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(54) **ELECTRONIC VAPORIZER**

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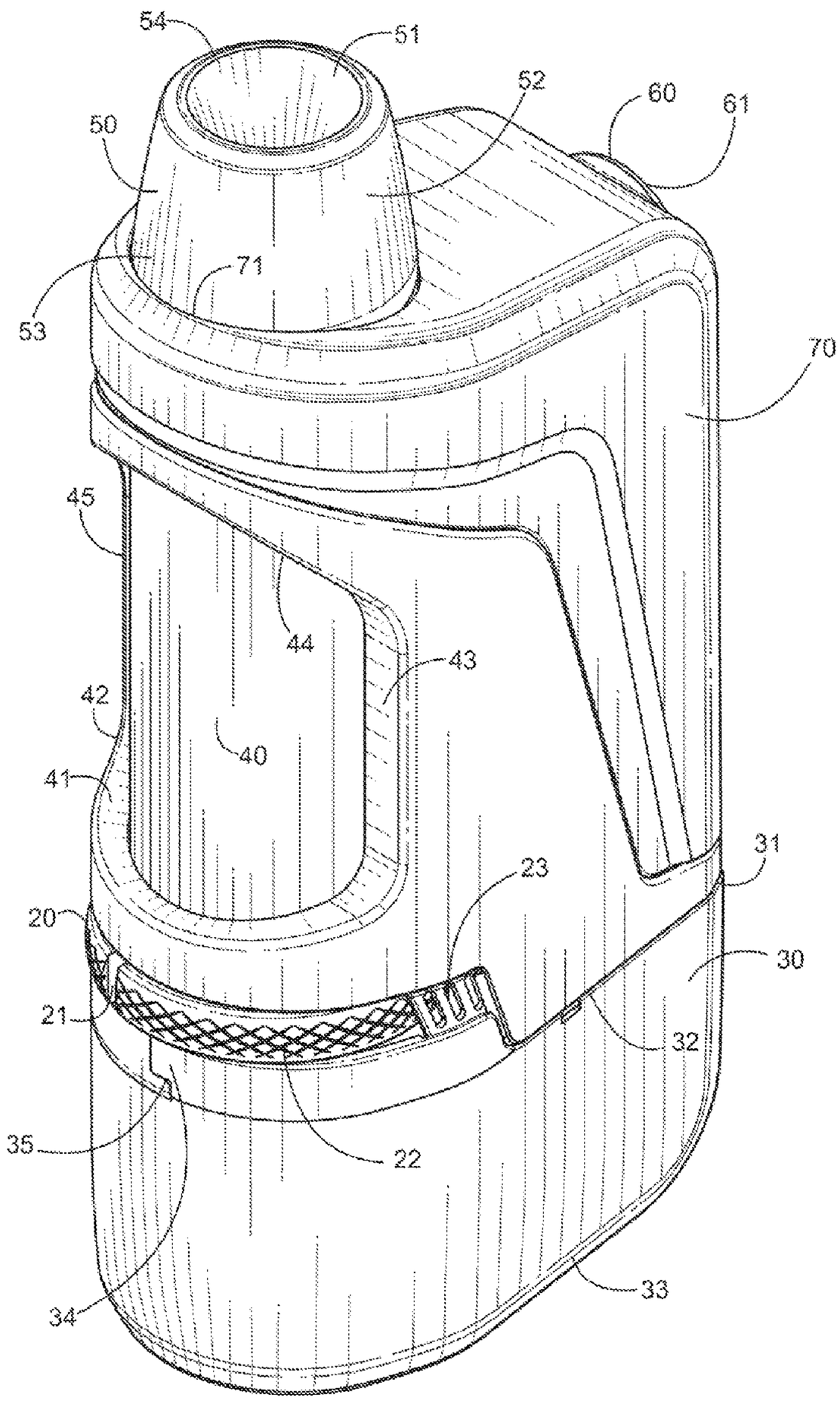
(57) **ABSTRACT**

An electronic vaporizer includes a battery, a set of controls, a heating vessel activated by the set of controls, an airflow dial formed above the heating vessel, a dial air exhaust passage, a tank configured to receive a liquid, and a mouthpiece. The airflow dial has a downward intake air conduit for directing intake airflow toward the heating chamber at a location off-center from the center of the heating chamber. The airflow dial is configured to be rotatable at least 180 degrees. The dial air exhaust passage is formed through the airflow dial. The tank is in airflow connection to the airflow dial. The mouthpiece is in airflow connection to the tank.



