heated air flows from the mixing tip 112 into the cone through holes 113 when heating elements 109 are in use. Holes 113 are evenly spaced around the cone in the depicted embodiment, but this is not required. There could be just 2 or 3 narrow slots, or 4-6 holes spaced around the cone. The holes 113 can also be located a

number of different positions in the depth of the cone. The holes 113 and the configuration of the cone shape of the hair inlet allow the force of the air entering the styling chamber to smoothly pull a hair strand H to be styled into the styling chamber and around the styling form 107, as seen in Figure 4. The mixing tip will be discussed in greater detail below.

5 [0038] The hair strand H can be either wet or dry. The air temperature in the styling chamber is between 140 to 300 degrees F during operation. In the preferred embodiment the hair strand H is drawn into the styling chamber 101 and held there with the heat on for about 45 to 60 seconds. The heat is then turned off, but not the airflow for another 15 to 20  
10 seconds. This holds the curl in the styling chamber at a reduced temperature and helps to set the curl.

[0039] Referring next to Figures 5 to 7, another embodiment of the hair styling device 200 has a body portion 210 and a handle portion 202. The body portion 210 has a hollow main styling chamber 201 and air channel 206 that runs roughly parallel to the styling chamber 201 for at least a portion of the length of the styling chamber, 201. The air channel 206 has a  
15 bypass air heating element 209 in the depicted embodiment. Some embodiments will not have the air heating element and the air will be not be actively heated in the air channel 206. Of course, some heating will occur due to friction. The length of the main styling chamber 201 will depend on the length of hair to be styled and the desired total weight of the device. For hand held units, there will be a practical limit of the length that is comfortable for most  
20 users to hold. In the depicted embodiment at least a portion of the walls of the styling chamber 201 are transparent or translucent. This is not required for function, but is a user convenience feature. The air channel 206 in the depicted embodiment is a similar length to the styling chamber, but this is not required, or even particularly likely on versions for longer hair. The air channel could also be located around the hair inlet 211.

25 [0040] The body 210 is attached to the handle 202 at each end in this embodiment. A vacuum impeller 203 is powered by a motor 204 mounted in a fan chamber 205 to produce the air flow. Other means of producing an air flow could be uses as well, including fans, propellers or other known means. No limitation is intended or should be inferred. The fan chamber 205 is aerodynamically connected to the main styling chamber 201 and to the air  
30 channel 206. The styling chamber 201 has a styling form 207, which in the depicted embodiment is a spiral for forming spiral curls. It is not necessary for the operation of the device to have the style form 207 in the styling chamber 201. If a person only wished to dry their hair in a generally straight style, then they could use the device with no style form in the chamber. The style form 209 has a heated core 208 in the depicted embodiment. In some

embodiments the style form 209 may not be heated. Any given embodiment may have the heated core 208 or the air heating element 209 only or may have both the heated core 208 and the air heating element 209. The choice will depend on a variety of design considerations, including price point of the final product, amount of hair to be styled at a time and the size and length of the style form.

[0041] The air flow in this embodiment is substantially similar to the airflow of the first embodiment as shown in Figures 6 and 7. In use, the impeller 203 creates an air flow when powered by motor 204. The air is pulled into impeller 203 as shown by arrow G. Outside air is drawn into the unit 201 at hair inlet 211 in first air flow, shown by arrow L. In this embodiment the mixing tip 212 and the hair inlet 211 are both contained in a removable inlet cap 220. This creates an air current that draws air through the styling chamber 201, as shown by arrows H. The air leaving the impeller is split into two air streams; one is exhausted out of the styling device, shown by arrows I at two sets of exhaust vents. The first set of exhaust vents 230 shown in Figure 6. This first set of vents is radially located around the body 210 behind the fan chamber 205 as shown in Figure 7. The other set of exhaust vents 231 is located around the power cord 232. The rest of air stream flows into the air channel 206 and over heating elements 209, shown by arrow J forming the second air flow. The air flowing over the heating elements 209 is heated and exits the heating chamber at the mixing tip 212, shown by arrow K when the heating element is present. When the heating element is not present the air flows through the air channel 206 to the mixing tip.

[0042] Figure 7 shows the air flow through the mixing tip 212 into the styling chamber 201 and the rest of the device. The hair inlet 211 is cone in the depicted embodiment to provide smooth gathering of the hair and to utilize increasing the speed of the air flow caused by the narrowing of the flow path created by the cone and an intake channel to provide maximum air velocity at the point the hair and air is drawn into the styling chamber 220. The hair inlet 211 could also be pyramidal shaped or other similar shapes that smoothly narrow towards the intake channel.

[0043] A second air flow, shown by arrow K, from the air channel 206 is combined and entrained with the first air flow L in the mixing tip into combined air flow M that flows into intake channel 220. The air flow in the intake channel 220 must be fast enough to suction the hair into the device and down into the styling chamber 201. It is believed that the Venturi effect created by the cone and the intake channel 220 such that the mouth of the intake channel is the point of greatest air flow velocity and thus greatest suction. The mixing tip 211 also ensures that when heating elements are used the heated air in the second air flow is



thoroughly mixed with the incoming air of the first air flow to reduce or eliminate hot spots or uneven heating of the hair strand.

[0044] Once inside the styling chamber 201 the cross sectional area increases, but the static pressure remains lower than outside the intake, encouraging airflow into the style chamber and around the style form. This air flow is shown in schematic form in Figure 9. The mixing tip 211 creates a stable, efficient air flow despite the mixing of the air flows, allowing good suction and good results with hair styling. As seen in Figure 8, the holes 213 in the mixing tip 211 do not need to be evenly sized or spaced, although the holes 213 do need to be surrounding the intake channel 220.

[0045] In this embodiment the style form 209 can be removed and changed for a different shaped style form. A large number of possible shapes of the styling form could be used with the present device. In the depicted embodiment the style forms 209 have two mechanical means to secure them into the hair styling device 200; a latch at the base and the air intake cap 220 on the end of the styling chamber 201. Each style form 207 can have visual and physical guides to aid in alignment. To change the style form 207 for a different one the user will remove the air intake cap 220 as seen in Figures 10 and 11. In the depicted embodiment the air intake cap 220 is retained in opening 223 by compressible tabs 221 that grip ridges 222 on the cap. Other known means of holding the air intake cap 220 in place would function as well. Once the air intake cap 220 is removed from opening 223, the front of the styling chamber 201 is open exposing a first end 224 of style form 207.

[0046] Figures 12 and 13 are perspective view of back end the style form 207 connection piece 240 that connects the style form 207, and thereby the styling chamber 201, to the fan chamber 205. The second end 225 of the style form 207 a power connection member 226 extending from the end. The power connection member 226 has a filter frame 250 with a filter 251 mounted around it. The filter 251 and the frame 250 form a disk that seals the bottom of the style form 207 to the connection piece and prevents hair or other materials from being pulled into the impeller. As seen in Figure 14, a connection member retainer 227 with a locking tab 227 is mounted around the connection member and between the style form 207 and the filter frame 250. Locking tab 228 extends through filter frame 250 and extends substantially parallel to the connection member 226. To mount the style form 207 in the connection piece 240 the connection member is inserted in to power connection jack 241 and the locking tab 228 is inserted through slot 242.

[0047] Referring next to Figures 15 and 16, the locking tab 228 extends through slot 242. The filter frame 250 is now against the connection piece 240. The locking tab 228 has

projection 229 which engages with the filter frame 250 when the style form 207 is rotated, which locks the style form 207 in place. The cap 220 is then placed over the end of the styling chamber 201 further locking it in to place. Other possible attachment mechanisms are possible as well, and no limitation should be inferred on the exact attachment mechanism of the style form 207. In one possible embodiment the style chamber and style form could be a single integrated unit that is changed out completely as a unit when a different style is desired. Conversely, a simpler embodiment could have the styling form fixed into the styling chamber with no option of removal and no removable tip or associated locking features. The air flow through the configuration in shown by arrows in Figure 14, 15 and 16. Air then flows into the impeller as discussed above.

[0048] A large number of possible shapes of the styling form could be used with the present device. Figures 17 through 20 show four possible configurations of style forms. Additionally, the form 209 and styling chamber 2011 have a shallow draft of approximately  $\frac{3}{4}$  to 1 degree. This achieves several things, including preventing scratches in the styling chamber from pulling style forms in and out, ensuring a better seal between the form and the chamber and preventing improper insertion of style forms.

[0049] In the depicted embodiment the hair styling device 200 has two sets of controls; a variable control for heat level and on-off controls for suction and heat. This allows the user to set the amount of heat and to turn off the heat when desired; separate from the suction that creates the air flow. The “master” control is the suction on-off. This will be located in a convenient location near the thumb or index finger. Unless the suction control is on, nothing else on the hair styling device will work and all heating systems will be locked out. This is a safety feature to prevent overheating.

[0050] The heat on-off will control heat to the system. With the suction running, the user will engage the heat. If the user wished to cool the hair to set a style, they would toggle the heat and shut off one or both of the heating elements, depending on the embodiment. This control will be located for use by the index finger and will be designed and placed to avoid confusion with suction on-off.

[0051] In one embodiment the user will have dual heat controls allowing the user to set the heat generated by each heating element independently.

[0052] Additional features could be added to the hair styling device, such as ionic generators, including tourmaline crystals, could be added to the device to allow the user to control the buildup of positive ions caused by the heating of the air flow. Silver ion sanitizing methods could also be used as well in the device.

[0053] While a number of exemplary aspects and embodiments have been discussed above, those of skill in the art will recognize certain modifications, permutations, additions and sub-combinations therefore. It is therefore intended that the following appended claims hereinafter introduced are interpreted to include all such modifications, permutations, additions and sub-combinations are within their true spirit and scope. Each apparatus embodiment described herein has numerous equivalents.

