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**Strechay et al.**

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(54) **BATTERY SWAP FLASHLIGHT**

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(51) **Int. Cl.**  
**F21L 4/00** (2006.01)  
**F21V 17/06** (2006.01)  
**F21V 23/04** (2006.01)  
**F21Y 115/10** (2016.01)

(52) **U.S. Cl.**  
CPC ..... **F21L 4/005** (2013.01); **F21V 17/06** (2013.01); **F21V 23/0414** (2013.01); **F21Y 2115/10** (2016.08)

(58) **Field of Classification Search**  
CPC ..... F21V 23/0414; F21V 17/06; F21L 4/005  
See application file for complete search history.

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(57) **ABSTRACT**  
An improved flashlight is disclosed. The flashlight includes first and second selectable power sources, housed in a common battery housing. The flashlight enables power to the flashlight to be switched to a second battery when the first battery fails by way of a switch on the exterior of the battery housing.

**13 Claims, 7 Drawing Sheets**

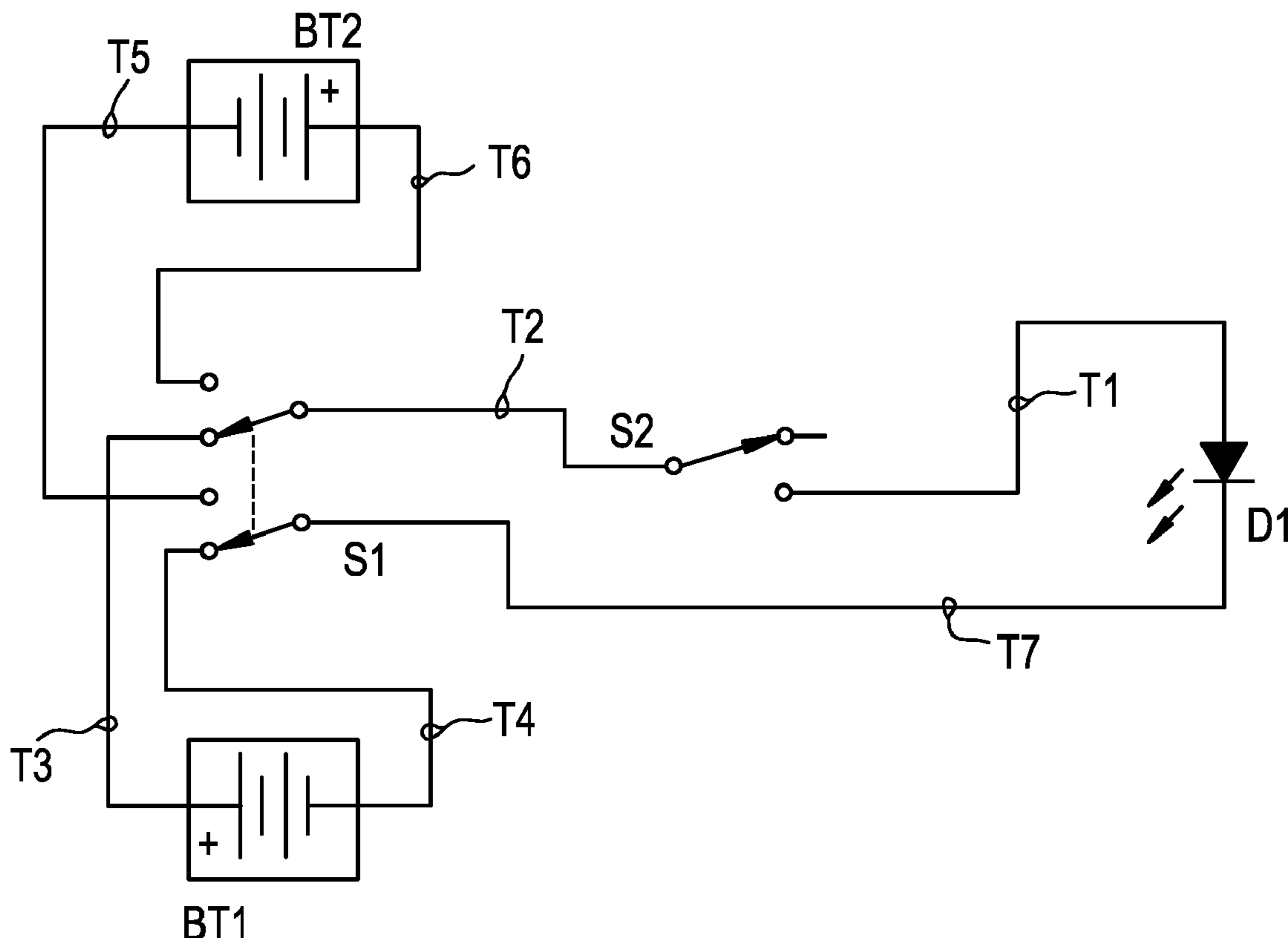


FIG. 1

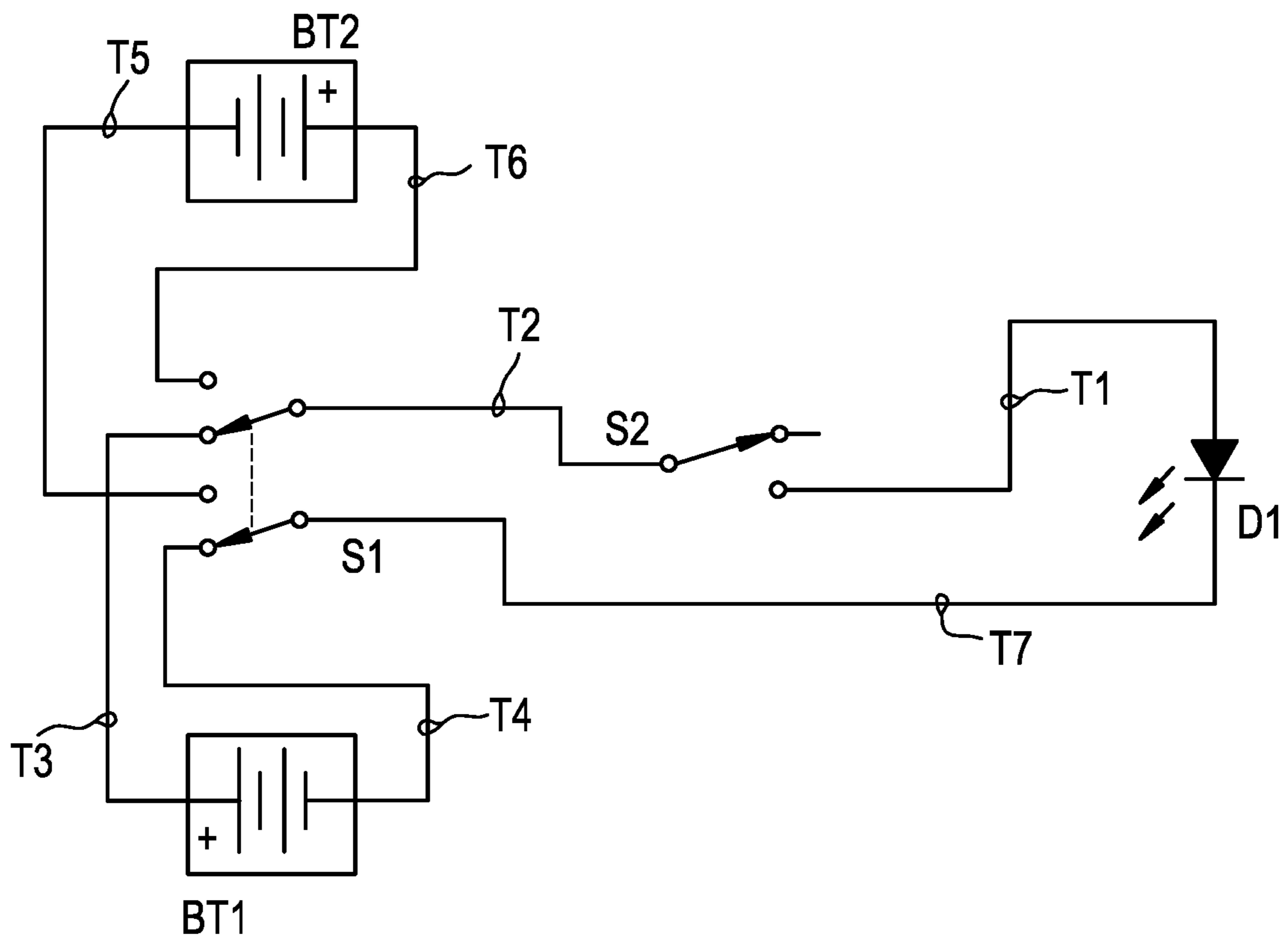


FIG. 2

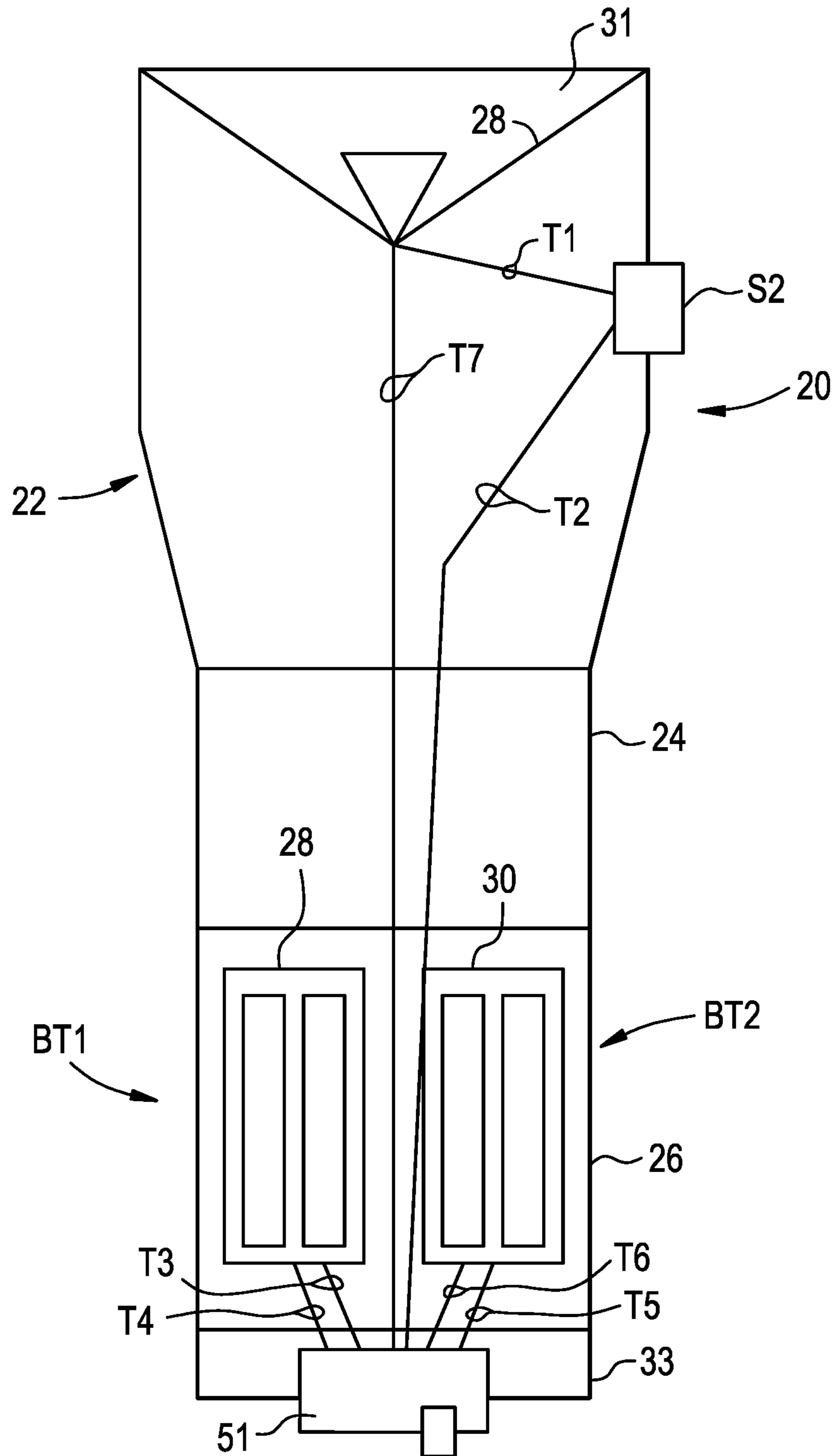


FIG. 3

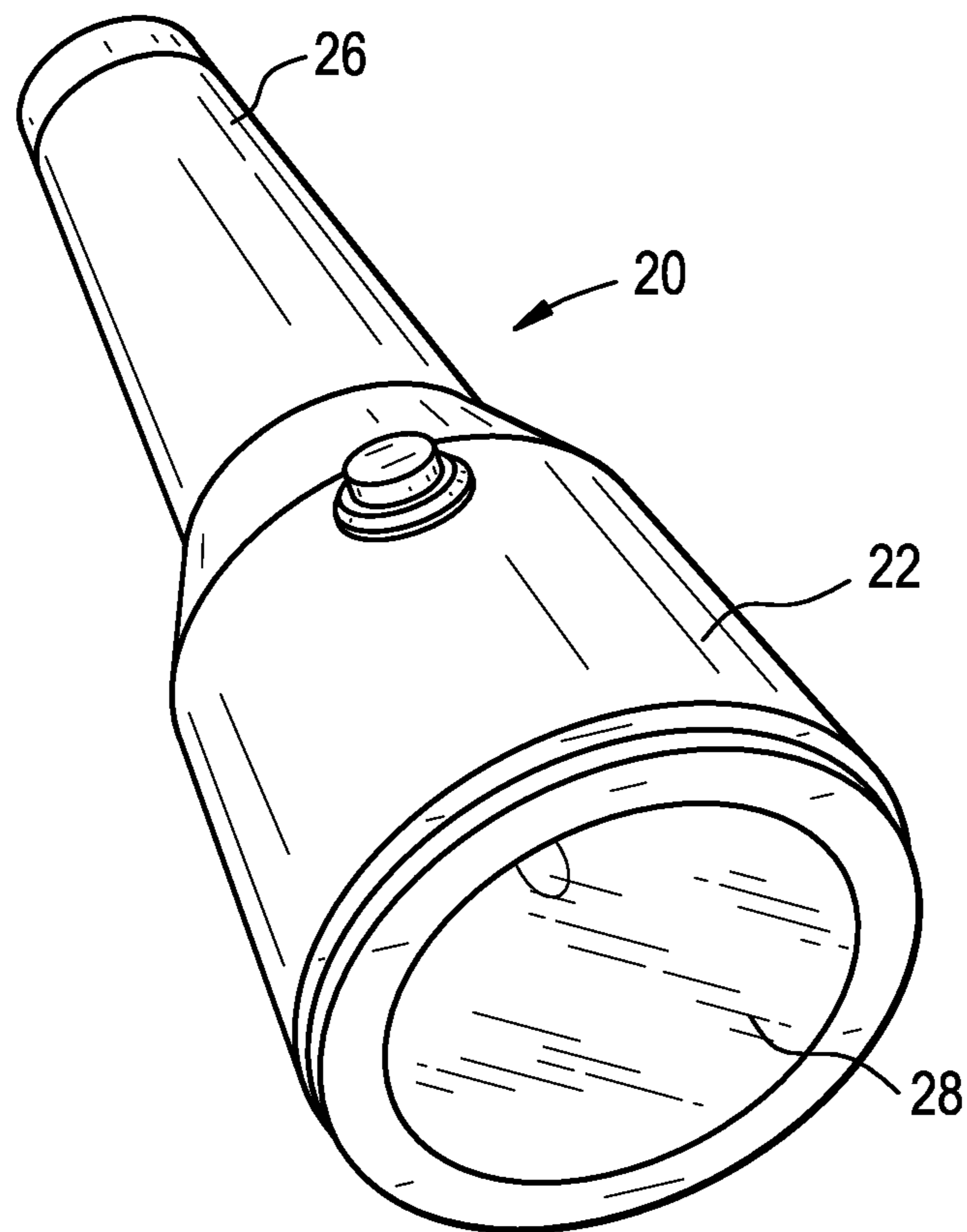


FIG. 4

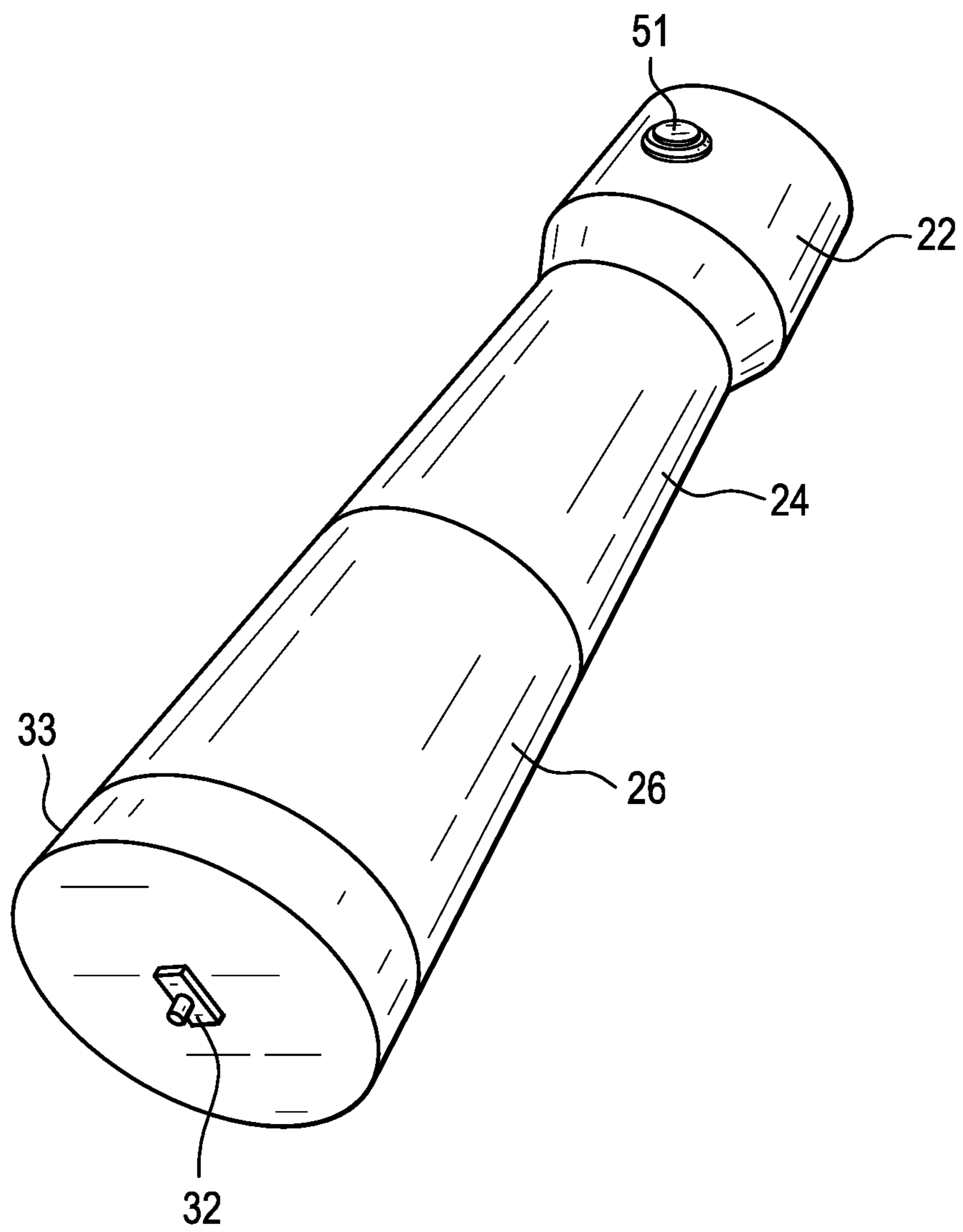


FIG. 5A

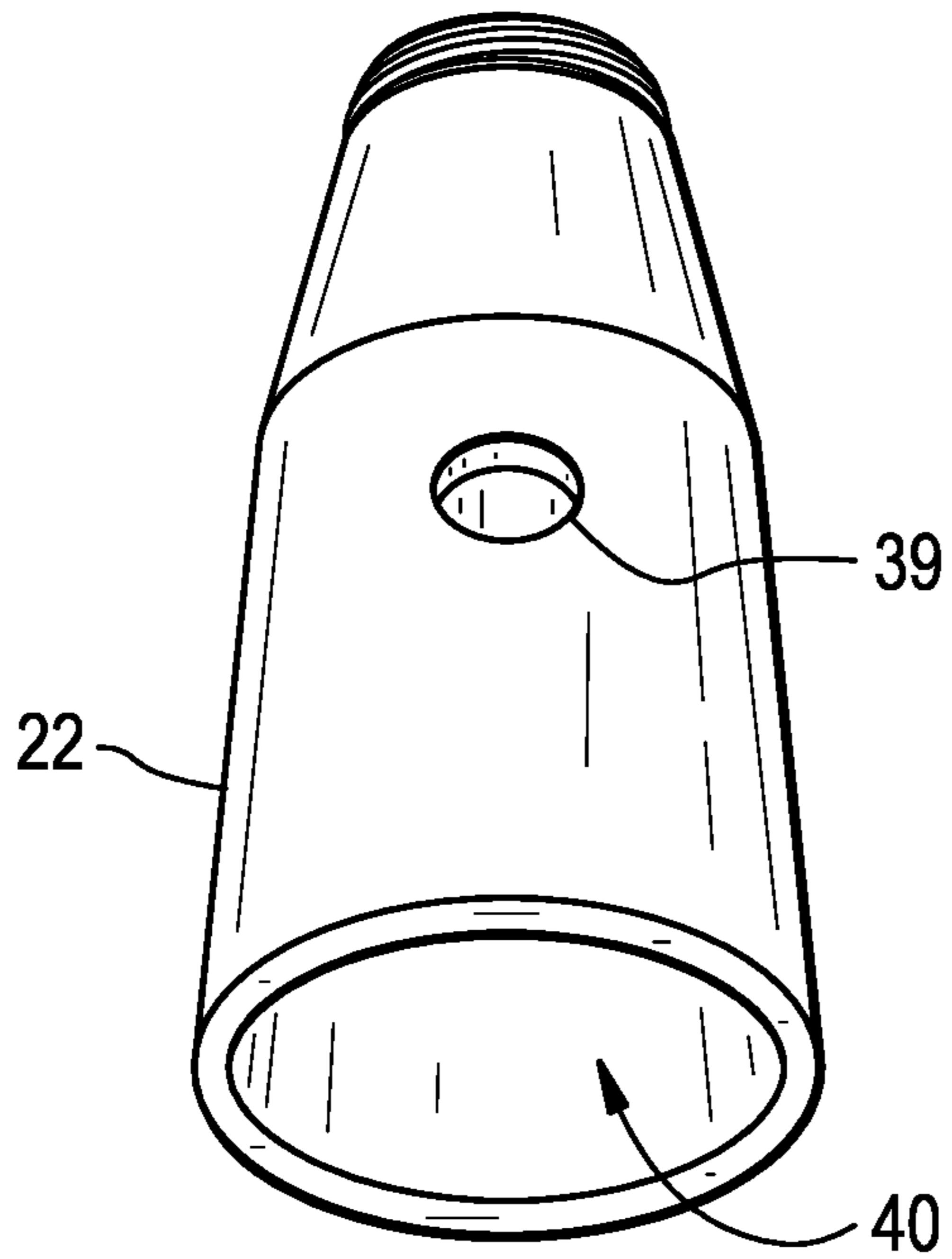


FIG. 5B

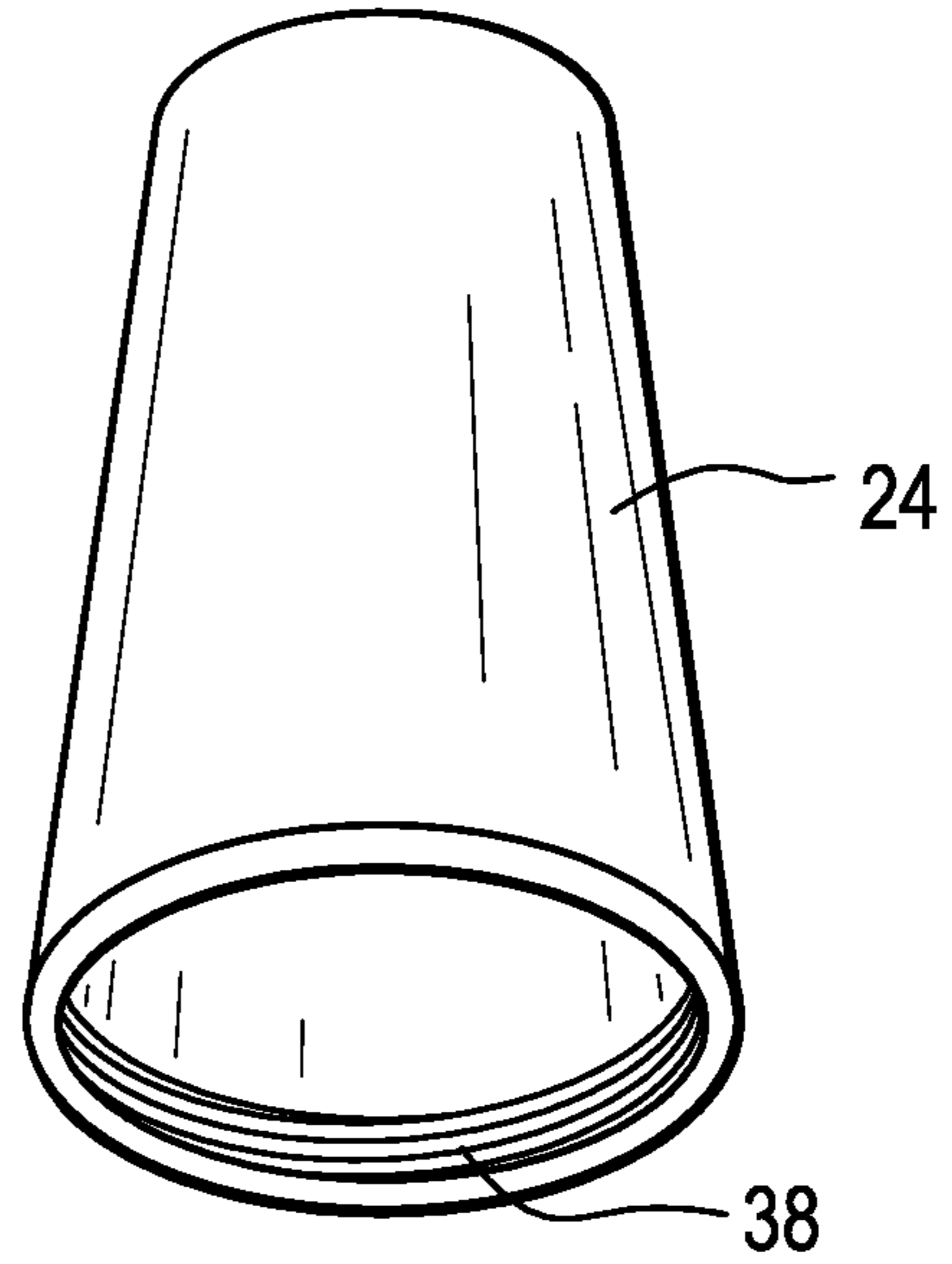


FIG. 5C

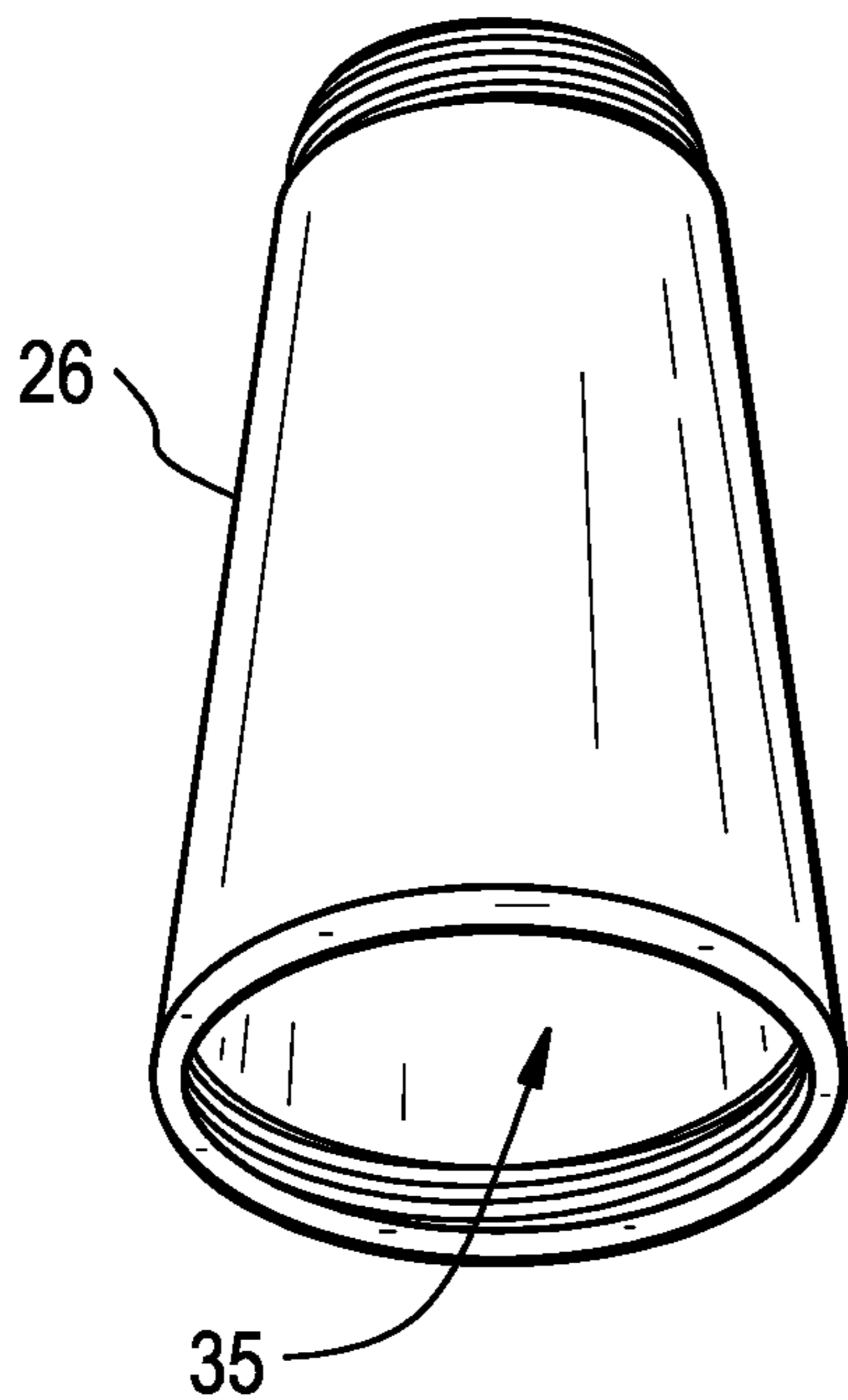


FIG. 5D