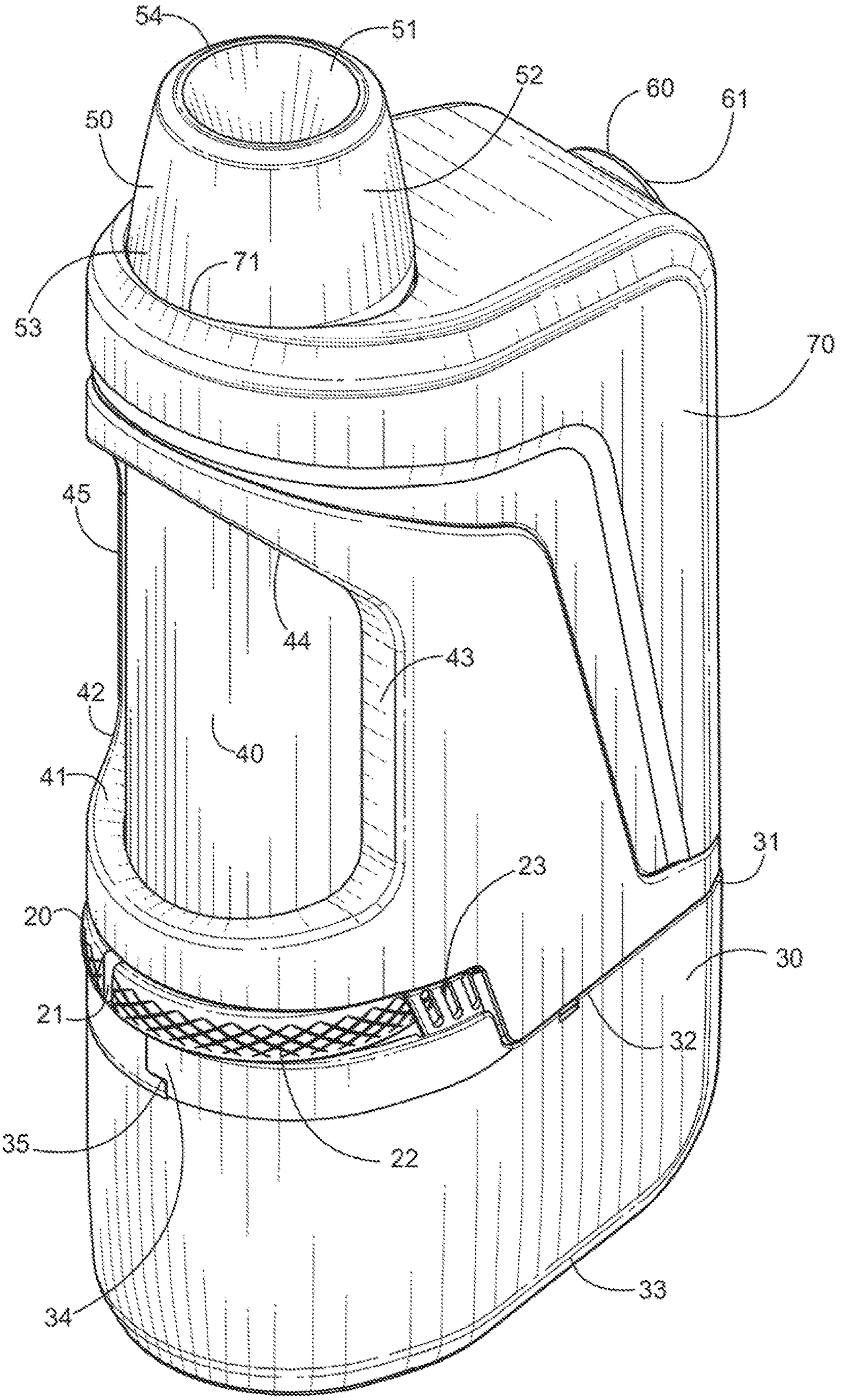

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FIG. 1

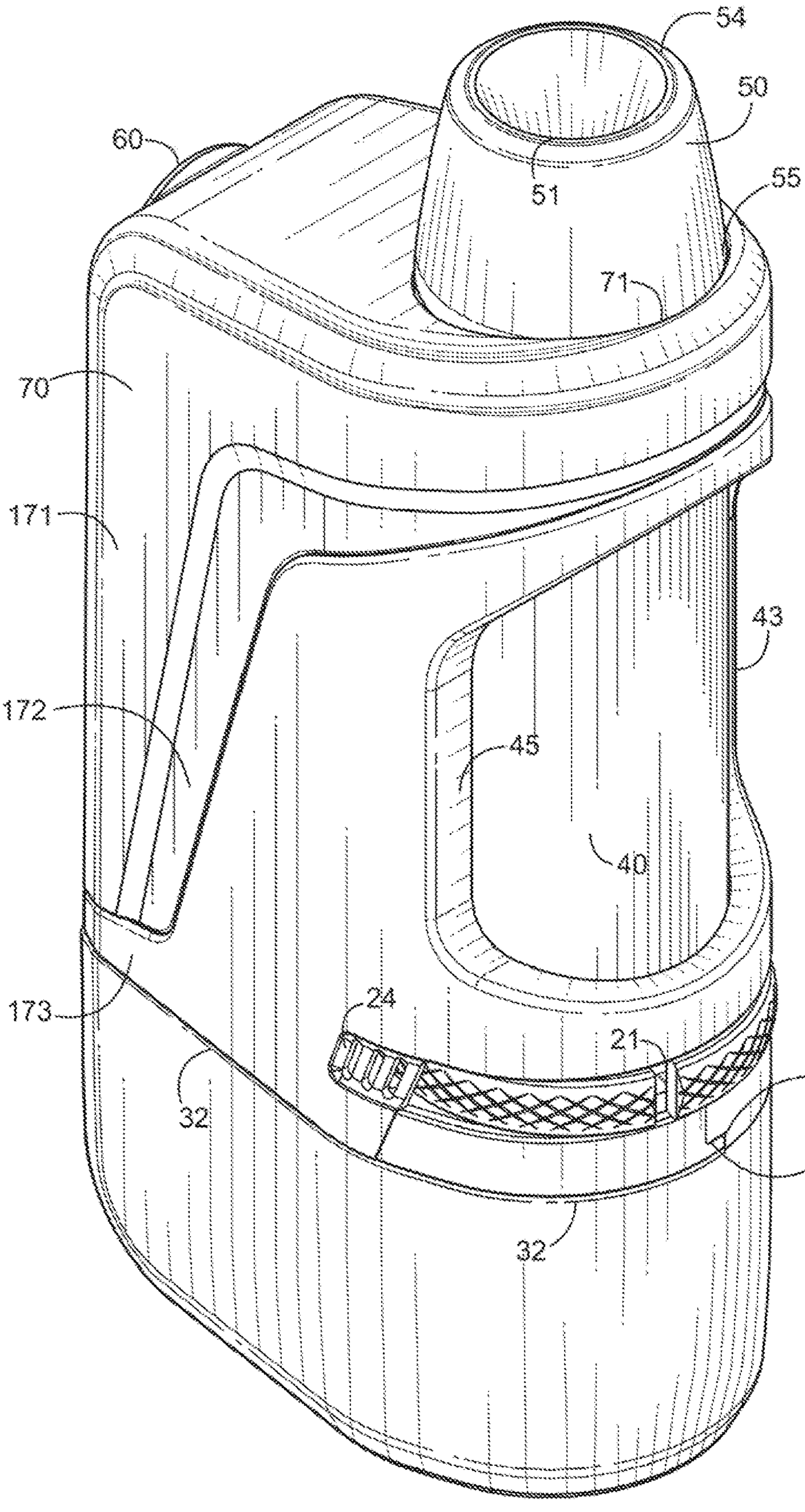

FIG. 2