[0054] The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed. Thus, it should be understood that although the present invention has been specifically disclosed by preferred embodiments and optional features, modification and variation of the concepts herein disclosed may be resorted to by those skilled in the art, and that such modifications and variations are considered to be within the scope of this invention as defined by the appended claims. Whenever a range is given in the specification, all intermediate ranges and subranges, as well as all individual values included in the ranges given are intended to be included in the disclosure

[0055] In general the terms and phrases used herein have their art-recognized meaning, which can be found by reference to standard texts, journal references and contexts known to those skilled in the art. The above definitions are provided to clarify their specific use in the context of the invention.

**I CLAIM:**

1. A hair styling device comprising:

5 a hollow hair styling chamber having a first end and a second end forming a first flow path, said hair styling chamber aerodynamically connected with a fan chamber having a means to induce an airflow at the second end, said means to induce an air flow creating an air flow along the flow path from the first end to the second end of the hair styling chamber and the fan chamber;

10 an air channel forming a second flow path aerodynamically connected to the fan chamber, said air channel being roughly parallel to the hair styling chamber from the second end to the first end;

the air channel being aerodynamically connected to a mixing tip, the mixing tip being aerodynamically connected to the hair styling chamber by an intake channel, said mixing tip being located on the first end of the hair styling chamber from the fan chamber;

15 the mixing tip mixing a first air flow of outside air with a second air flow from the air channel to form a combined air flow in the hair styling chamber and creating a suction that functions to draw a lock of hair into the hair styling chamber; and

20 the mixing tip having a generally cone shaped hair inlet narrowing towards the inlet channel functioning to increase a flow rate of the air to pull a lock of hair into the styling chamber.

2. The hair styling device of claim 1 wherein the mixing tip has a number of openings spaced around the hair inlet, said openings aerodynamically connecting the air channel to the mixing tip.

25 3. The hair styling device of one of claims 1 or 2 wherein the means to induce an airflow is an impeller.

4. The hair styling device of one of claims 1 to 3 wherein the intake channel has a smaller internal diameter than the hair styling chamber.

5. The hair styling device of one of claims 1 to 4 further comprising the hair styling chamber having a style form, said style form extending the length of the hair styling chamber and the combined air flow pulling the lock of hair around the style form forming the lock of hair into a spiral;
- 5 6. The hair styling device of one of claims 1 to 5 further comprising a heating element in the air flow channel to heat the second air flow.
7. The hair styling device of one of claims 1 to 6 further comprising the style form being heated.
8. The hair styling device of one of claims 1 to 7 wherein a portion of the air flow  
10 generated by the impeller is vented to outside of the body without being circulated through the air intake channel.
9. The hair styling device of one of claims 5 to 8 wherein the style form is removable and is held in the style chamber by a removal cap.
10. The hair styling device of one of claims 5 to 9 wherein the style form is held in the style  
15 chamber by a latch located near the fan chamber.
11. The hair styling device of one of claims 1 to 10 wherein there is a filter located between the hair styling chamber and the fan chamber to prevent hair or other matter from being drawn into the means to induce an airflow.
12. A hair styling device comprising:
- 20 a first chamber defining an air flow path from a first end to a second end,  
a second chamber having a first end and a second end, said second chamber defining a respective flow path,  
a blower having an input and an output, the input of the blower coupled with the second end of the first chamber,  
25 the output of the blower connected with the first end of the second chamber and with an exit port,

a mixing tip, the mixing tip having a mouth of a first diameter and a throat of a second diameter, the second diameter smaller than the first diameter,

the throat coupled with the first end of the first chamber, and

the second end of the second chamber coupled with a plurality of openings between  
5 the mouth of the mixing tip and the throat of the mixing tip.

13. The hair styling device of claim 12 wherein blowing by the blower draws air into the mouth and through the throat into the first chamber.

14. The hair styling device of one of claims 12 or 13 further characterized in that blowing by the blower forces air into the second chamber, and through the at least one opening, the air  
10 forced through the first opening being entrained with the air drawn into the mouth and through the throat.

15. The hair styling device of one of claims 12 to 14 wherein the mouth and throat and at least one opening define a Venturi structure.

16. The hair styling device of one of claims 12 to 15 further comprising a heating element in  
15 the respective flow path of the second chamber.

17. The hair styling device of one of claims 12 to 15 wherein the mixing tip has a number of openings spaced around the throat, said openings aerodynamically connecting the second chamber to the mixing tip.

18. The hair styling device of one of claims 12 to 17 wherein the throat has a smaller  
20 internal diameter than the first chamber.

19. The hair styling device of one of claims 12 to 18 further comprising the first chamber having a style form, said style form extending the length of the first chamber and the combined air flow pulling the lock of hair around the style form forming the lock of hair into a spiral.

20. The hair styling device of one of claims 12 to 19 further comprising the style form  
25 being heated.

21. The hair styling device of one of claims 12 to 20 wherein a portion of the air flow generated by the impeller is vented to outside of the body without being circulated through the air intake channel.
22. The hair styling device of one of claims 19 to 21 wherein the style form is removable and is held in the style chamber by a removal cap.
23. The hair styling device of one of claims 19 to 22 wherein the style form is held in the style chamber by a latch located near the fan chamber.
24. The hair styling device of one of claims 12 to 23 wherein there is a filter located between the hair styling chamber and the fan chamber to prevent hair or other matter from being drawn into the means to induce an airflow.
24. A hair styling method comprising:  
drawing air through a mixing tip and thence through a first chamber, the mixing tip having a mouth of a first diameter and a throat of a second diameter, the second diameter smaller than the first diameter, the first chamber defining a helical air flow path,  
passing air through at least one opening in the mixing tip between the mouth and the throat thereof, said passed air entrained in the drawn air, and  
by means of the drawing of air, drawing hair through the mouth and through the throat and into the helical flow path of the first chamber.
25. The hair styling method of claim 24 wherein the air being passed through at least one opening in the mixing tip between the mouth and the throat thereof is heated.
26. The method of claim 24 wherein the mouth and the throat of the mixing tip have a shape, and the passing of air through the at least one opening in the mixing tip between the mouth and the throat thereof occurs by means of a Venturi effect resulting from the shape of the mouth and throat of the mixing tip.