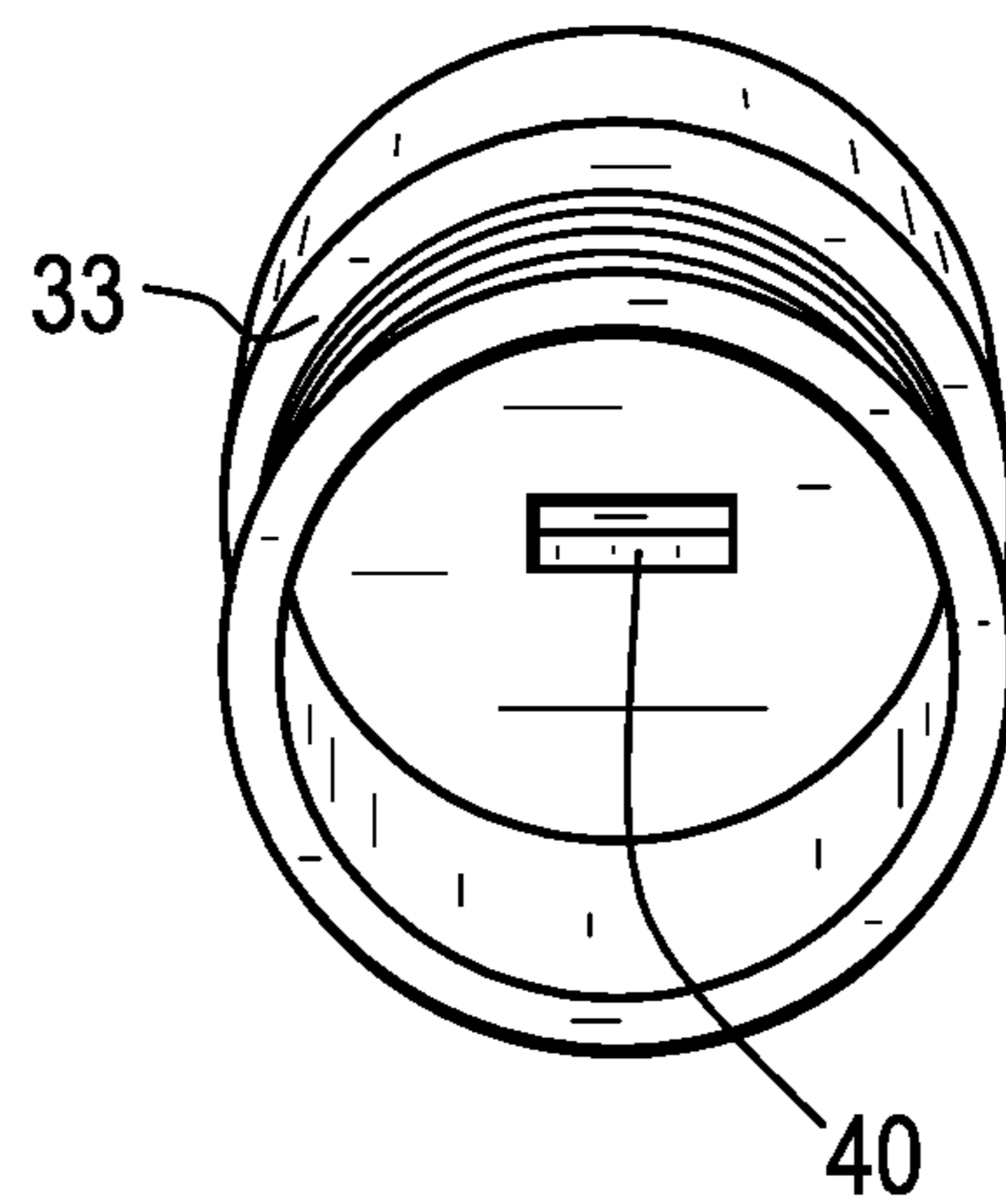


FIG. 5E

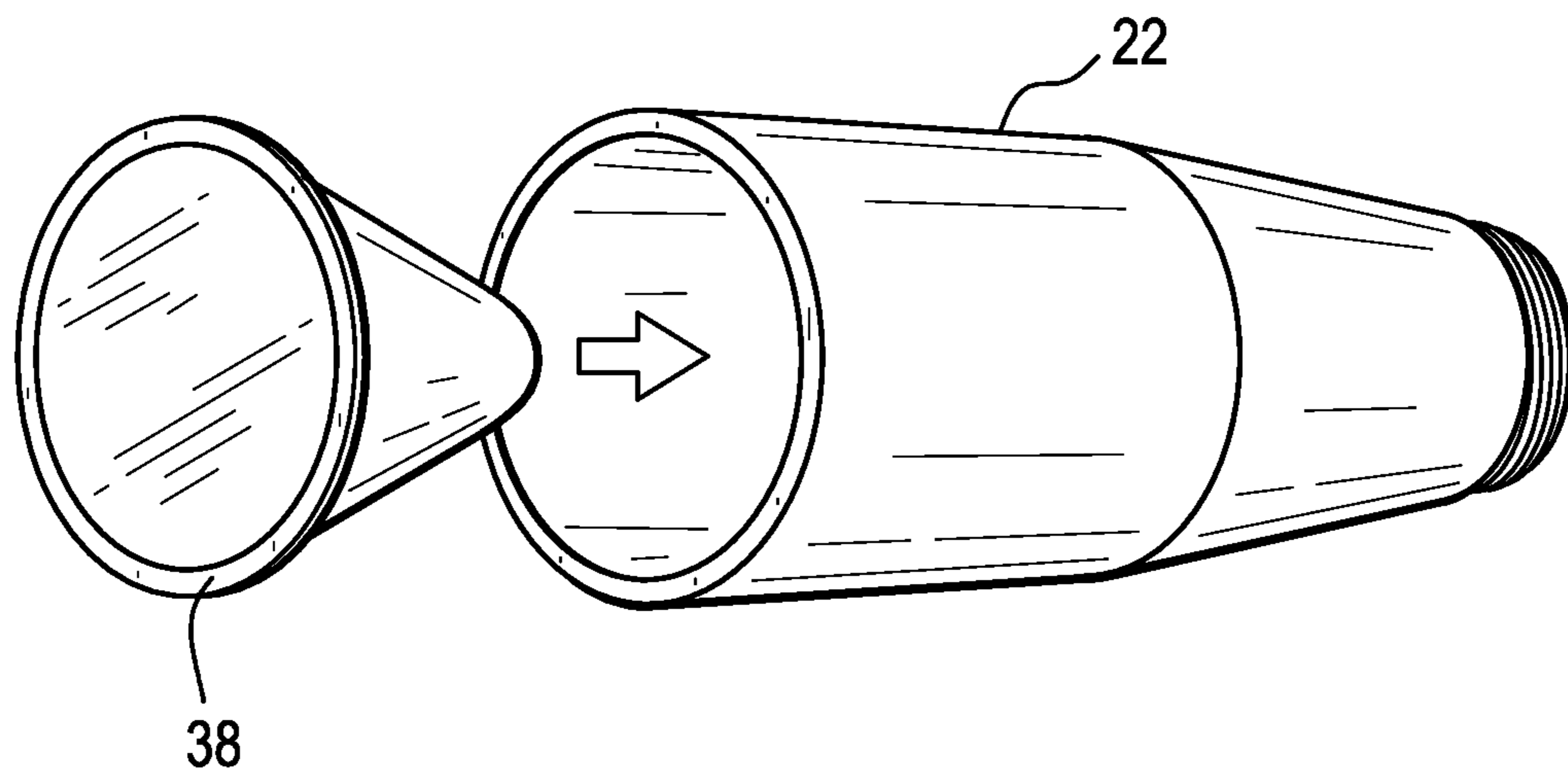


FIG. 5F

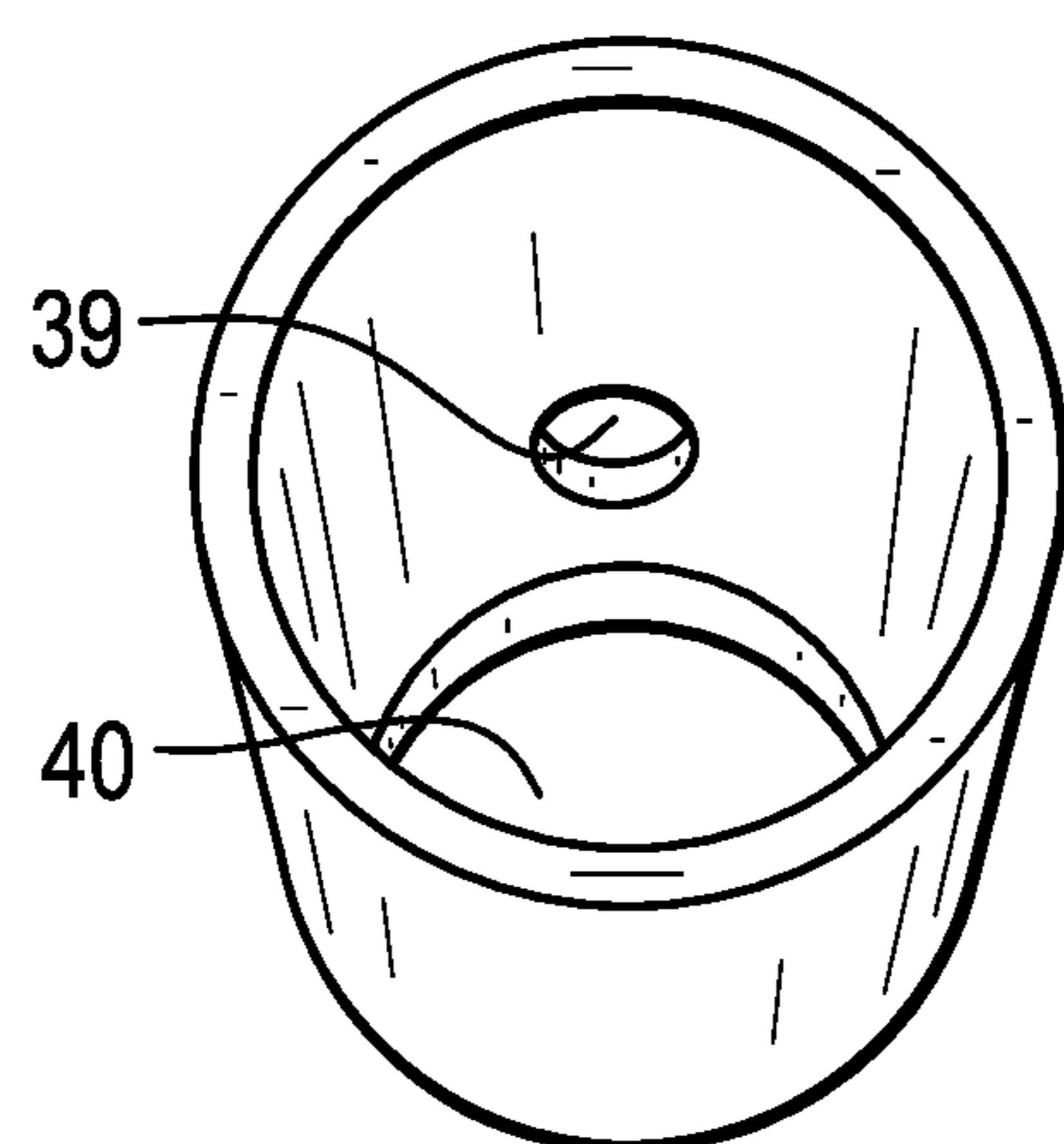


FIG. 5G

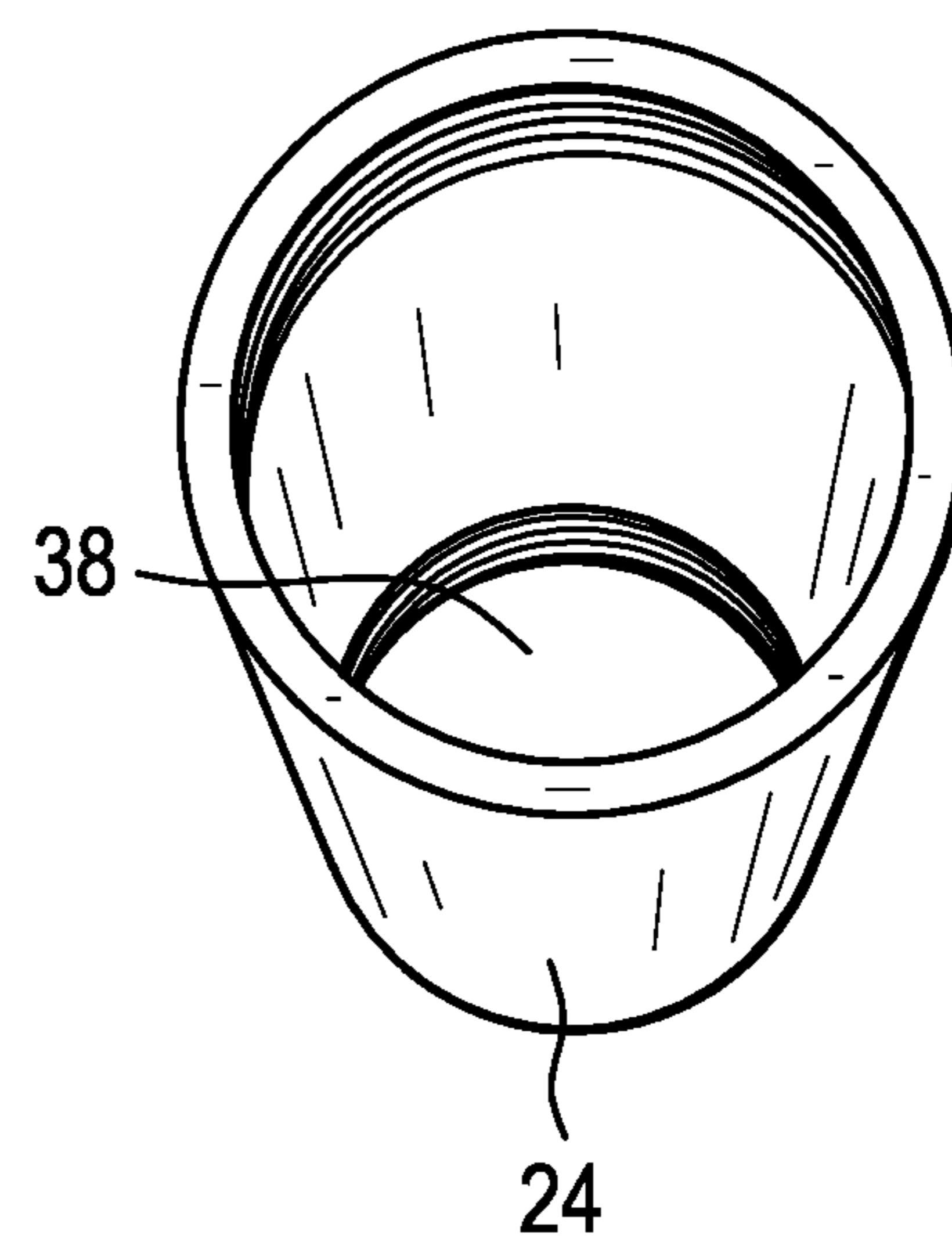


FIG. 5H

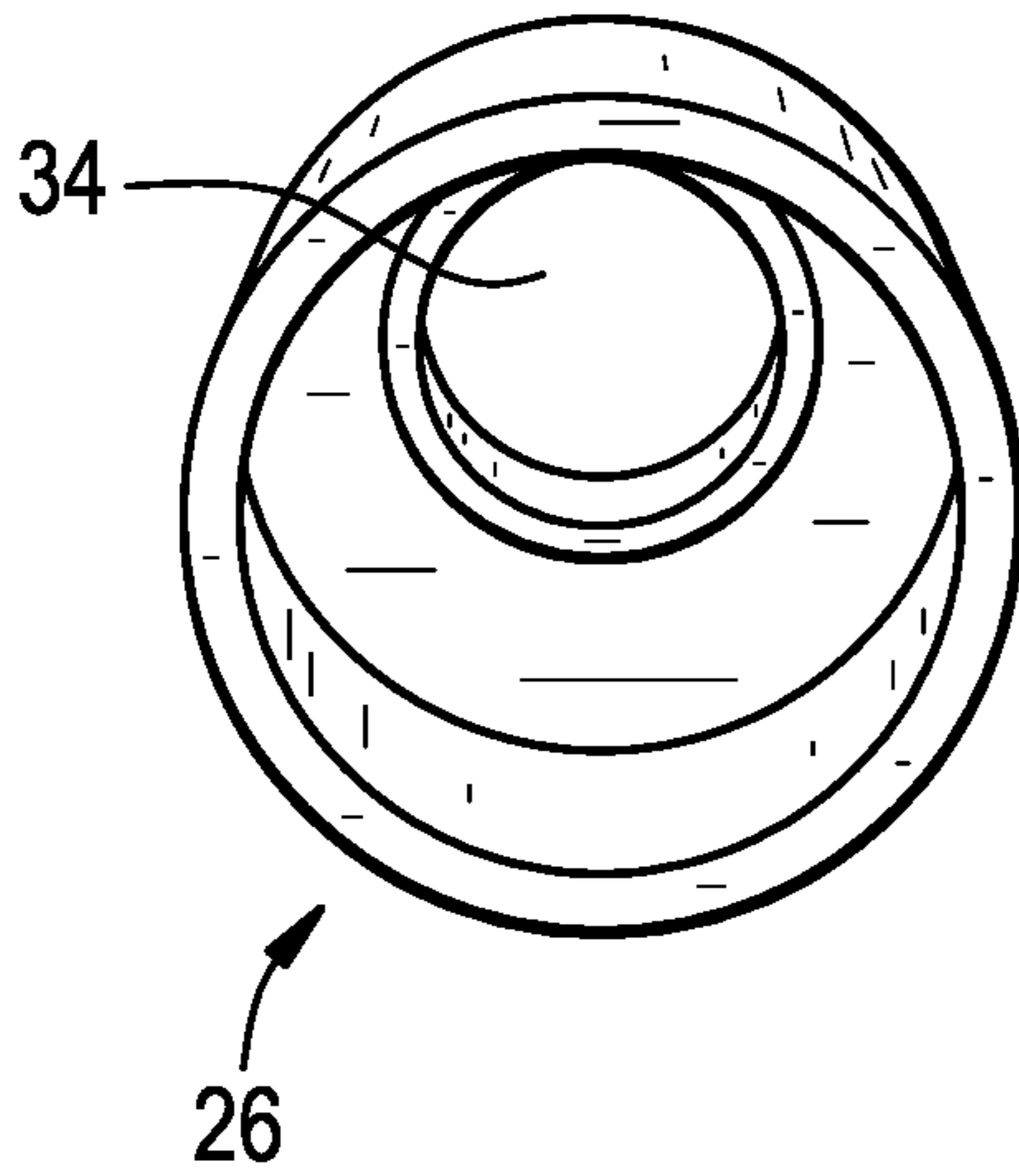


FIG. 5I

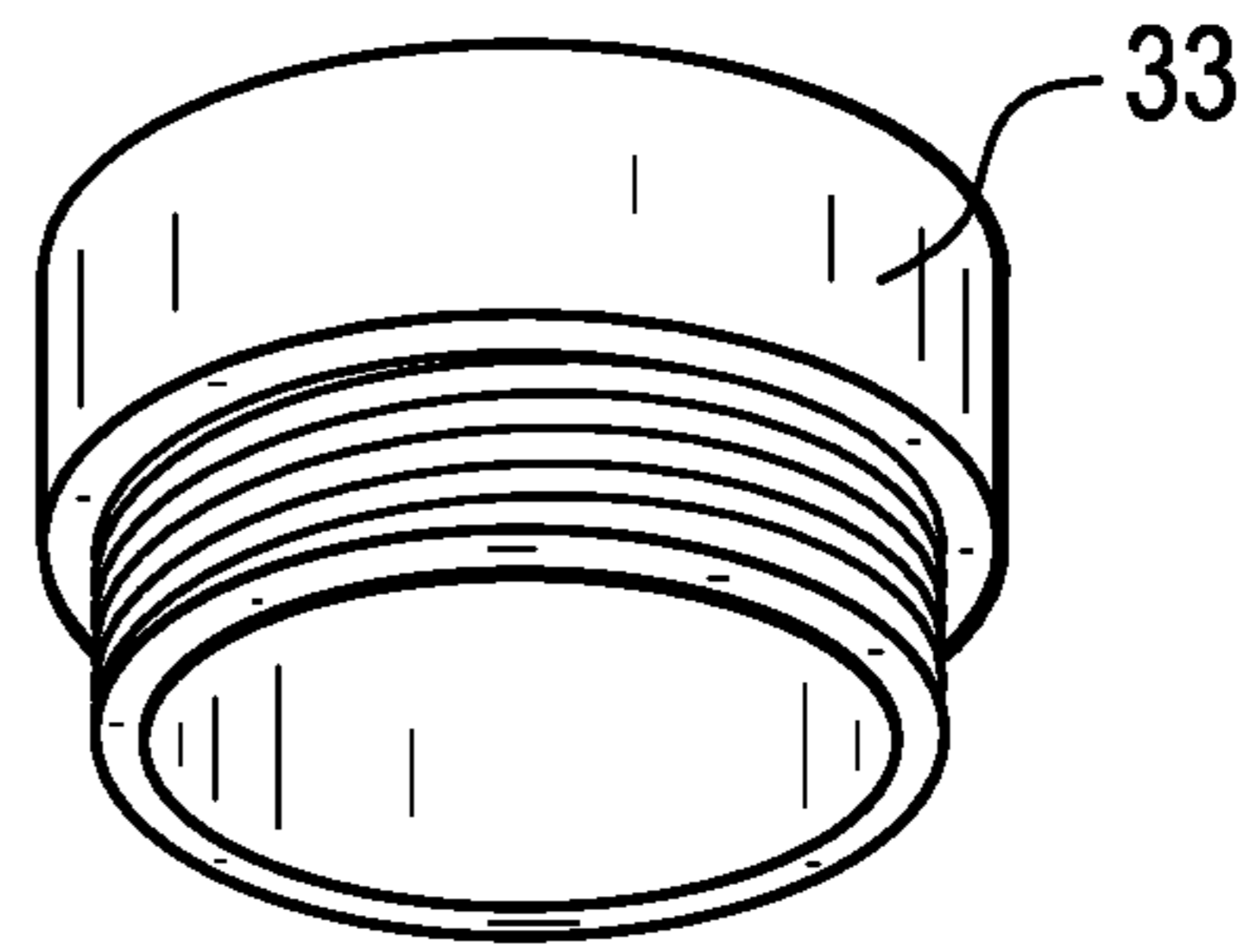
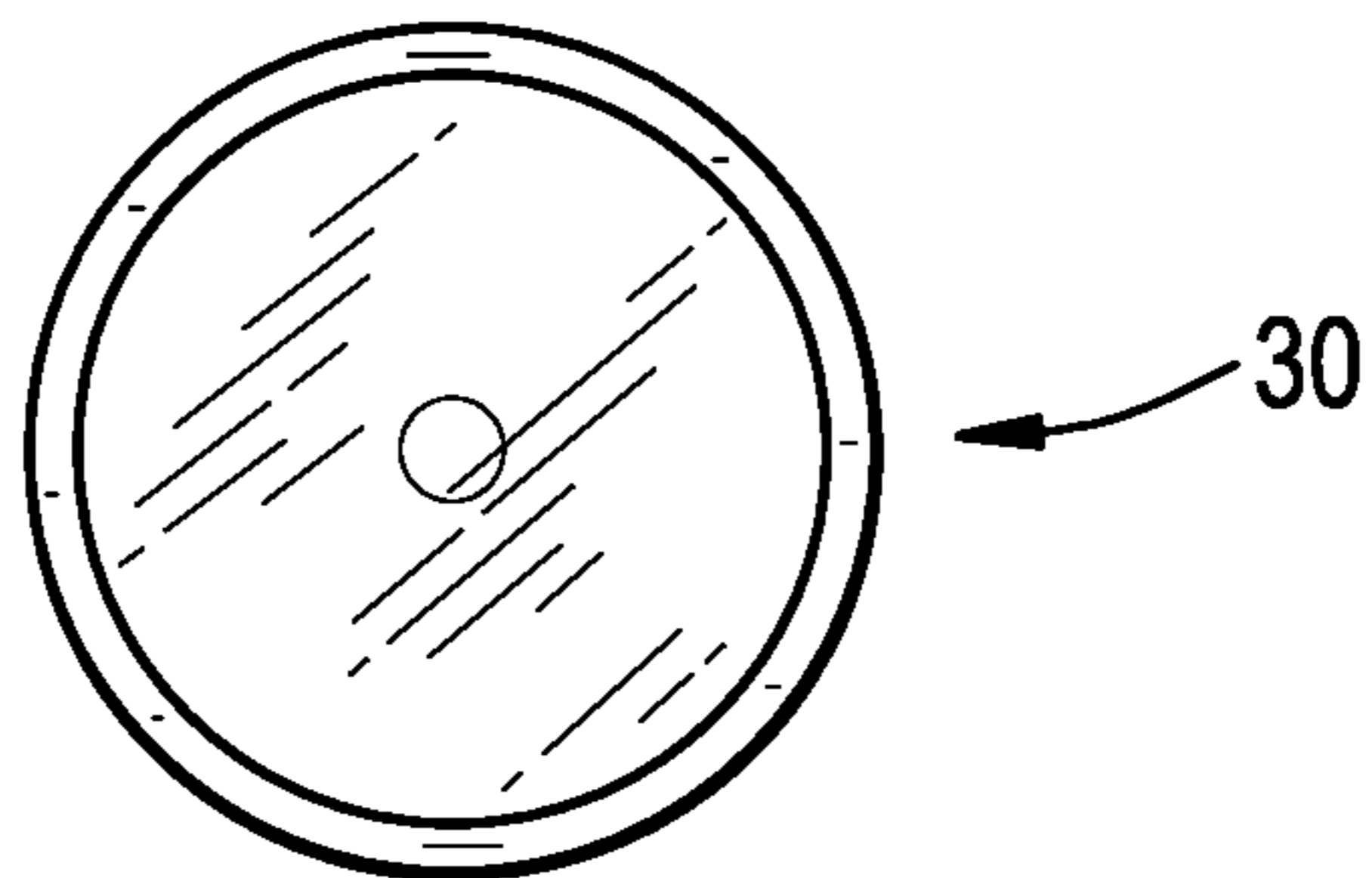


FIG. 5J





**1****BATTERY SWAP FLASHLIGHT****CROSS REFERENCE TO RELATED APPLICATIONS**

This application claims priority to and the benefit of U.S. Provisional Patent Application No. 63/288,900, filed on Dec. 13, 2021, hereby incorporated by reference.

**BACKGROUND OF THE INVENTION****1. Field of the Invention**

The present invention relates to an improved flashlight that includes a first power source and a second power source housed in a common housing. The flashlight is configured so that power to the flashlight can be switched to the second power source when the first power source fails by way of a selector switch on the exterior of the battery housing.

**2. Description of the Prior Art**

Flashlights are vital tools in various industries. For example, plumbers electricians, to name a few. Plumbers need flashlights in order see into dark places, such as under sinks. Electricians need flashlights to see into electrical cabinets. Police are also known to use flashlight to see the inside a vehicle and its occupants during night-time traffic stops.

There are several problems with conventional flashlights. Without a battery tester, there is no way of knowing that flashlight batteries are going bad will soon need to be replaced. Moreover, flashlight batteries can fail at unsuspecting times. However, battery replacement is not always possible at the time and location of the failure. If a backup flashlight is not readily available, the user, such as a policeman on a night-time traffic stop, for example, can be placed in a precarious if not dangerous situation.