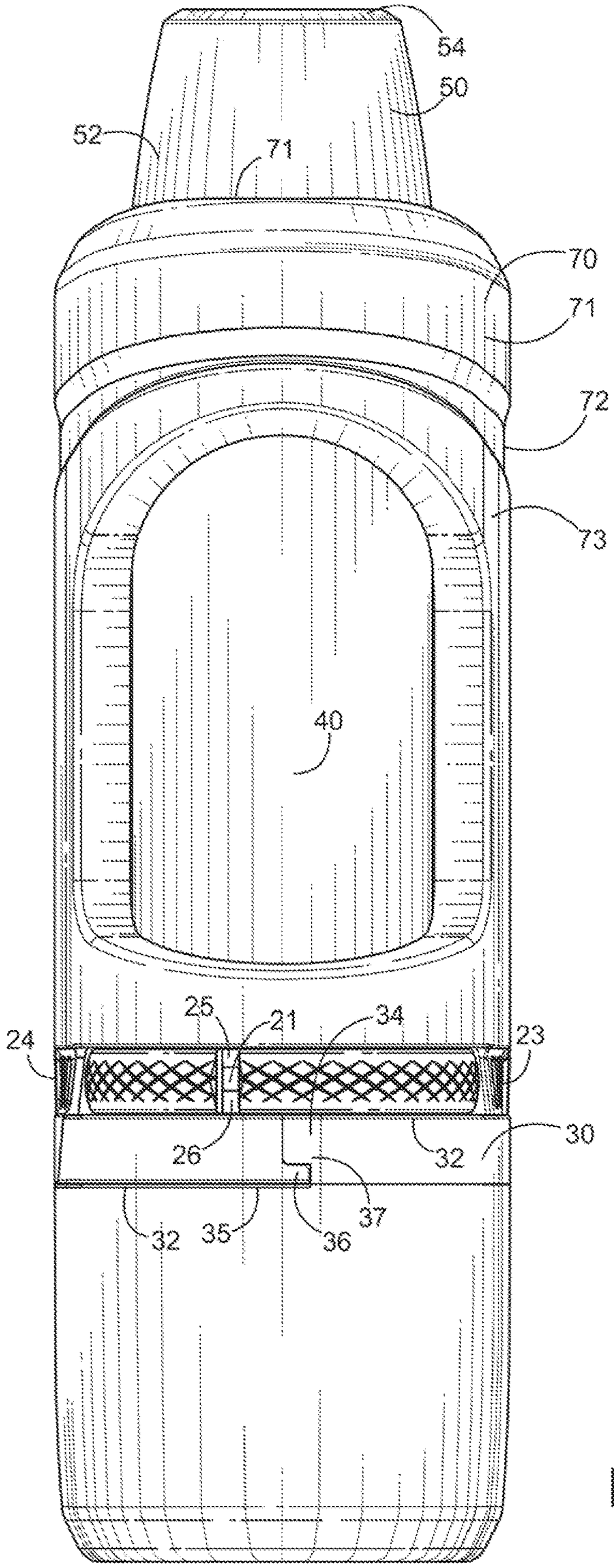

FIG. 3

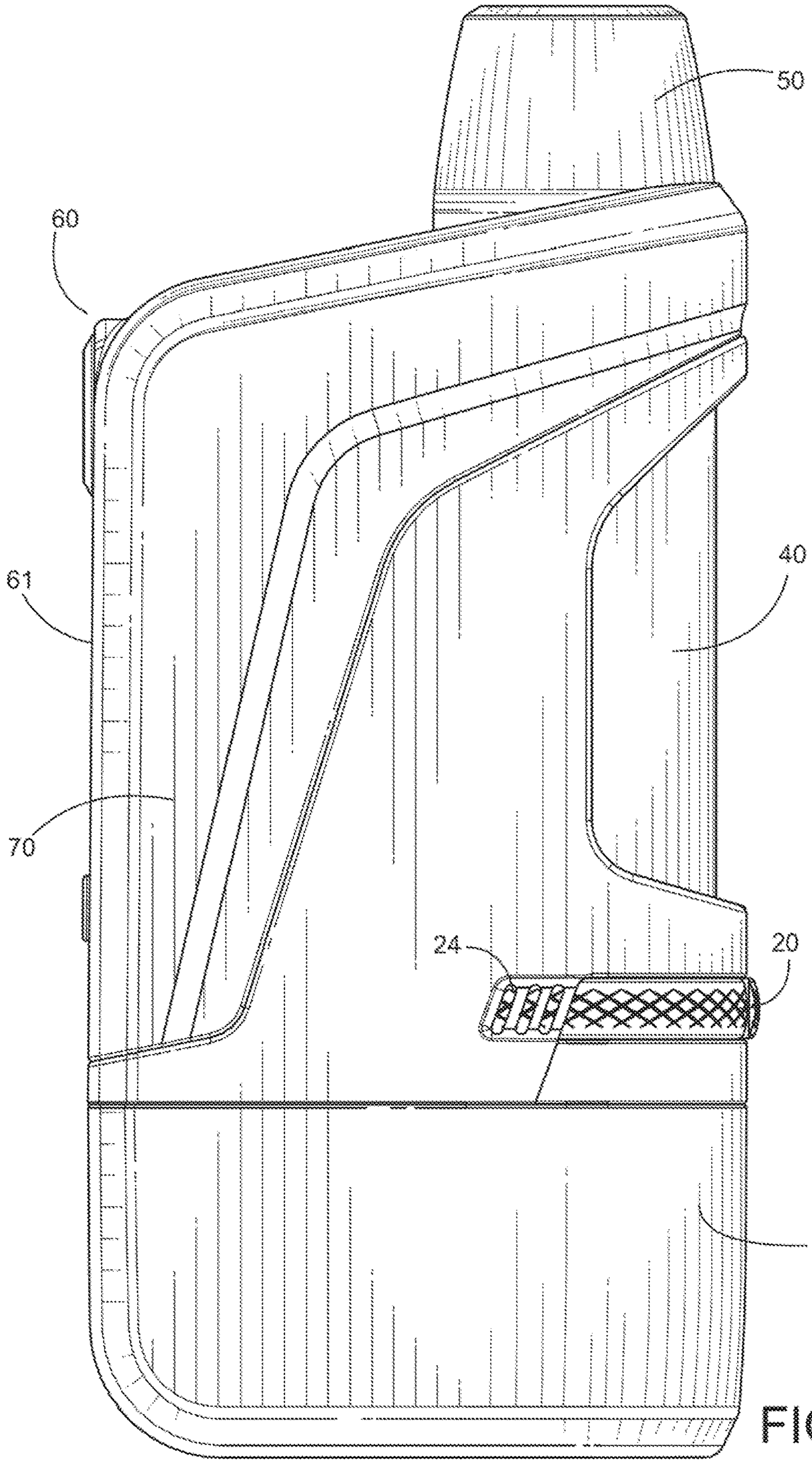

FIG. 4

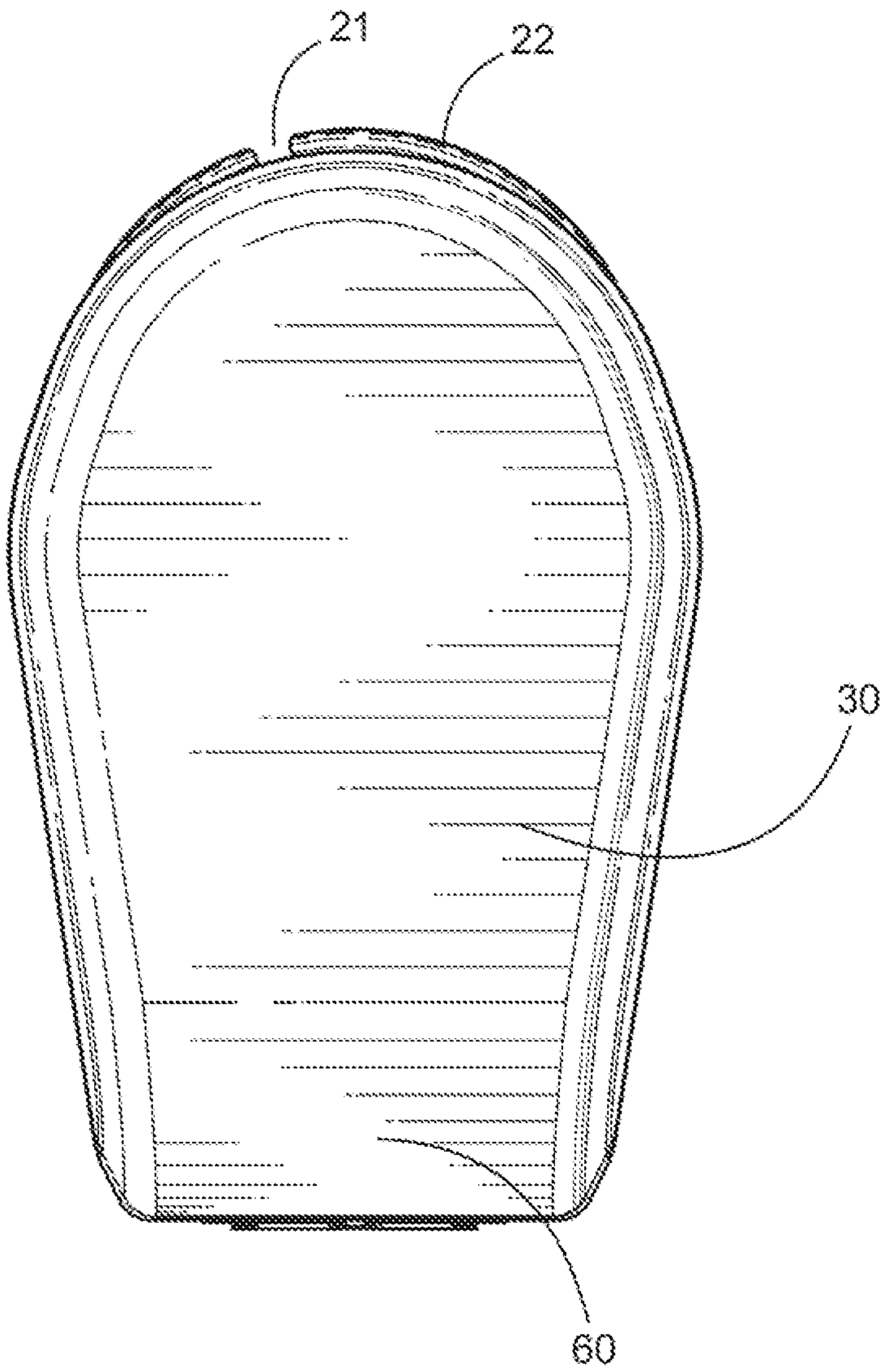

FIG. 5