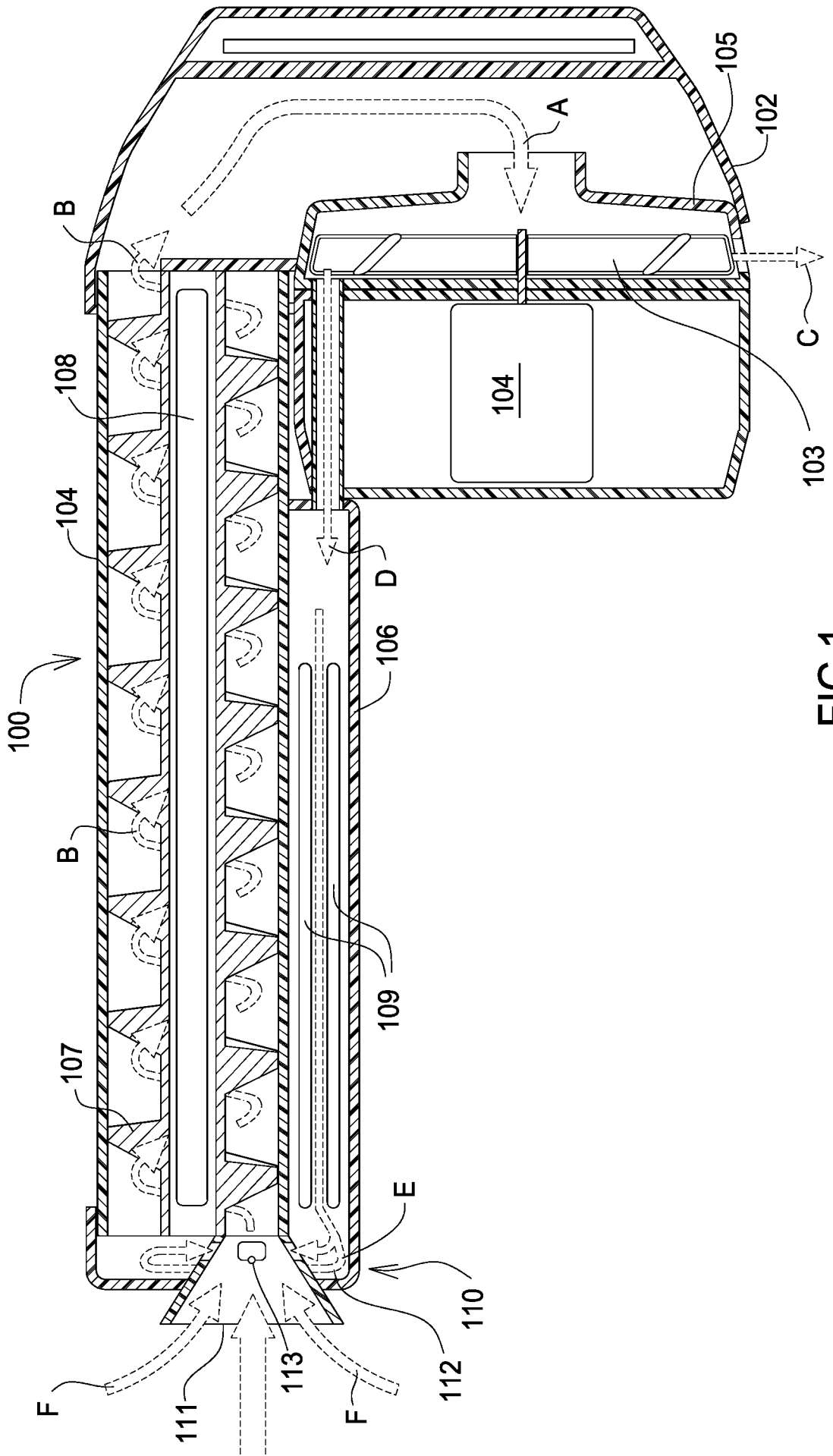
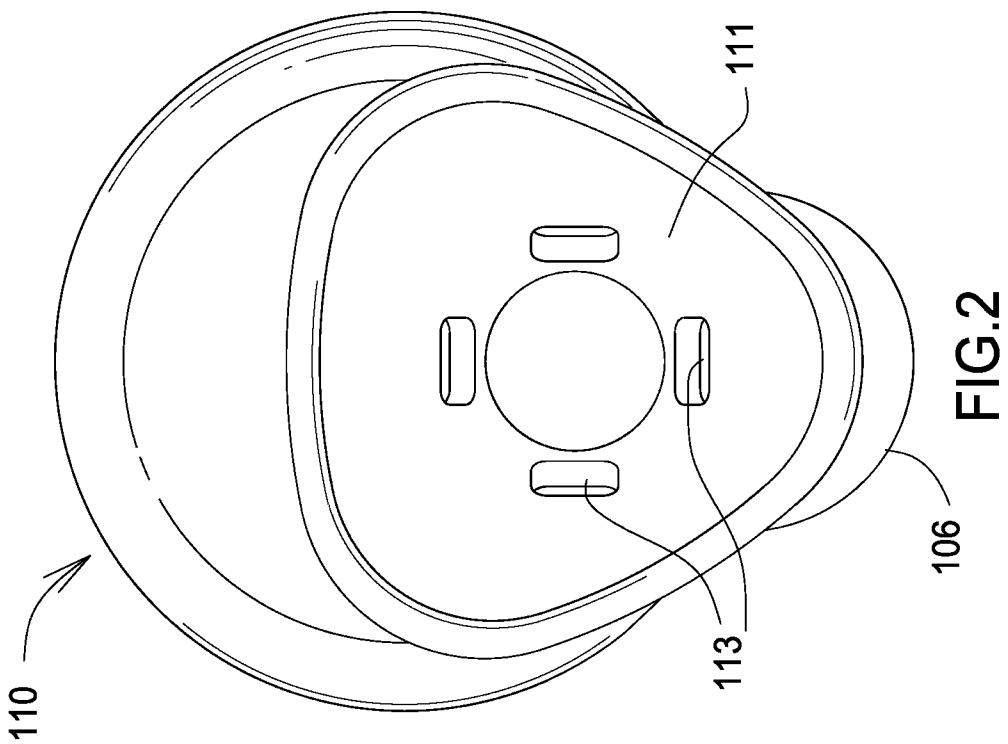
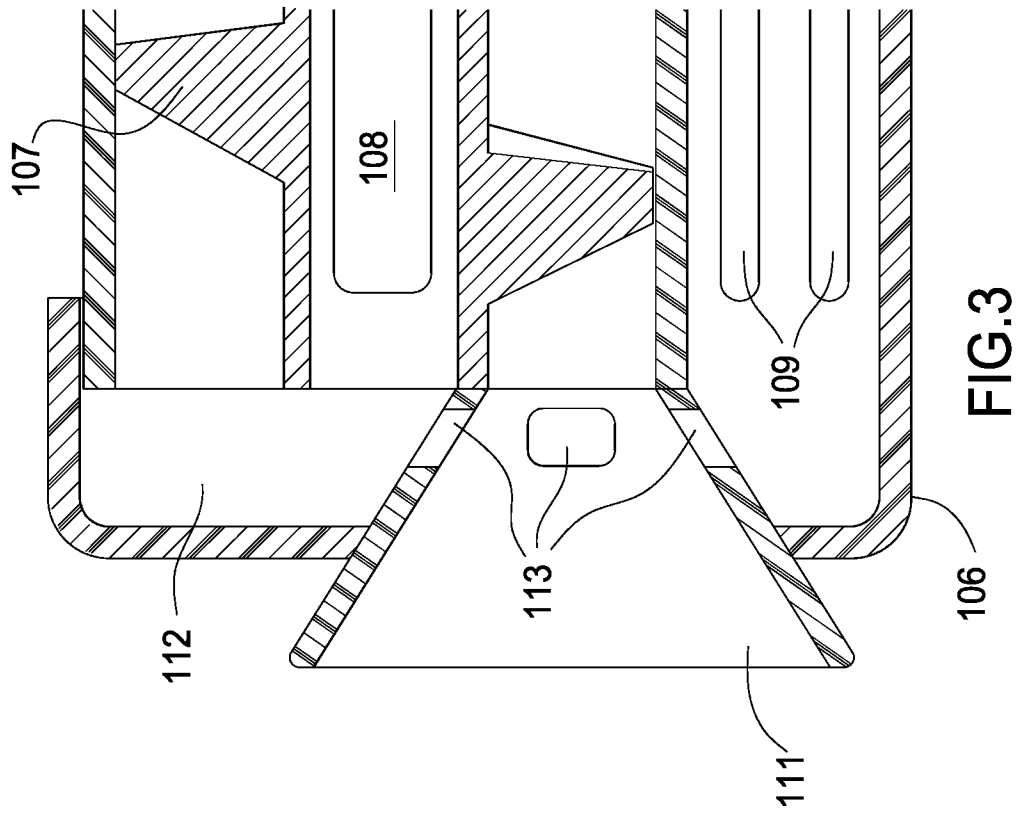