**SUMMARY OF THE INVENTION**

The present invention relates to a flashlight with a backup battery, housed in the battery housing, that enables power to the flashlight to be switched to the backup battery when the primary battery fails by way of a switch on the exterior of the battery housing. Thus, power can be immediately restored to the flashlight with no manual intervention other than actuating a switch on the exterior of the flashlight housing. Such a configuration allows the failed primary battery to be replaced at a convenient time and place.

**DESCRIPTION OF THE DRAWING**

These and other advantages of the present invention will be readily understood with reference to the following specification and attached drawing wherein:

FIG. 1 is an electrical schematic diagram of the battery swap flashlight.

FIG. 2 is an exemplary configuration of the battery swap flashlight illustrated in FIG. 1.

FIG. 3 is an isometric view of an exemplary embodiment of the battery swap flashlight in accordance with the present invention illustrating a front view of the battery swap flashlight.

FIG. 4 is similar to FIG. 3 but illustrating a rear view of the battery swap flashlight.

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FIG. 5A is an isometric view of a head portion of the battery swap flashlight illustrated in FIGS. 3 and 4.

FIG. 5B is an isometric view of a body portion of the battery swap flashlight illustrated in FIGS. 3 and 4.

FIG. 5C is an isometric view of a body portion of the battery swap flashlight illustrated in FIGS. 3 and 4.

FIG. 5D is an isometric view of the lid portion of the battery swap flashlight illustrated in FIGS. 3 and 4.

FIG. 5E is an exploded isometric view of reflector removed from the body portion of the battery swap flashlight illustrated in FIGS. 3 and 4.

FIG. 5F illustrates the inside of the head portion illustrated in FIG. 5A.

FIG. 5G illustrates the inside of the body head illustrated in FIG. 5B.

FIG. 5H illustrates the inside of the battery compartment illustrated in FIG. 5C.

FIG. 5I illustrates is an isometric view of the side of the lid portion illustrated in FIG. 5D.

FIG. 5J is a front view of the reflector illustrated in FIG. 5E.

**DETAILED DESCRIPTION**

The present invention relates to a flashlight with a backup battery, housed in the battery housing, that enables power to the flashlight to be switched to a second or backup battery when the first or primary battery fails by way of a switch on the exterior of the battery housing. Thus, power can be immediately restored to the flashlight with no manual intervention other than actuating a switch on the exterior of the flashlight housing. Such a configuration allows the failed primary battery to be replaced at a convenient time and place.

An exemplary schematic for the battery swap flashlight is illustrated in FIG. 1. As shown, the flashlight includes two power sources BT1 and BT2. BT1 may be considered the first or primary power source and BT2 is the second or backup power source. A double pole single throw switch S1 is used to alternatively couple the power sources BT1 and BT2 to the light emitting diode (LED) D1. A on-off switch S2 is used to turn the flashlight on and off and connect the selected power source to the LED. The switch S2 is a single pole double throw switch. The switch S2 is shown in an off position. When the switch S2 is turned on, one of the power sources BT1 and BT2 will be connected to a light emitting diode D1. When S1 is in the on position, shown in FIG. 1, the positive terminal of the power source BT1 is connected to the anode of the LED D1 and the negative terminal of the power source BT1 is connected to the cathode, thus forward biasing the diode D1 forward biasing the LED causing it to illuminate.

In the event the power source BT1 fails, the switch S1 may be depressed to disconnect the power source BT1 from the diode D1 and connect the power source BT2 to the diode D1. In this mode, the positive terminal of the power source BT2 is connected to the anode of the diode D1 and the negative terminal of the power source BT2 to the cathode, thus forward biasing the diode D1, causing it to illuminate. As such, a failure of one of the power sources BT1 and BT2 does not result in a loss of function of the flashlight thus allowing the failed power source to be replaced immediately at a convenient time and location.

FIG. 2 illustrates an exemplary configuration of the battery swap flashlight in accordance with the invention. As shown, an exemplary housing, generally identified with the reference numeral 20, includes a head portion 22, a body

portion **24** and battery compartment section **26**. The LED **D1** is located in a conical reflector **28**, disposed in an open end **27** of the head portion **22** to disperse light outwardly from the LED **D1**. A protective cover may be used to cover **31** the conical reflector **28** forming an assembly to protect the LED **D1** from damage.

The head portion **22** is coupled to a body portion **24**, which, in turn, is connected to the battery compartment portion **26**. The battery compartment portion **26** includes a pair of battery holders **28** and **30**. Each battery holder **28** and **30** is used to connect one of the power sources **BT1** and **BT2** to the circuit.

Each battery holder **28**, **30** is configured to connect **2** batteries in series to the circuit. Two AA battery cells are shown in FIG. **2** for illustration to form the power sources **BT1** and **BT2**. However, type AAA, C, and D battery cells are also suitable for use with the invention as well as rechargeable batteries. Each battery cell provides a nominal voltage of 1.5 volts DC. Thus, the battery holders **28** and **30** connect two batteries in series to provide a nominal 3.0 volts DC. This 3.0 DC voltage is required to enable the diode **D1** to turn when it is forward biased.

FIG. **2** also illustrates the wiring for the circuit. The wiring between components is indicated by the references **T1-T7**. As shown, the battery compartment portion **28** is connected to the switch **S1** by way of **T3** and **T4**. Similarly, the battery compartment portion **30** is connected to switch **S1** by way of **T5** and **T6**. Lastly, the LED is connected to switch **S1** by way of **T7**.

As will be discussed in more detail below, one end **32** of the battery compartment portion **26** of the housing **20** is open. It is closed by a battery compartment lid portion **33**. The switch **S1** is carried by the battery compartment lid portion **33**. As shown, there are multiple wiring connections **T1, T2, T3, T4, T5** and **T6** between the battery compartment lid portion **33** and other components in the circuit. With reference to FIGS. **1** and **2**, there is also one connection **T1** between switch **S2** and the LED. The switch **S2** is also connected switch **S1** by way of **T2**.

FIGS. **3** and **4** illustrate exemplary embodiments of the housing. As shown, the switch **S2** may be carried on the exterior of the head portion. The switch **S1** may be carried on battery compartment lid portion **33**. Other locations of the switches **S1** and **S2** are also contemplated.

FIGS. **5A-5I** illustrate how all of the components of the housing **20** are interconnected. As shown, the battery compartment portion **26** is formed as a cylindrical member with exterior threads on one end **35**. The body portion **24** is also formed as cylindrical member with exterior threads **36** on one end to enable connection to interior threads **38** on one end of the body portion **24**. One end **40** of the head portion **22** is formed with a slightly larger diameter than the outer diameter of the body portion **24** to enable a friction fit with the body portion **24**. The head portion **22** is formed with an aperture **39** to receive the switch **S2**. The head portion **20** is threaded on one end to receive a threaded reflector **38** and protective cover **30** assembly. The battery compartment lid **33** closes the opening on one end **35** of the battery com-

partment **26** and is connected thereto by way of a friction fit. The battery compartment lid **33** includes an aperture **40** to receiving the switch **S1**.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. Thus, it is to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described above.

We claim:

1. A flashlight comprising:  
a first power source;  
a second power source;  
an LED;

a circuit which includes a double pole single throw selector switch for alternatively connecting said first power source to said LED and disconnecting said second power source from the circuit in a first position or alternatively connecting said second power source to said LED and disconnecting said first power source from said circuit in a second position defining a selected power source;  
an on-off switch for connecting and disconnecting said selected power source to said LED; and  
a housing for carrying said first power source, said second power source, said selector switch, said on-off switch and said LED.

2. The flashlight as recited in claim 1, wherein said housing is hollow cylindrical member open on both ends, wherein one end is closed by a head portion and the other end is closed by a lid portion.

3. The flashlight as recited in claim 1, wherein said lid portion carries said selector switch.

4. The flashlight as recited in claim 1, wherein said head portion is configured to receive a reflector and a protective cover.

5. The flashlight as recited in claim 1, wherein said head portion is configured to carry said on-off switch and said LED.

6. The flashlight as recited in claim 1, wherein said first and second power sources are batteries.

7. The flashlight as recited in claim 6, further including battery holders for carrying said batteries.

8. The flashlight as recited in claim 6, wherein said first and second power sources each include two batteries connected in series.

9. The flashlight as recited in claim 6, wherein said first and second power sources each include two AA batteries.

10. The flashlight as recited in claim 6, wherein said first and second power sources each include two AAA batteries connected in series.

11. The flashlight as recited in claim 6, wherein said first and second power sources each include two C batteries.

12. The flashlight as recited in claim 6, wherein said first and second power sources each include two D batteries.

13. The flashlight as recited in claim 6, wherein one of said first and second power sources are rechargeable batteries.

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