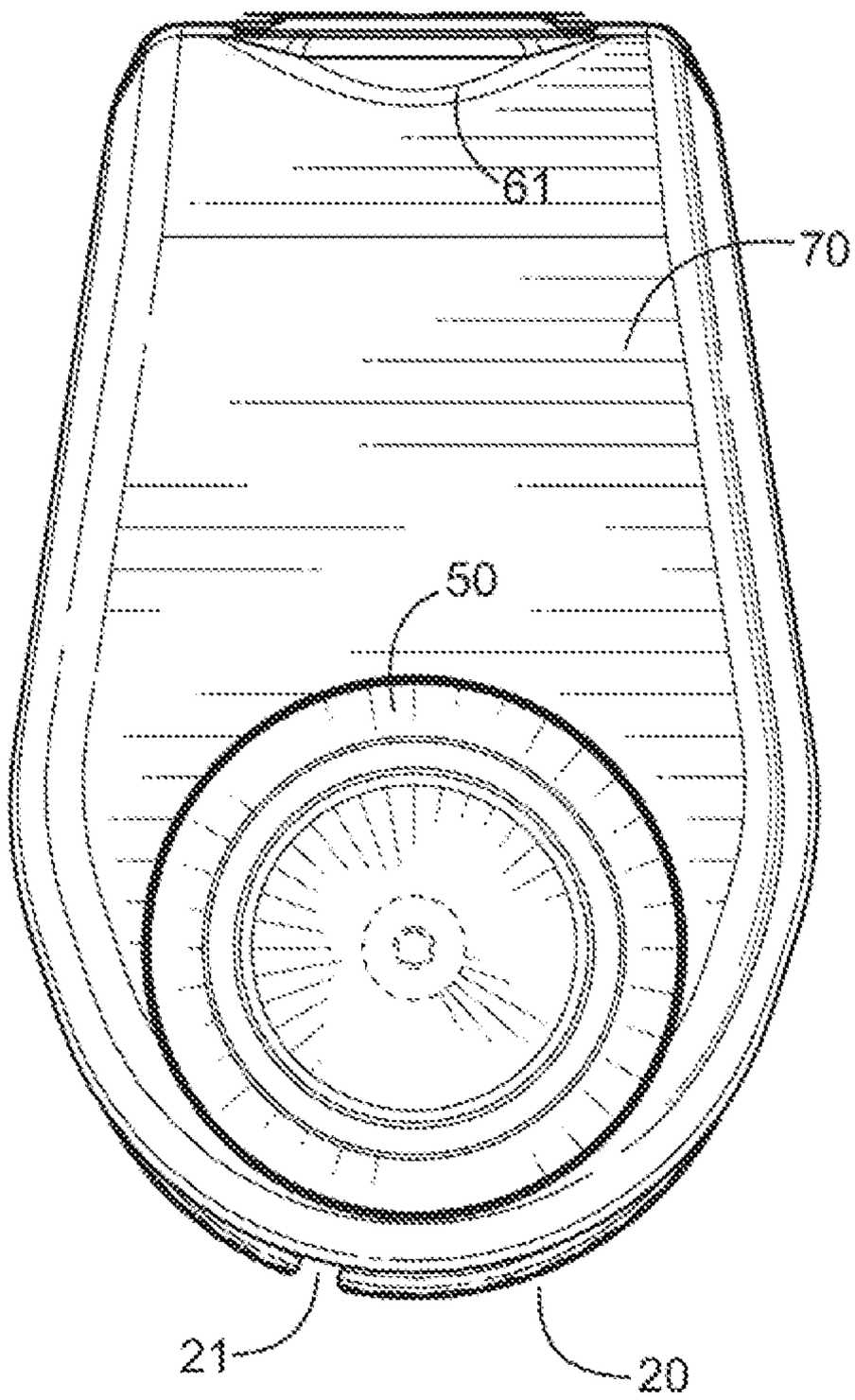

FIG. 6

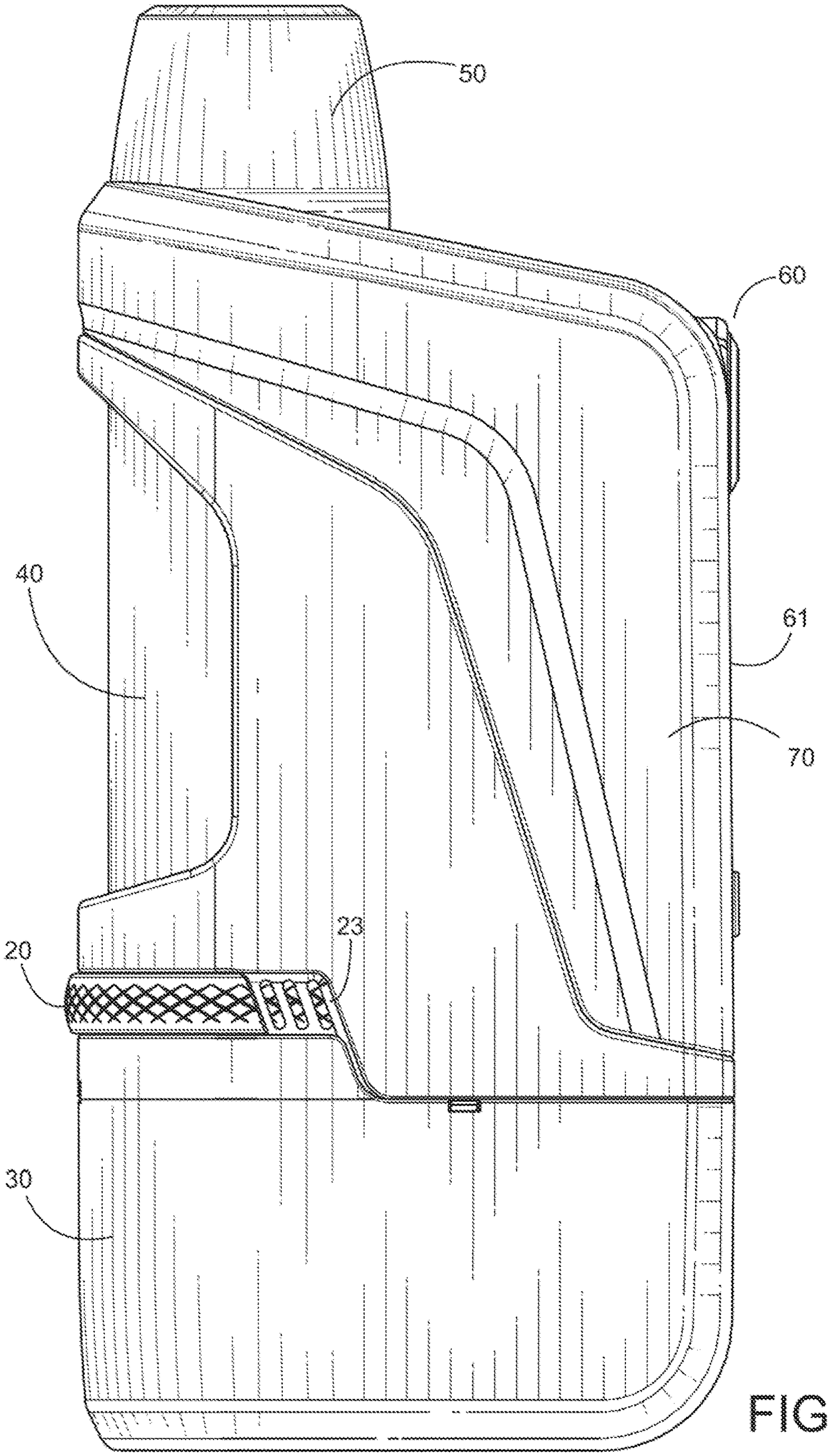

FIG. 7

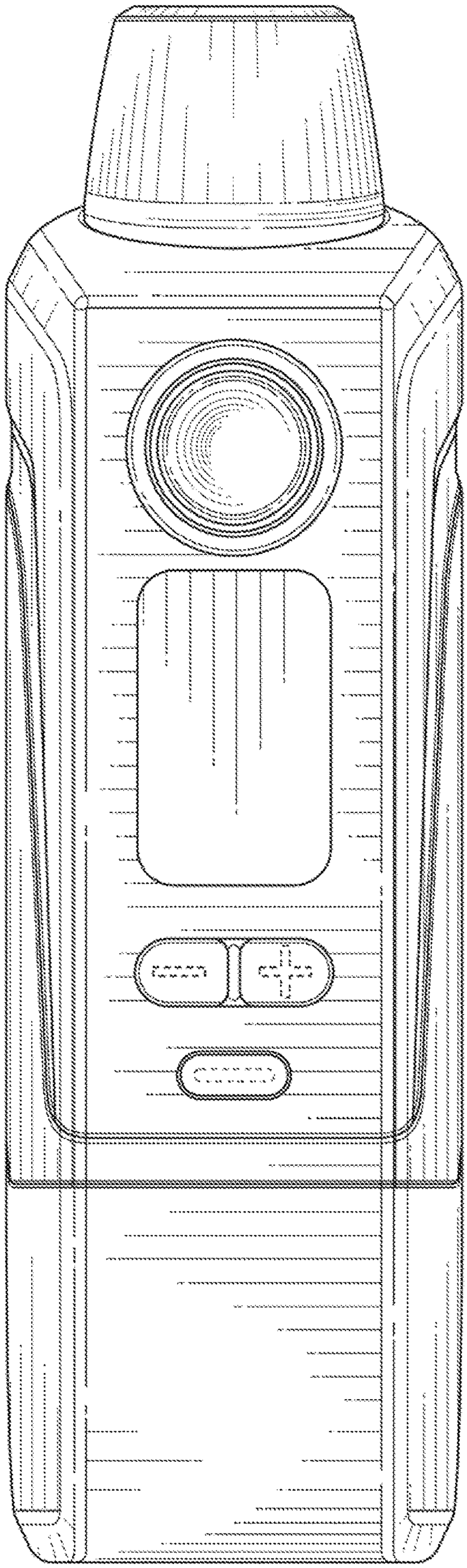

FIG. 8