FIG. 1





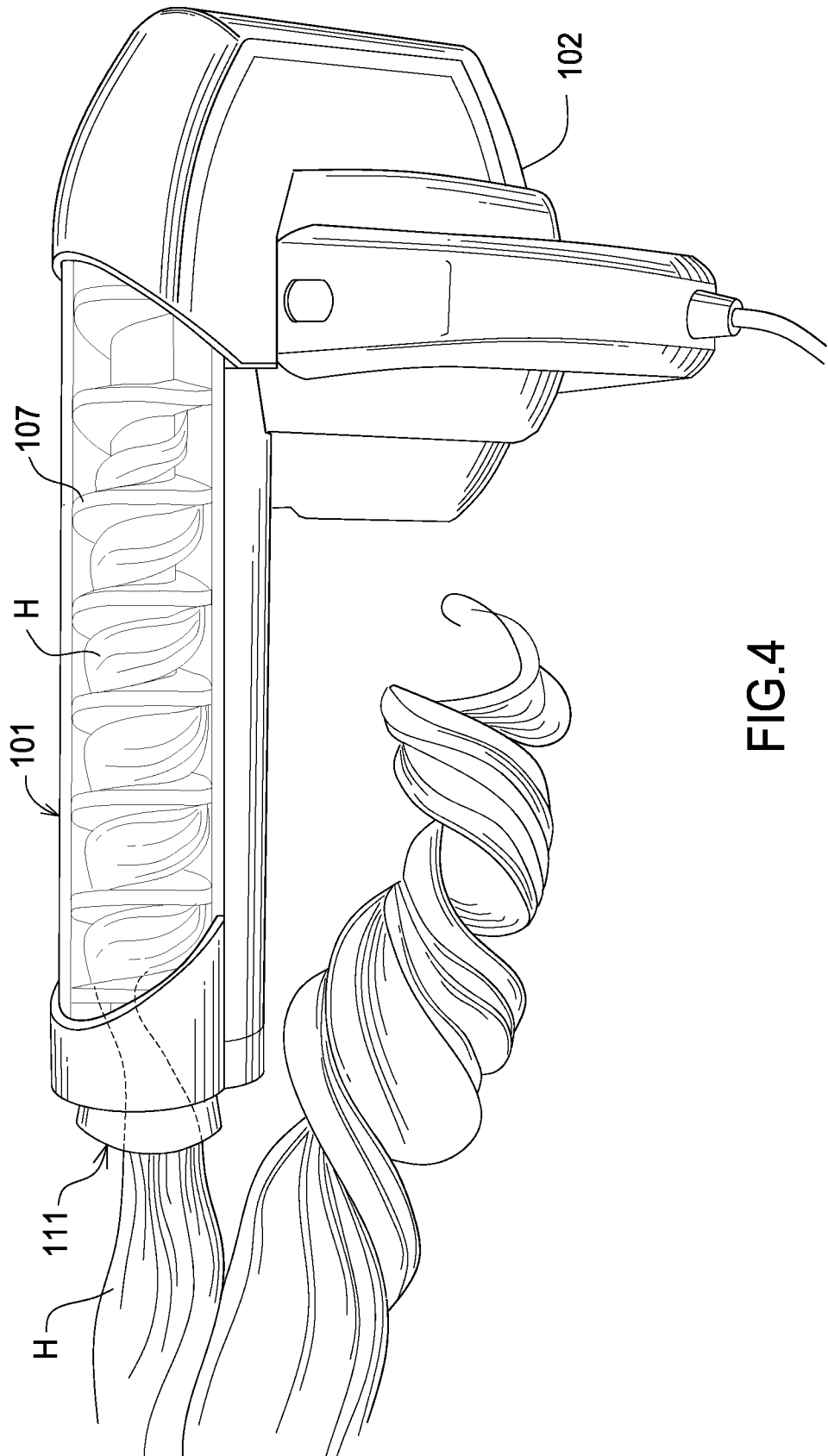


FIG.4

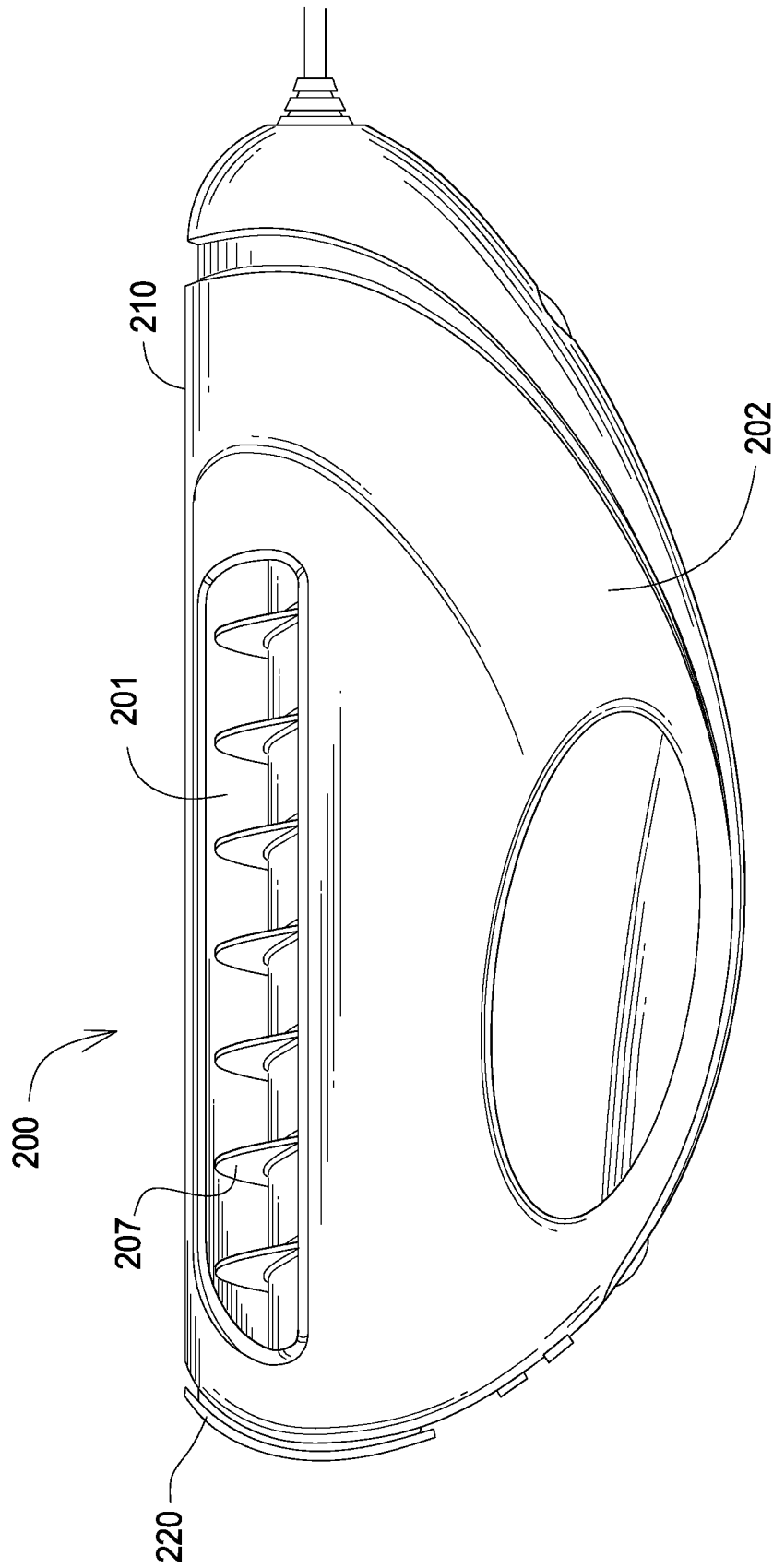


FIG. 5

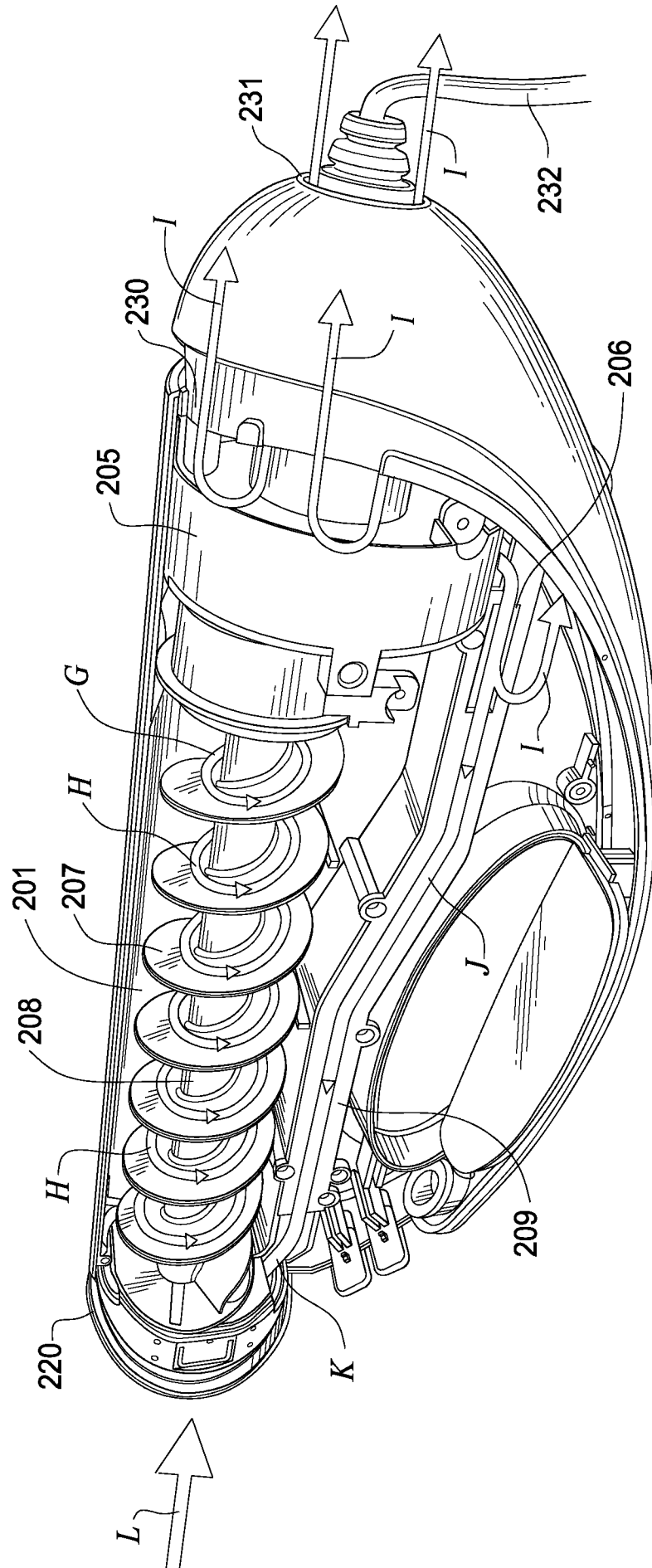


FIG.6

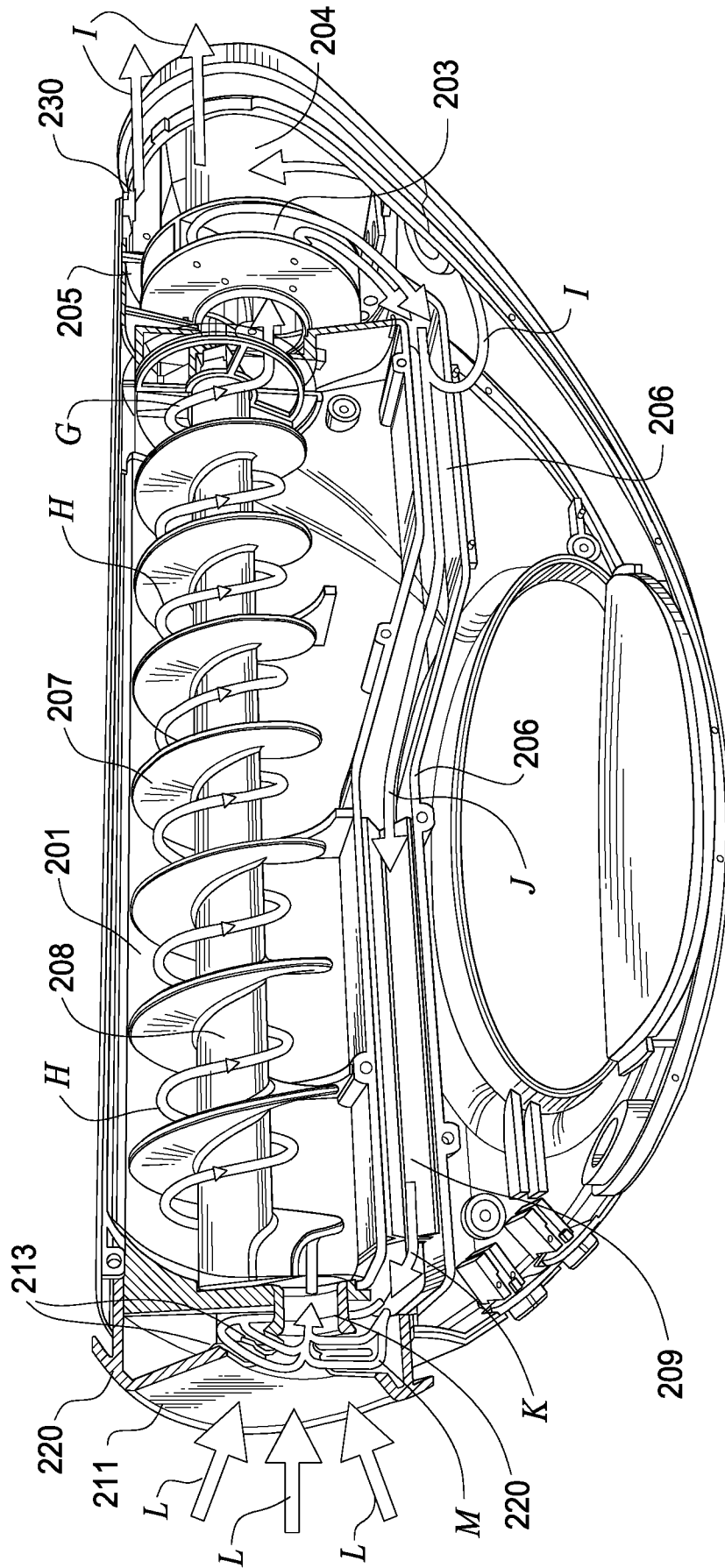


FIG.7

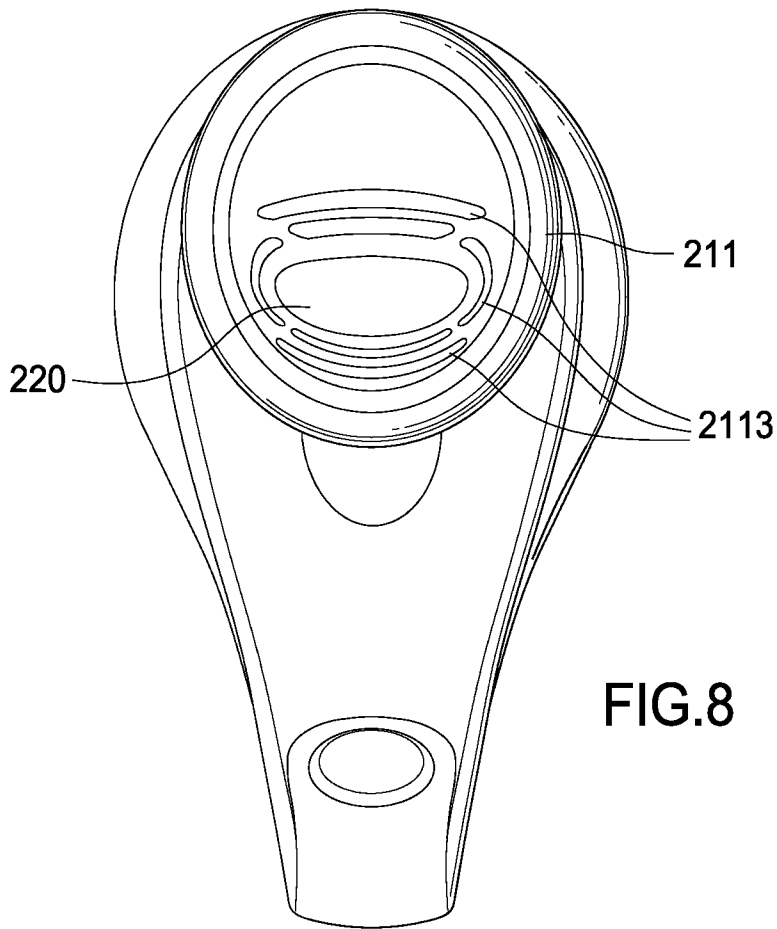


FIG. 8

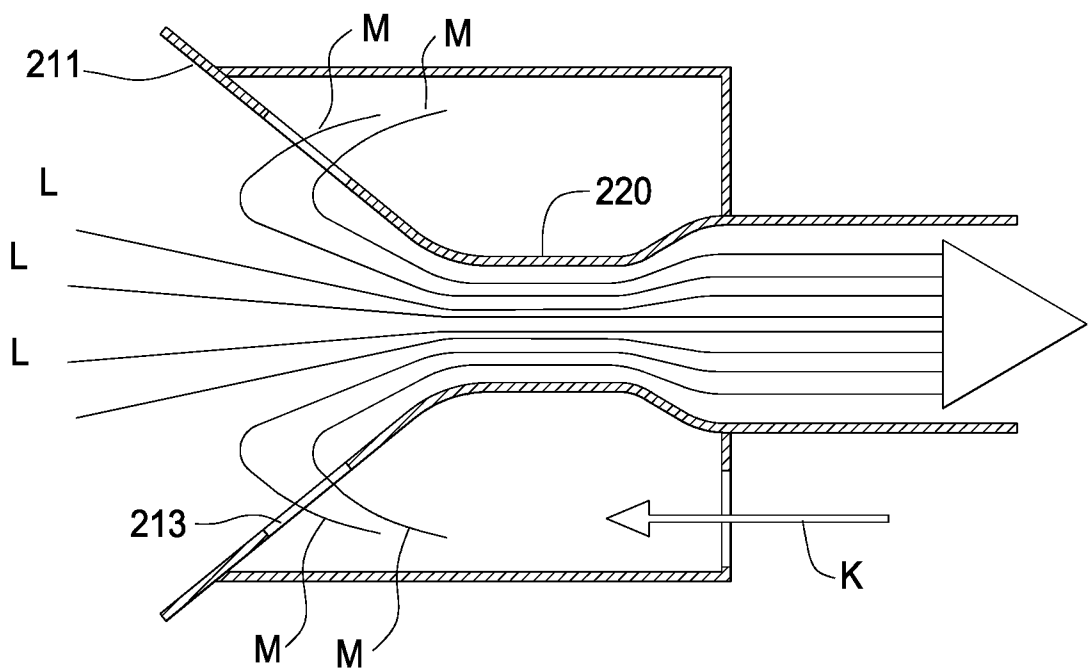


FIG. 9

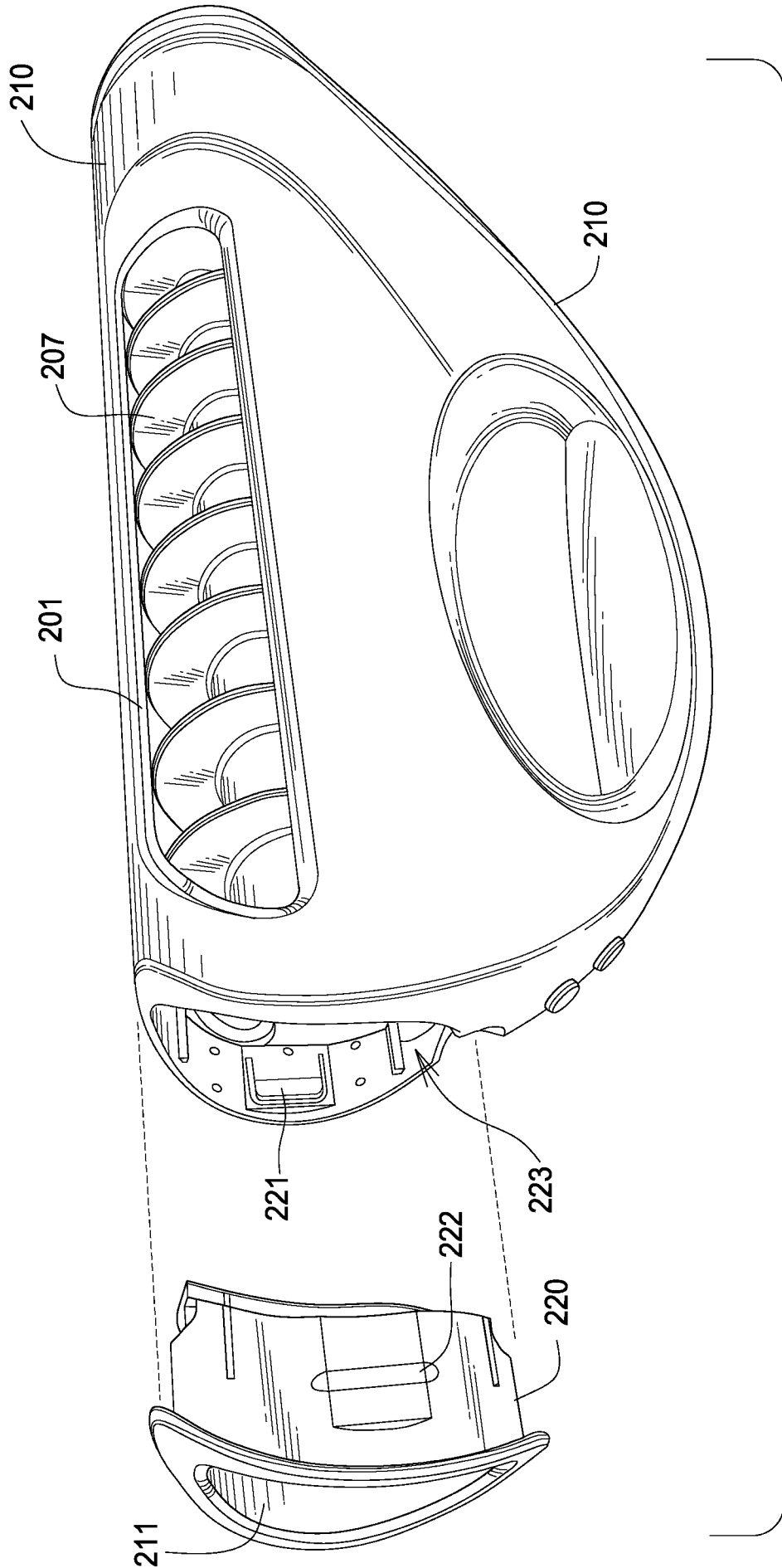


FIG. 10

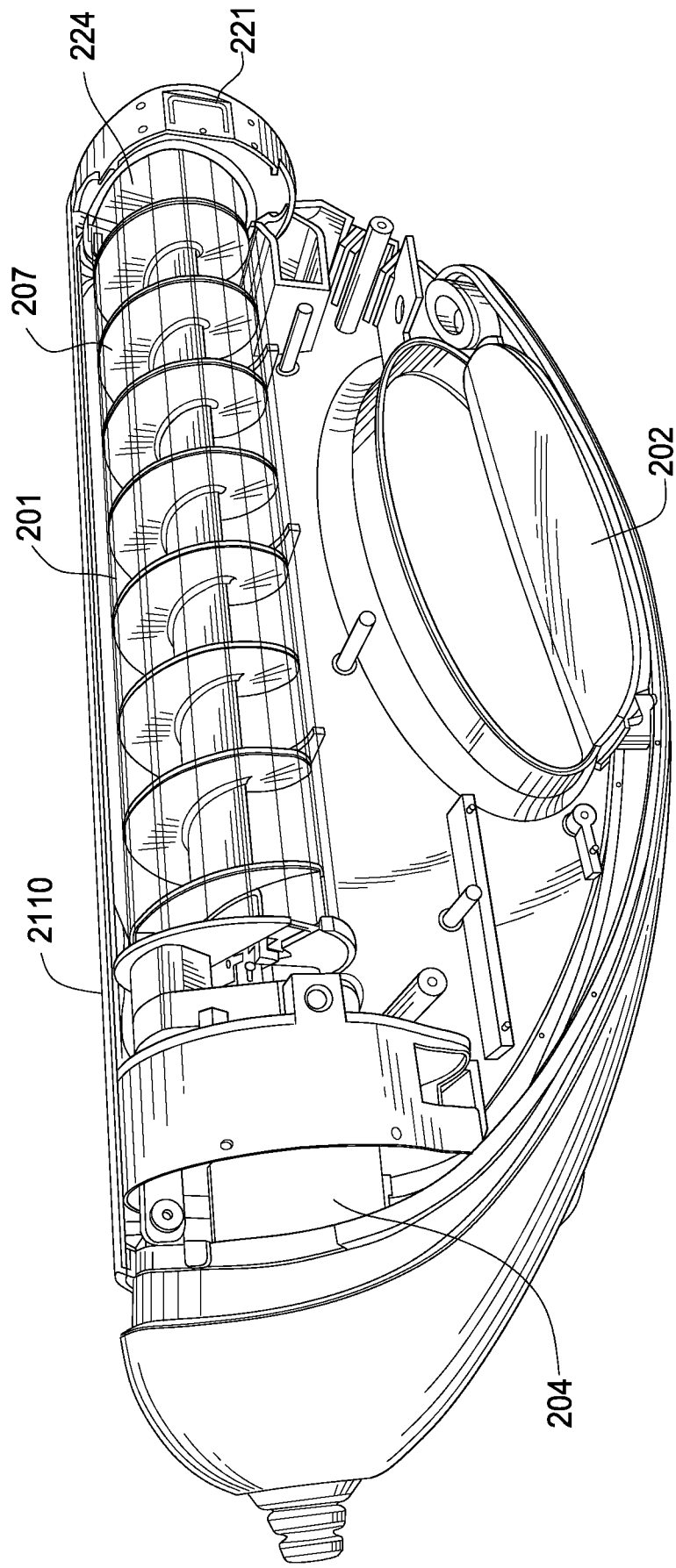


FIG.11



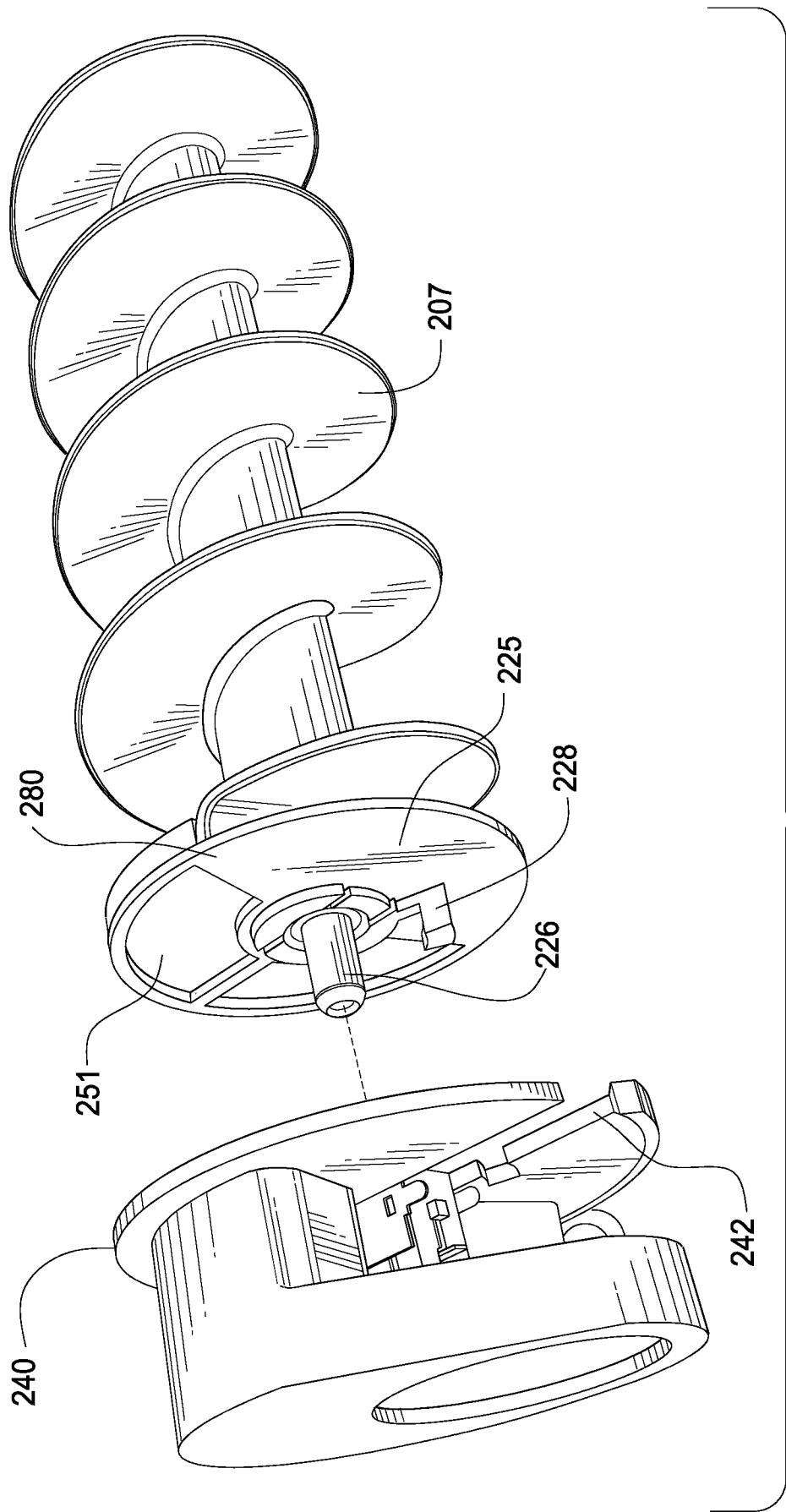


FIG.12

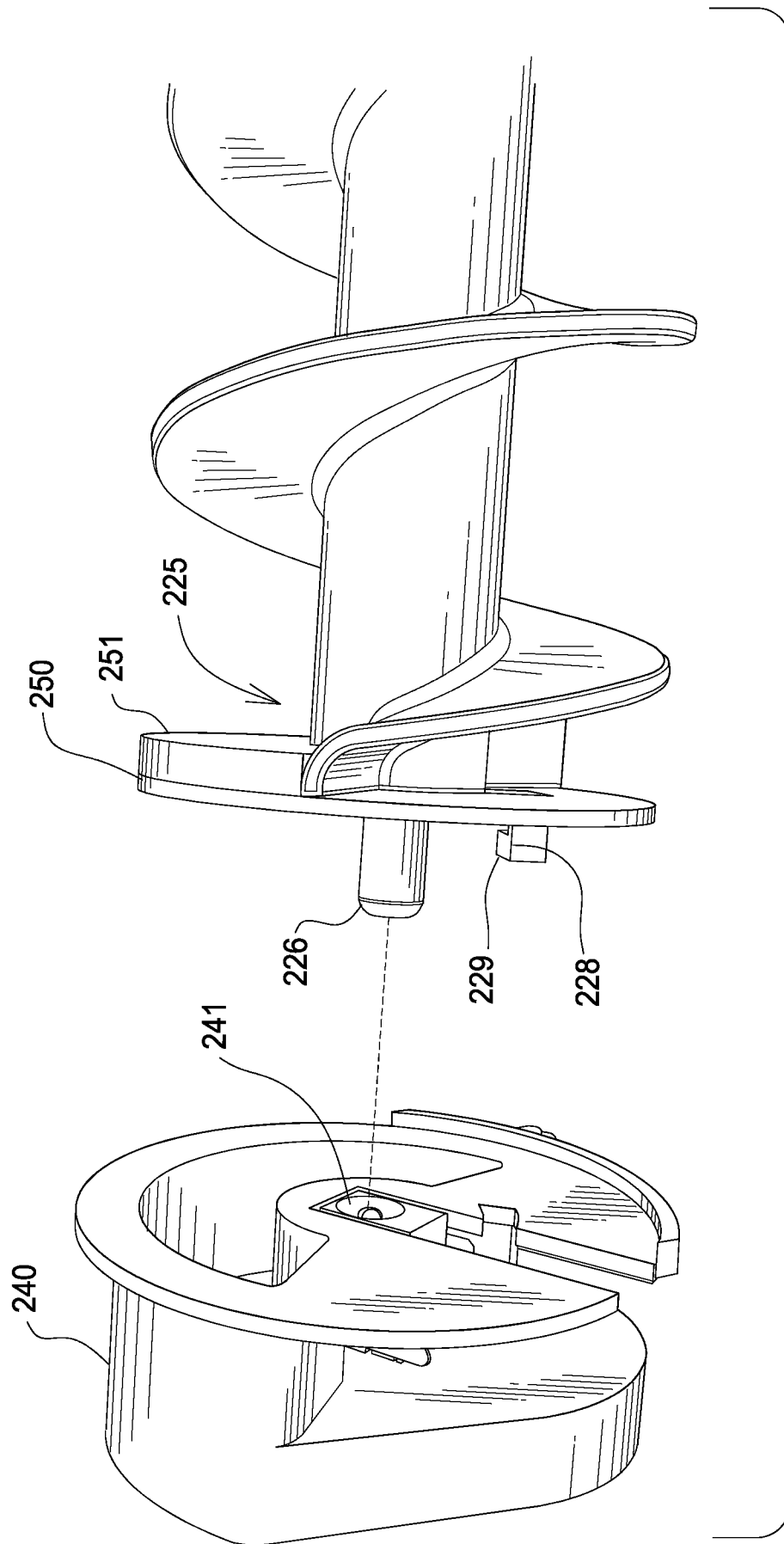


FIG. 13