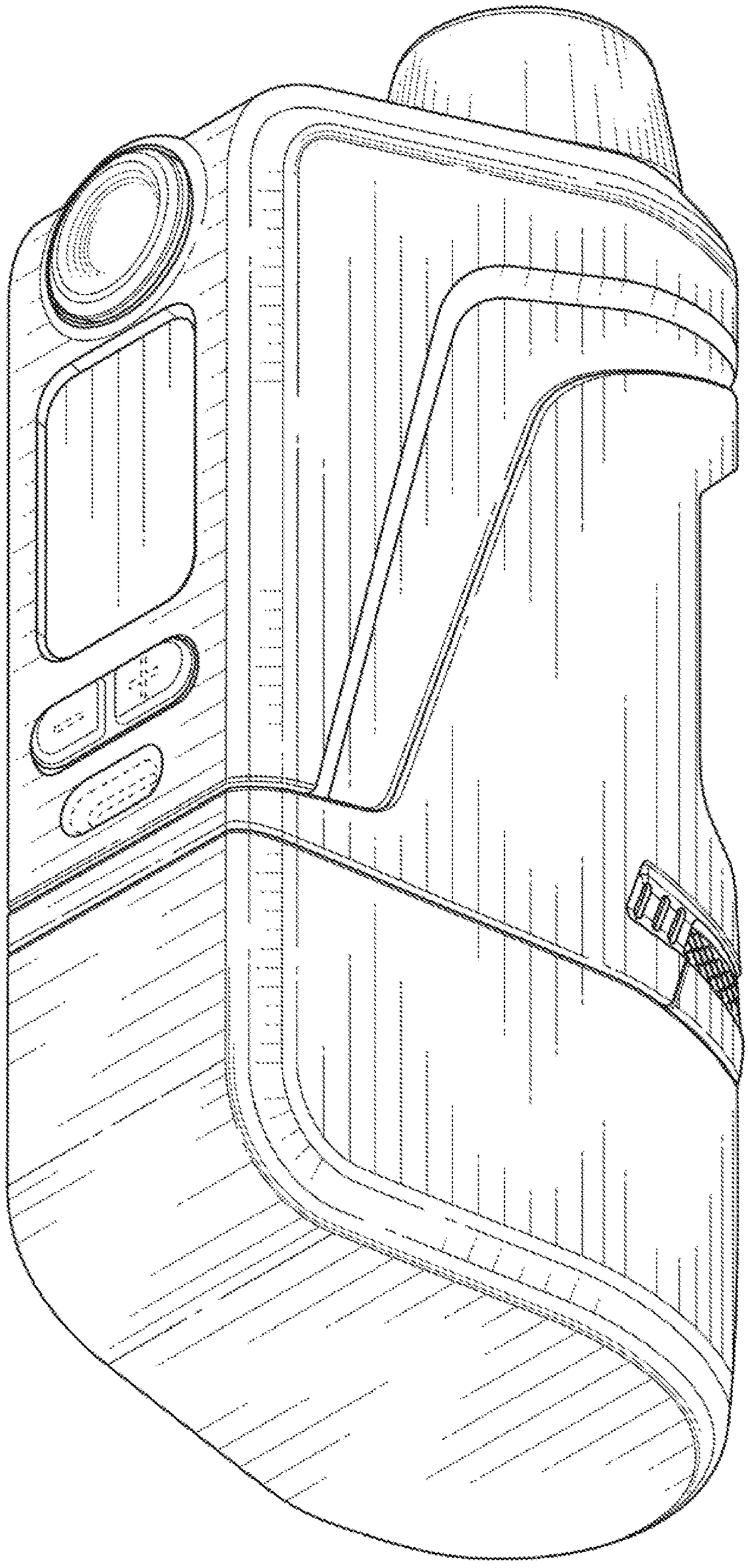

FIG. 9

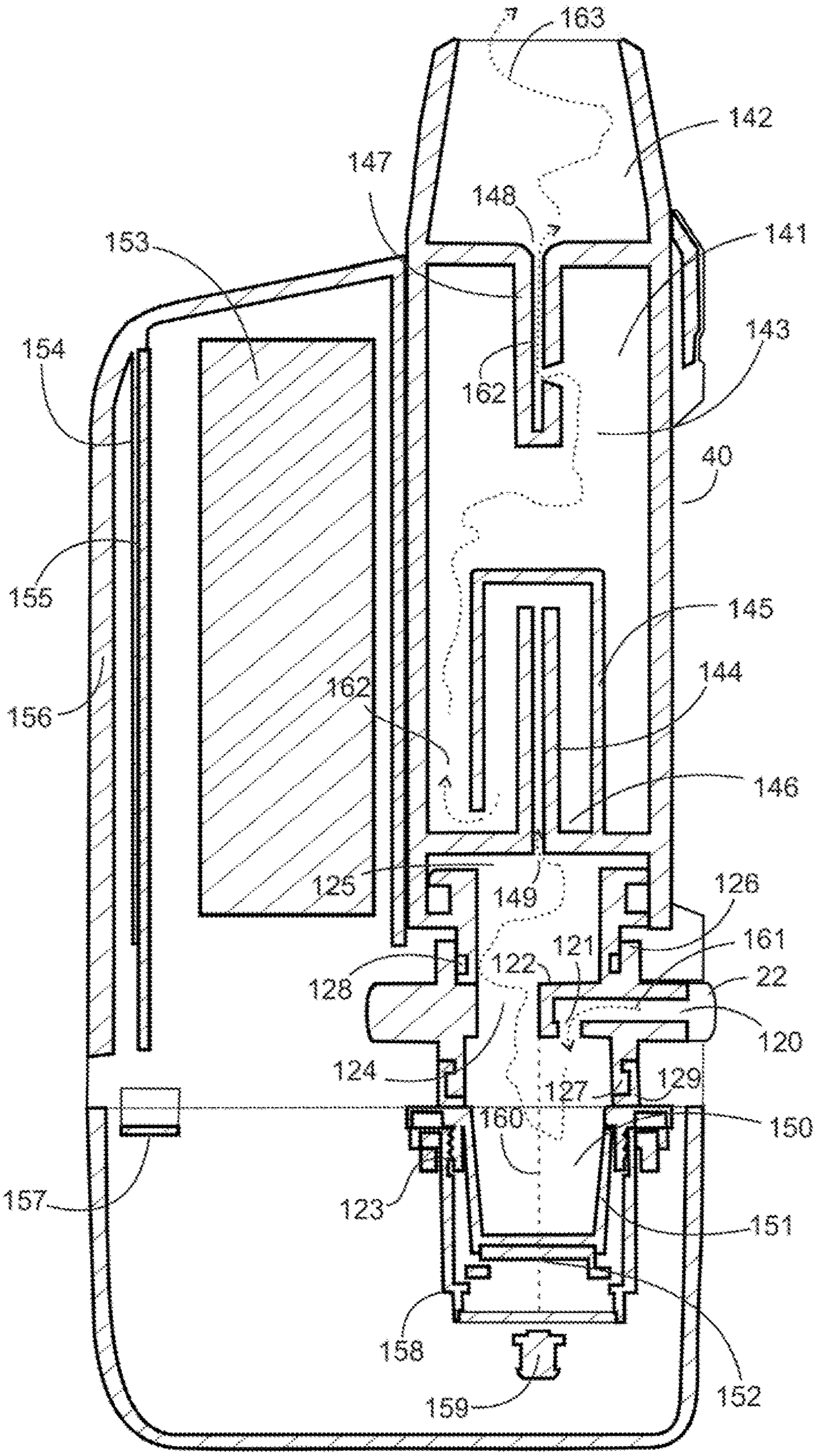
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FIG. 10

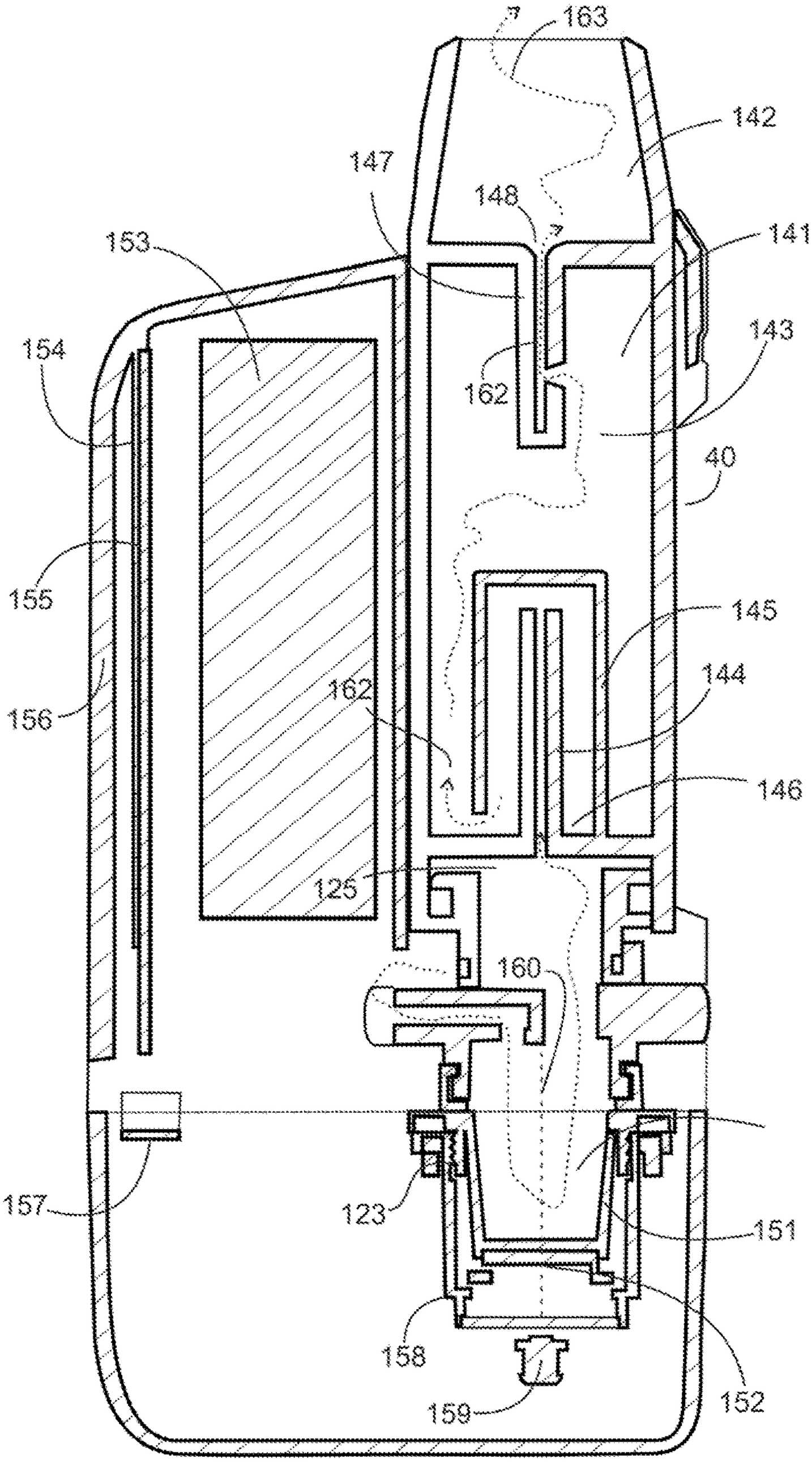
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FIG. 11

ELECTRONIC VAPORIZER

FIELD OF THE INVENTION

[0001] The present invention is in the field of electronic vaporizers.

DISCUSSION OF RELATED ART

[0002] A variety of different electronic vaporizers have been described in the prior art for smoking articles.

SUMMARY OF THE INVENTION

[0003] An electronic vaporizer includes a battery, a set of controls, a heating vessel activated by the set of controls, an airflow dial formed above the heating vessel, a dial air exhaust passage, a tank configured to receive a liquid, and a mouthpiece. The airflow dial has a downward intake air conduit for directing intake airflow toward the heating chamber at a location off-center from the center of the heating chamber. The airflow dial is configured to be rotatable at least 180 degrees, although it is preferable to be 360 degrees rotatable. The dial air exhaust passage is formed through the airflow dial. The tank is in airflow connection to the airflow dial. The mouthpiece is in airflow connection to the tank.

[0004] The dial air exhaust passage exhausts to a mixing chamber, and the mixing chamber exhausts to the tank. The dial air exhaust passage is off-center from the heating vessel center. The airflow dial has a horizontal intake air conduit passing air to a downward intake air conduit. The airflow dial has a dial upper pivot and a dial lower pivot. The airflow dial has a dial grip with a dial vent opening formed on a grip gap of the airflow dial. A right air grille is mounted to a right side of the airflow dial, and a left air grille is mounted to a left side of the airflow dial. The right air grille and the left air grille both have air grille openings to allow airflow through the right air grille and the left air grille.

[0005] The upper housing fits over the tray. The heating vessel is mounted in the tray. The battery, set of controls, airflow dial, tank, and mouthpiece are mounted in the upper housing. The tray pivots to the upper housing at a heating tray hinge. The tray has an open position and a closed position. The heating vessel has a heating vessel center and if cylindrical or circular or conical, may have a radius.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. **1** is a perspective right side view of the present invention.

[0007] FIG. **2** is a perspective left side view of the present invention.

[0008] FIG. **3** is a front view of the present invention.

[0009] FIG. **4** is a left view of the present invention.

[0010] FIG. **5** is a bottom view of the present invention.

[0011] FIG. **6** is a top view of the present invention.

[0012] FIG. **7** is a right side view of the present invention.

[0013] FIG. **8** is a rear view of the present invention.

[0014] FIG. **9** is a rear perspective view of the present invention.

[0015] FIG. **10** is a cross-section diagram.

[0016] FIG. **11** is a cross-section diagram showing the airflow dial rotated by a half turn.

[0017] The following call out list of elements can be a useful guide in referencing the elements of the drawings.

[0018] **20** Airflow Dial
[0019] **21** Dial Vent Opening
[0020] **22** Dial Grip
[0021] **23** Right Grille
[0022] **24** Left Grille
[0023] **25** Grip Backer
[0024] **26** Grip Gap
[0025] **30** Tray
[0026] **31** Tray Swivel
[0027] **32** Tray Upper Edge
[0028] **33** Tray Lower Edge
[0029] **34** Tray Extension
[0030] **35** Tray Extension Retainer
[0031] **36** Tray Extension Retainer Upper Edge
[0032] **37** Tray Extension Retainer Bevel
[0033] **40** Tank
[0034] **41** Tank Indent
[0035] **42** Tank Indent Lower Face
[0036] **43** Tank Indent Right Face
[0037] **44** Tank Indent Upper Face
[0038] **50** Mouth Piece
[0039] **51** Mouth Piece Opening
[0040] **52** Mouth Piece Flare
[0041] **53** Mouth Piece Base
[0042] **54** Mouth Piece Upper Bevel
[0043] **60** Controls
[0044] **61** Control Panel
[0045] **70** Upper Housing
[0046] **71** Upper Housing Mouth Piece Ridge
[0047] **171** Housing Rear Face
[0048] **172** Housing Middle Face
[0049] **173** Housing Front Face
[0050] **120** Horizontal Intake Air Conduit
[0051] **121** Downward Intake Air Conduit
[0052] **122** Intake Air Conduit Stem
[0053] **123** Vessel Threading
[0054] **124** Dial Air Exhaust Passage
[0055] **125** Mixing Chamber
[0056] **126** Dial Upper Pivot Joint
[0057] **127** Dial Lower Pivot Joint
[0058] **128** Dial Upper Pivot Seal
[0059] **129** Dial Lower Pivot Seal
[0060] **141** Tank Hollow
[0061] **142** Mouthpiece Conduit
[0062] **143** Tank Upper Step
[0063] **144** Tank Lower Stem
[0064] **145** Tank Lower Stem Cover
[0065] **146** Lower Stem Conduit
[0066] **147** Upper Stem Conduit
[0067] **148** Upper Stem Conduit Outlet
[0068] **149** Lower Stem Conduit Opening
[0069] **150** Heating Chamber
[0070] **151** Heating Vessel
[0071] **152** Heating Element
[0072] **153** Battery
[0073] **154** Printed Circuit Board
[0074] **155** Circuit Board Mount
[0075] **156** Control Mounting Surface
[0076] **157** Heating Tray Hinge
[0077] **158** Heat Shield
[0078] **159** Electrical Contact
[0079] **160** Center Of Heating Chamber