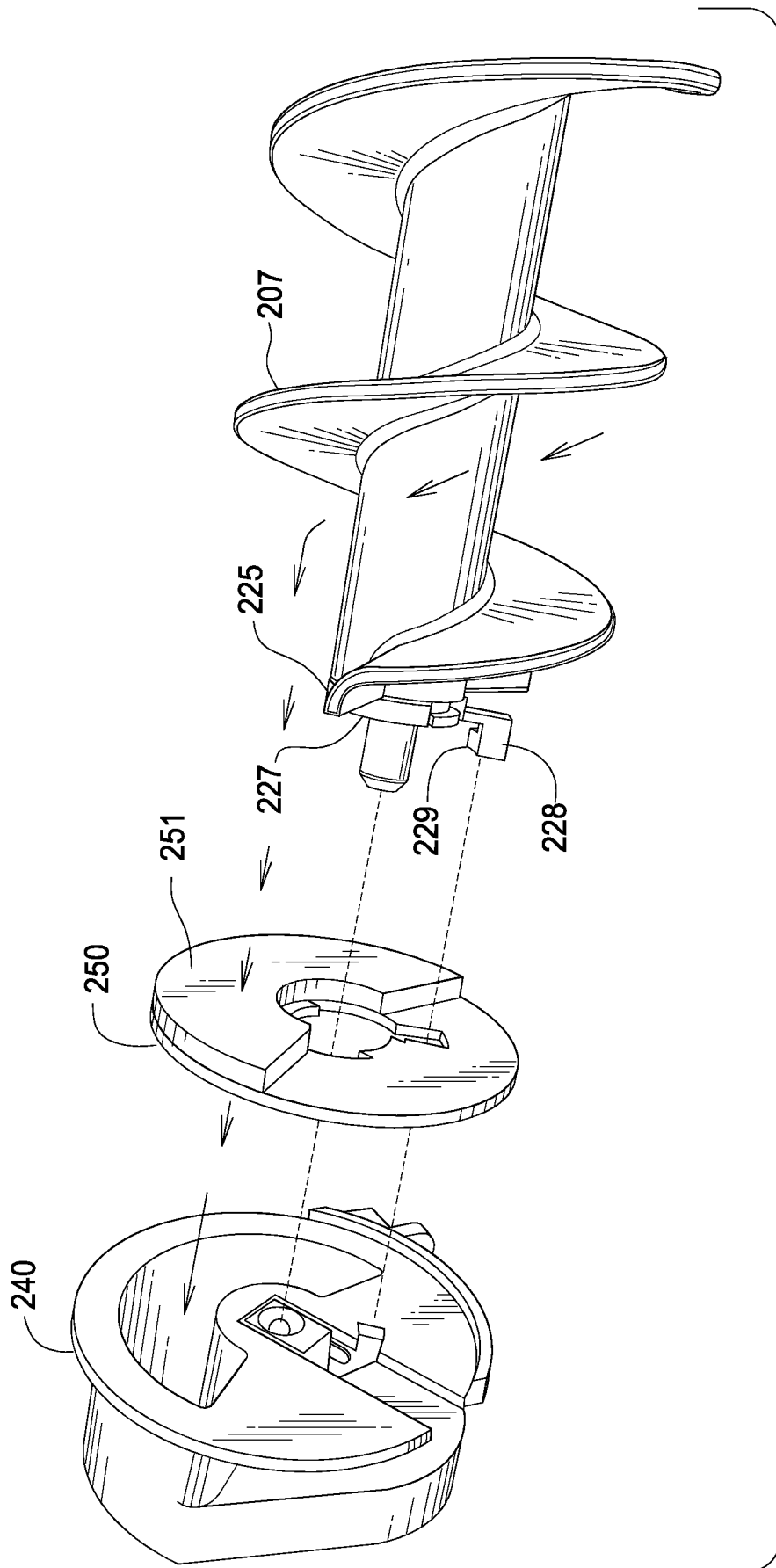


FIG.14

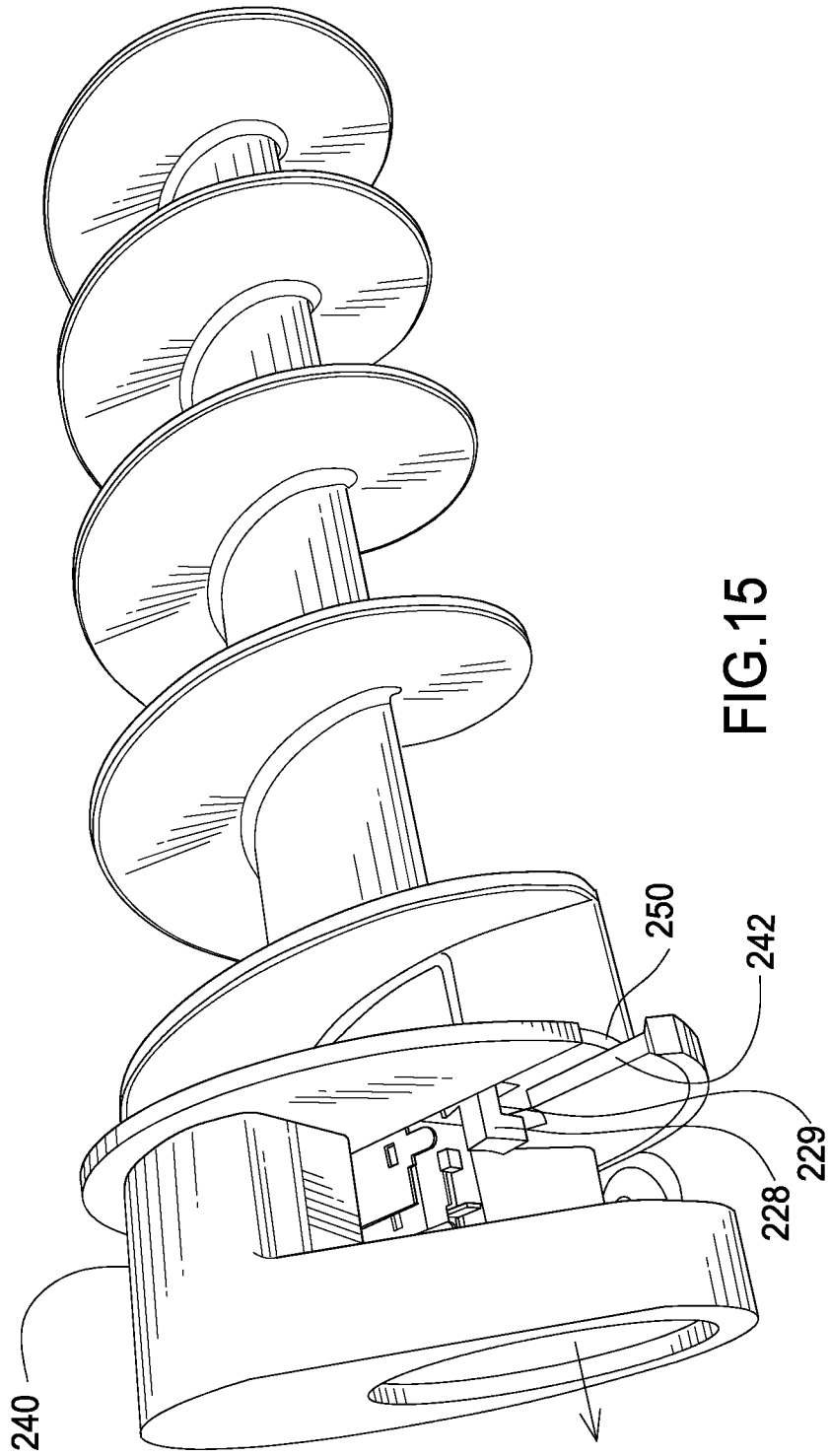


FIG.15

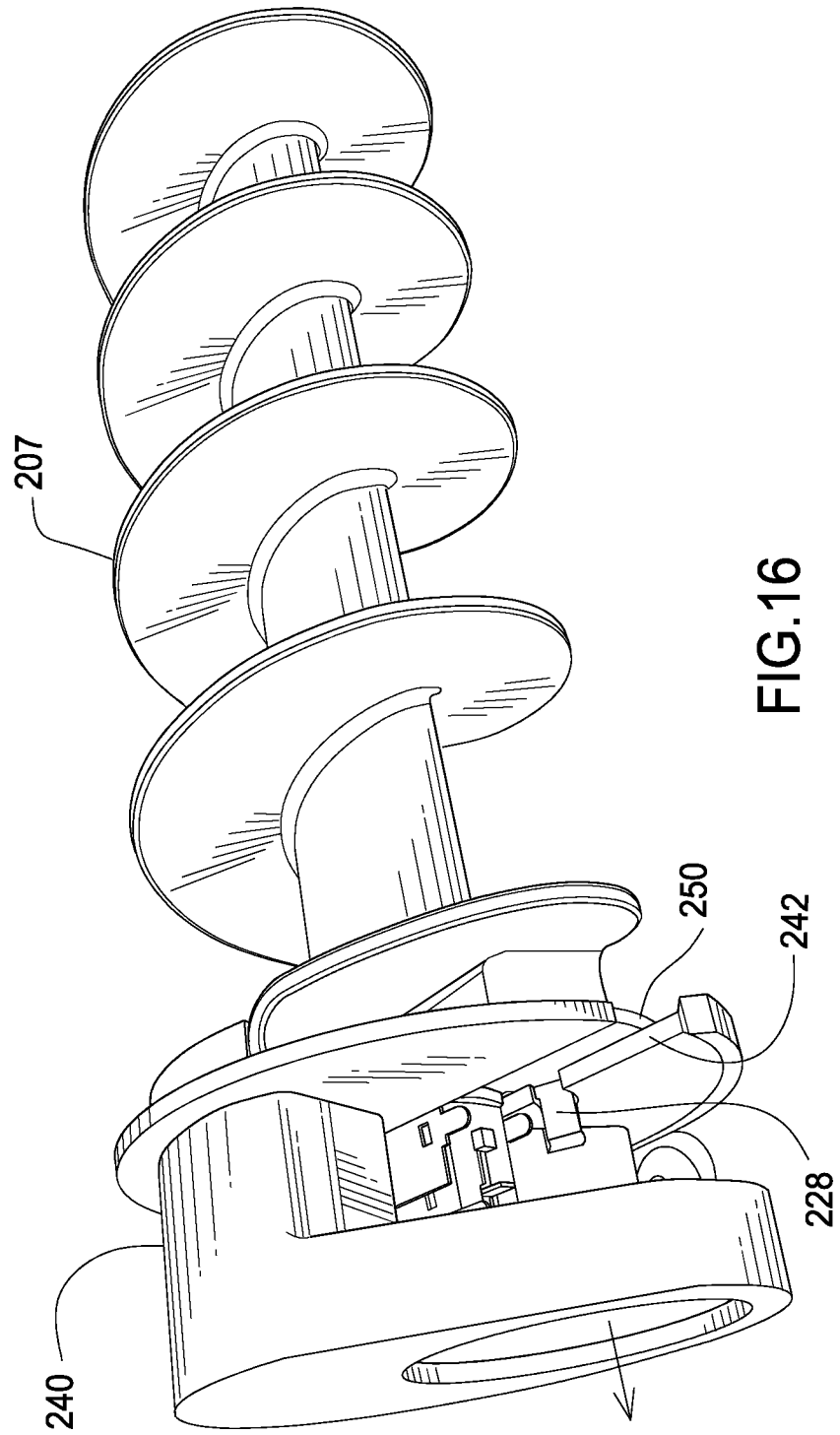


FIG.16

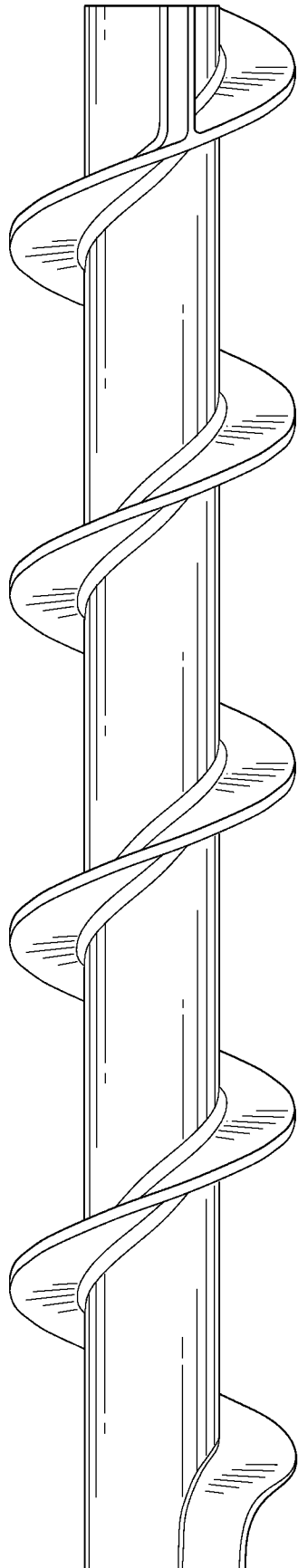


FIG.17

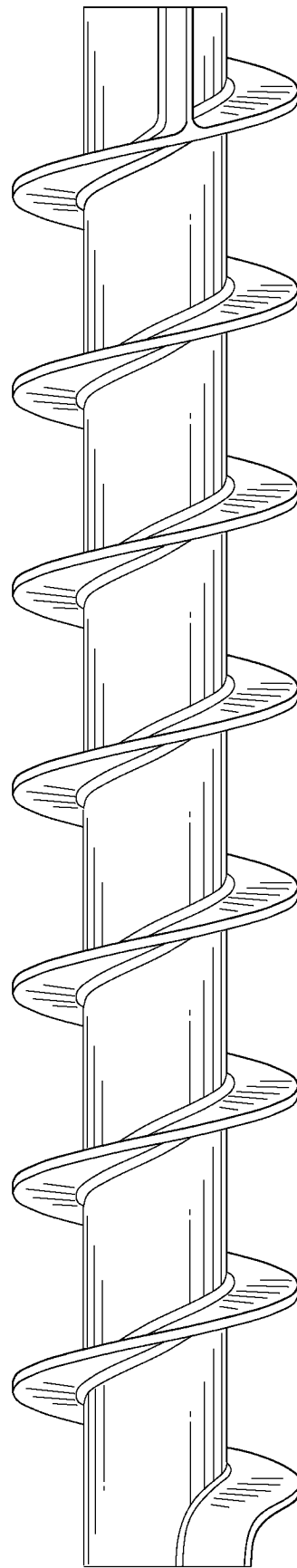


FIG.18

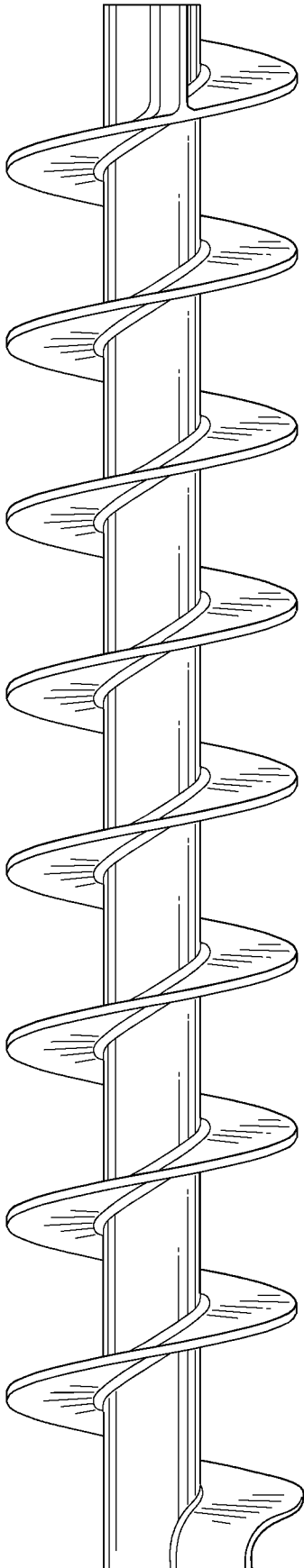


FIG.19

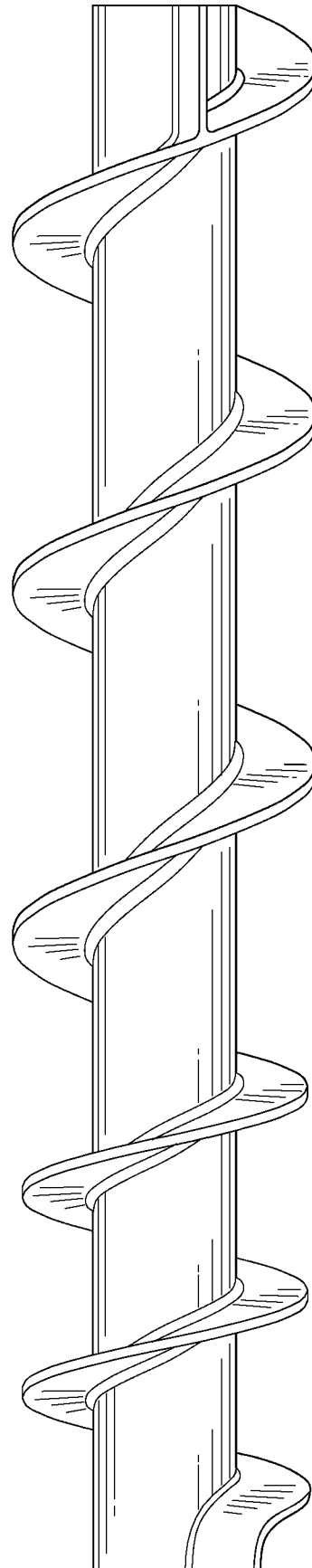


FIG.20

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/US2012/048411

**A. CLASSIFICATION OF SUBJECT MATTER**  
INV. A45D2/10 A45D2/08 A45D6/06  
ADD.

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