[0080] **161** Air Intake Airflow
[0081] **162** Internal Air Flow
[0082] **163** Air Exhaust

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0083] As seen in FIG. **1**, the present invention is an electronic vaporizer having controls **60** mounted on an upper housing **70** with a lower tray **30** being swivel attached to the upper housing **70**. The mouthpiece **50** is connected to the upper housing **70**. The mouthpiece **50** has a mouthpiece upper bevel **54** circumferentially disposed around a mouthpiece opening **51**. The mouthpiece **50** has a mouthpiece flare **52** which is a wider base than the mouthpiece upper bevel **54**. The mouthpiece base **53** is disposed within a hollow formed by an upper housing mouthpiece ridge **71**. A user has access to controls **60** and a control panel **61** mounted to the controls **60**. The controls **60** are mounted to the upper housing **70** on a side of the upper housing **70**. The tank **40** fits within the upper housing **70** and the upper housing **70** has a tank indent **41** so that the tank **40** is partially shown. A tank indent **41** has a tank indent lower face **42**, a tank indent right face **43**, a tank indent upper face **44**, and a tank indent left face **45** defining a window to view the tank **40** through the upper housing **70**. The tank **40** is preferably generally cylindrical in shape and may have a glass exterior, or a stainless steel exterior.

[0084] An airflow dial **20** is attached to a lower portion of the upper housing **70**. The airflow dial **20** has a dial vent opening **21** disposed in a gap in the dial grip **22**. The right grille **23** has 3 diagonal openings and is mounted on the upper housing **70** with the tray **30** immediately below. The tray upper edge **32** may enclose a lower edge of the right grille **23**. The tray **30** has a tray swivel **31** so that the tray **30** swivels away from the upper housing **70** at a tray upper edge **32**. The tray also has a tray lower edge **33** which forms a base foot for the electronic vaporizer. The tray **30** may interface with the upper housing **70** at a tray latch which is formed at a tray extension **34** of the tray **30** extending over a tray extension retainer **35** of the upper housing **70**. The tray extension retainer **35** may have a ramp or slope and may have a mechanical detent mechanism for clicking in.

[0085] As seen in FIG. **2**, the upper housing mouthpiece ridge **71** forms a mouthpiece indent **55** that retains the mouthpiece base **53** of the mouthpiece **50**. The tray connection may further include a tray extension retainer upper edge **36** of the tray extension **34** that engages a tray extension retainer bevel **37** of the tray extension retainer **35**.

[0086] The upper housing **70** preferably includes a housing rear face **171** with a recessed housing middle face **172** and a housing front face **173** formed at three different levels to provide a profiled grip for the upper housing **70**.

[0087] As seen in FIG. **3**, a grip backer **25** can support the dial grip **22** of the airflow dial **20**. A grip gap **26** can be formed on the grip backer **25**. The grip backer **25** preferably fits around the airflow dial **20**. The airflow dial **20** can be rotated 360 degrees and can be rotated more than a few turns in a clockwise or counterclockwise direction. When a user turns the airflow down **20**, the airflow dial changes the flow of air downward into the heating chamber. Preferably, the grip gap **26** is a tall rectangle shape that has a grip gap height greater than a grip gap width. The airflow dial acts as an air intake during user inhalation. The airflow dial **20** has an air gap between the dial grip **22** and the right grille **23** and the left grille **24**. When the airflow dial **20** is turned so that the grip gap **26** is facing toward the interior, the airflow passes through the right grille **23** and the left grille **24**. The airflow dial **20** is not electronic but rather mechanically controls the flow of air.

[0088] As seen in FIG. **4**, the airflow dial **20** fits between the left grille **24**, the tray **30** and the tank **40**. The tank **40** connects to the mouth piece **50** so that air aspirated through the airflow dial **20** passes through the heating chamber, then through the tank **40** before exiting to the mouthpiece **50**. The controls **60** are mounted on a control panel **61** on the upper housing **70**. Air passes through the airflow dial twice. The first time, the air passes horizontally in a radial direction from a circumferential periphery towards the center of the airflow dial before exiting downwardly. The second time, the air passes from the heating chamber upwardly in a generally vertical direction through the airflow dial. The airflow conduits through the airflow dial are preferably collinearly oriented.

[0089] The controls **60** are preferably electronic and configured for vaporizing concentrate or oil. The device may have modular removable or replaceable parts such as heaters. Preferably, the controls provide for six different preset temperatures at 500° F., 520° F., 540° F., 560° F., 580° F., and 600° F. The controls **60** also have a graphic or text LCD display. The display preferably includes a temperature indicator, and a countdown timer. Preferably, a battery indicator indicates the battery level, and a vibration on off symbol can indicate the status of power and vibration indications. The buttons on the controls **60** may include a power button, a fire button, or a combined power and fire button. Additional buttons may include an increase temperature button and decrease temperature button. The increase temperature button can be a generic + symbol having navigation function, and the decrease temperature button can be a generic − symbol having navigation function so as to be able to navigate through a control menu displayed on the display. The increase temperature button can be the plus button, and the decrease temperature button can be the minus button.

[0090] For example, the functions may include a device on which requires pressing the power button five times within two seconds, and the functions may include a device off which requires pressing the power button five times within two seconds. The temperature setting can be controlled using the up and down, or plus and minus symbols to cycle through the preset temperatures. The heat on can be activated by pressing and holding the power button for three seconds. The heat off command future can be activated by pressing the power button twice within one second. The extend session timer can occur when the plus button is pressed two times within one second. The reset function can be activated when all three buttons are pressed and held for ten seconds. The change temperature function can be activated when the plus or minus buttons are held for five seconds. A stealth mode function can be enabled where the screen only shows when the keys are pressed and stays on for only five seconds. The screen can have a backlit LED that provides an LED function for five seconds before turning off. A vibration on and off feature can provide a vibration when a function is activated. For example, holding the power and minus button for five seconds can activate and deactivate the vibration feature. A vibration generator such as a motor with an eccentric mass can be installed in the housing of the electronic vaporizer. The device settings can

be preset for 30 seconds with a 20 second increment time extension up to 60 seconds. The default starting temperature can be set at 500° F. The default values can be saved based upon the last settings before turning off the device. In this situation, the default values will be saved to a persistent memory. The default units can be in Fahrenheit for the United States, and Celsius in other countries.

[0091] As seen in FIGS. **5-7**, the dial vent opening **21** and the dial grip **22** both protrude slightly beyond the tray **30**, and the upper housing.

[0092] As seen in FIG. **10**, the cross-section diagram shows a tank **40** with a tank hollow **141**, the mouthpiece conduit **142** has a flared shape. At the base of the mouthpiece, the upper stem conduit outlet **148** provides a vapor passage for the user to inhale vapor. The tank upper stem **143** has a circuitous passage to prevent liquid spills, however still has an upper stem conduit **147** to provide vapor passage. Similarly, the tank lower stem **144** also has a circuitous passage through a lower stem conduit **146** that draws heated vapor from a heating chamber **150**. The tank lower stem **144** has a tank lower stem cover **145** that provides a circuitous passage through the lower stem conduit also to prevent loss of liquid into the heating chamber **150**.

[0093] The battery **153** is housed within the upper housing **70** and powers a printed circuit board **154**. The circuit board **154** is mounted to a circuit board mount **155** and the control mounting surface **156** is formed over the circuit board mount **155**.

[0094] The heating tray hinge **157** provides a swivel for the tray to swivel away from the upper housing. When the heating tray hinge **157** is in closed position, the dial air exhaust passage **124** is aligned to the heating chamber **150**. The heating chamber **150** has a heating vessel **151** heated by a heating element **152**. Optionally, the heating vessel **151** can be removed for cleaning by vessel threading **123**. Alternatively, the vessel threading **123** is omitted, and the heating vessel **151** is press fit into the tray **30**. The heating element **152** has an electrical contact **159**, and the electrical contact **159** is powered by the battery **153**. The heating element **152** is housed within a heat shield **158**. The heat shield **158** can be formed as an enclosure and the enclosure can be formed with the tray **30**. The heating vessel **151** can be attached magnetically.

[0095] The air intake dial is a key feature of the present invention. The air intake dial has a horizontal intake air conduit **120** that takes air at the dial grip **22** at the dial vent opening **21**. The air intake dial can be made of metal such that it is conductive to heat and where the horizontal intake air conduit **120** has a heat transfer from the heating chamber **150**. Alternatively, the conduits can be made of ceramic or a combination of metal and ceramic. If the horizontal intake air conduit **122** heats to a particular temperature, the intake air can be preheated. The horizontal intake air conduit **120** exits at a downward intake air conduit **121** which is aimed at the articles being vaporized. The horizontal intake air conduit **120** is housed within the intake air conduit stem **122**. The intake air conduit stem **122** includes the downward intake air conduit **121**. The downward intake air conduit **121** is off-center such that when it is rotated, it is halfway between the center of the heating chamber **150** and the edge of the heating chamber **150**. A user can rotate the airflow dial **20** which rotates the position of the downward intake air conduit **121**. In this manner, the user can direct air at different portions of the heating chamber **150** so as to provide more even heating.

[0096] The intake air been directed downwardly into the heating chamber **150**, then produces vapor which exits upwardly through the dial air exhaust passage **124**. The dial air exhaust passage **124** is preferably formed as a circular opening in the airflow dial **20** which forms a U shaped airflow that can be rotated. During use, the rotating U-shaped airflow provides vaporization air for vaporizing contents. The dial air exhaust passage **124** passes through the airflow dial **20** and encompasses a distance between generally the edge of the heating chamber **150** and the center of the heating chamber **150** such that the cross-section of the dial air exhaust passage **124** is greater than the downward intake air conduit **121**. The downward intake air conduit **121** thus has a faster flow rate than the flow rate at the dial air exhaust passage **124**. The faster flow rate blows at the contents in the heating chamber **152** thereby optimizing vaporization. The downward intake air conduit **121** can have a cross-section that is smaller than the horizontal intake air conduit **120** so that it forms a small flush nozzle.

[0097] The airflow dial **20** has a dial upper pivot seal **128** of the dial upper pivot joint **126** and a dial lower pivot seal **129** of the dial lower pivot joint **127** to allow an airtight seal of the airflow dial **20** while the airflow dial **20** rotates. The dial upper pivot seal **128** and the dial upper pivot joint **126** are formed between the mixing chamber **125** immediately above the airflow dial **20**, and the airflow dial **20**. The dial lower pivot seal **129** and the dial lower pivot joint **127** is formed between the airflow doll **20** and bottom of the upper housing **70** which is immediately above the tray upper edge **32**. As the vapor passes from the dial air exhaust passage **124** to the mixing chamber **125**, the cross-section again expands so as to generate turbulence. Then, the vapor passes through the lower stem conduit **146** of the tank **40** where the vapor cools by heat transfer to the liquid in the tank. The tank is preferably spill proof while allowing air passage through it.

[0098] During use, a user first turns on the device using the power button which displays a logo for a few seconds. Then the user flips open the door to expose the heater unit. The user then places their material at the bottom surface of the ceramic heater unit. The user can then close the tray door. The user can then select the desired temperature and start the heating process. The temperature is preferably displayed on the LCD display as it increases to the target set temperature. Once the desired temperature is reached, there will be a quick vibration and the temperature display will switch to a 30 second countdown timer to start the session. During the session, the user can extend the time in 20 second increments up to 60 seconds by pressing the plus button two times in quick succession. The user can slowly rotate the airflow dial **20** so that airflow blows downwardly to different parts of the heating chamber to provide even heating of contents. Turning the airflow dial **20** does not turn the heating chamber, but changes the airflow path.

[0099] At anytime during the heating process or during the session, the user can turn off the heater by pressing the power button 2 times within one second. Once the countdown timer reaches 0, the user receives another quick vibration indication from the vibration mechanism mounted in the housing. The timer will switch to the temperature display. The temperature units can be switched by holding the plus and minus buttons together for five seconds. The

vibration can also be turned on or off by holding the power and the minus button for five seconds. If the door is not closed, the heater cannot be turned on. A door sensor in the form of a magnet can be added to the door for automatically turning off the heater or to not allow the heater to activate unless the door is closed. The display will indicate that the door must be closed to begin heating. The heater is not in the device, the display will show that there is no heater instead of turning on. If the device is turned off with five clicks of the power button, a logo can be displayed for a few seconds.

[0100] The airflow begins at the air intake airflow **161** which passes through the center of heating chamber **160** as internal air flow **162**, and then exhausts at air exhaust **163**.

[0101] FIG. **11** is a cross-section diagram showing the airflow dial rotated by 180 degrees. Optionally, a motor can turn the dial based upon an algorithm. A sensor such as an optical sensor can sense the position of the dial. Data can be collected by Bluetooth for analysis and data logging such as temperature, and usage.

1. An electronic vaporizer comprising:

a. a battery;

b. a set of controls;

c. a heating vessel activated by the set of controls, wherein the heating vessel has a heating vessel center;

d. an airflow dial formed above the heating vessel, wherein the airflow dial has a downward intake air conduit for directing intake airflow toward the heating chamber at a location off-center from the center of the heating chamber, wherein the airflow dial is configured to be rotatable at least 180 degrees;

e. a dial air exhaust passage, wherein the dial air exhaust passage is formed through the airflow dial;

f. a tank configured to receive a liquid, wherein the tank is in airflow connection to the airflow dial; and

g. a mouthpiece in airflow connection to the tank.

2. The electronic vaporizer of claim **1**, wherein the dial air exhaust passage exhausts to a mixing chamber, and wherein the mixing chamber exhausts to the tank.

3. The electronic vaporizer of claim **1**, wherein the dial air exhaust passage is off-center from the heating vessel center.

4. The electronic vaporizer of claim **1**, wherein the airflow dial has a horizontal intake air conduit passing air to a downward intake air conduit.

5. The electronic vaporizer of claim **1**, wherein the airflow dial has a dial upper pivot and a dial lower pivot.

6. The electronic vaporizer of claim **1**, wherein the airflow dial has a dial grip with a dial vent opening formed on a grip gap of the airflow dial.

7. The electronic vaporizer of claim **1**, further including a right air grille mounted to a right side of the airflow dial, and a left air grille mounted to a left side of the airflow dial, wherein the right air grille and the left air grille both have air grille openings to allow airflow through the right air grille and the left air grille.

8. The electronic vaporizer of claim **1**, further including an upper housing fit over a tray, wherein the heating vessel is mounted in the tray, and wherein the battery, set of controls, airflow dial, tank, and mouthpiece are mounted in the upper housing.

9. The electronic vaporizer of claim **8**, wherein the tray pivots to the upper housing at a heating tray hinge, wherein the tray has an open position and a closed position.

10. The electronic vaporizer of claim **9**, wherein the dial air exhaust passage exhausts to a mixing chamber, and wherein the mixing chamber exhausts to the tank.

11. The electronic vaporizer of claim **9**, wherein the dial air exhaust passage is off-center from the heating vessel center.

12. The electronic vaporizer of claim **9**, wherein the airflow dial has a horizontal intake air conduit passing air to a downward intake air conduit.

13. The electronic vaporizer of claim **9**, wherein the airflow dial has a dial upper pivot and a dial lower pivot.

14. The electronic vaporizer of claim **9**, wherein the airflow dial has a dial grip with a dial vent opening formed on a grip gap of the airflow dial.

15. The electronic vaporizer of claim **9**, further including a right air grille mounted to a right side of the airflow dial, and a left air grille mounted to a left side of the airflow dial, wherein the right air grille and the left air grille both have air grille openings to allow airflow through the right air grille and the left air grille.

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