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
A45D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

EP0-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1 036 583 A (GILLETTE CO) 20 July 1966 (1966-07-20) page 4, line 83 - page 6, line 44; figures 8,12,15	1,12
A	----- US 4 210 162 A (DREYER BERNARD F [CA] ET AL) 1 July 1980 (1980-07-01) abstract	1,12
A	----- US 4 422 464 A (JOSEFSSON BERTIL [SE]) 27 December 1983 (1983-12-27) abstract	1,12
A	----- GB 2 455 716 A (BENEDICTIS ALFREDO DE [GB] BENEDICTIS ALFREDO DE [GB]; TF3 LTD [GB]) 24 June 2009 (2009-06-24) abstract	1,2
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

14 November 2012

Date of mailing of the international search report

02/01/2013

Name and mailing address of the ISA/  
European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040,  
Fax: (+31-70) 340-3016

Authorized officer

Nicolás, Carlos



# INTERNATIONAL SEARCH REPORT

International application No PCT/US2012/048411
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1 043 315 A (GILLETTE CO) 21 September 1966 (1966-09-21) page 1, lines 52-82 -----	1,12
A	JP 2004 249034 A (OKAMOTO AKIRA) 9 September 2004 (2004-09-09) abstract -----	1,12

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2012/048411

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-24

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-24

Hair styling device  
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2. claims: 25-27

Hair styling method  
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/048411

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