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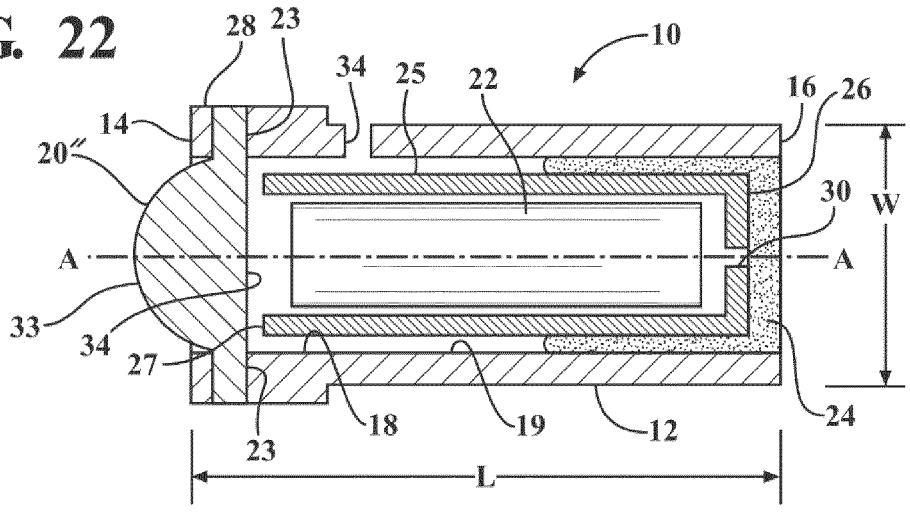
(54) **TRITIUM HOUSING**

(57) A tritium housing includes a body extending from a first end to a second end to define a hollow extending therebetween. A lens is disposed adjacent and surrounded by the first end of the body and a tritium vial is disposed within the housing to produce illumination visible through said lens. Said lens is hemispherical and includes a spherical face extending outwardly from said first end of said body for allowing said tritium illumination to be viewable from a wider range of angles defined relative to said first end of said body and a planar face disposed in axially opposing relationship with said spherical face and adjacent said tritium vial.

FIG. 22

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## Description

### CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims priority of US 16/210,302 which is a continuation-in-part of U.S. Application No. 16/047,106 filed on July 27, 2018, which is a continuation of U.S. Application No. 15/678,678 filed August 16, 2017, now U.S. Patent No. 10,062,464, all of which claim the benefit of United States Provisional Patent Application No. 62/375,928 filed on August 17, 2016 as well as United States Provisional Patent Application No. 62/491,678 filed on April 28, 2017.

### FIELD OF THE DISCLOSURE

**[0002]** The present disclosure relates generally to a housing which includes or incorporates tritium. More specifically, the present disclosure relates to a housing which encapsulates and protects a glass vial of tritium.

### BACKGROUND OF THE INVENTION

**[0003]** This section provides a general summary of background information and the comments and examples provided in this section are not necessarily prior art to the present disclosure.

**[0004]** Tritium is a radioactive isotope of hydrogen which can be used as a luminary device for watches, compasses, knives, guns, tools, and the like. For example, tritium is often incorporated into a sighting device for firearms, archery bows, or the like. However, tritium is not readily visible when the sighting device is utilized during the daytime. Accordingly, prior art sighting devices, such as those disclosed in U.S. Reissue Patent No. 35,347 to Trijicon, Inc., have made attempts to manually paint a white ring adjacent a first end of a tritium housing to add distinction and brightness to the tritium illumination during the daytime. However, such prior attempts are extremely labor intensive, especially when one considers that the white ring must be intricately painted around a housing that is only 2.0-2.5mm in width. Furthermore, any painted white ring is subject to wearing off, chipping, and even fading during continued use of the sighting device. Thus, other prior art sighting devices, such as those disclosed in US 7,562,486 to TruGlo, Inc., have made attempts to press or install a colored mounting ring over a first end of a tritium housing after the tritium housing has been inserted into a sighting device. Relatedly, other prior art tritium housings, such as those disclosed in WO 2016/124686 to MB-Microtec AG have made attempts to secure or arrange a separate colored ring body to a first end of a tritium housing prior to its placement within the sighting device. However, such prior attempts necessarily require additional manufacturing steps and parts (and thus expense) to incorporate and secure the colored rings to the tritium housing. Accordingly, there remains a continuing need for an improved tritium housing. Further prior art in the field of Tritium housings is provided in US Application No. 16/047,106 and US Patent No. 10,062,464.

### SUMMARY OF THE INVENTION

**[0005]** This section provides a general summary of the disclosure and is not intended to be a comprehensive disclosure of its full scope, aspects, objectives, and/or all of its features.

**[0006]** The present invention is provided by the appended claims. The following disclosure serves a better understanding of the present invention. The subject invention provides for a tritium housing including a body extending along an axis **A** from a first end to a second end to define a hollow extending therebetween. A lens is disposed adjacent and surrounded by the first end of the body and a sleeve is disposed within the hollow and extends from a closed end disposed adjacent the second end of the housing to an open end disposed adjacent the lens. A tritium vial is disposed within the sleeve to produce illumination that is visible through the lens. The body is comprised of a colored, plastic material for adding distinction and brightness to the tritium illumination during a daylight use of the tritium housing. In other words, since the first end of the body is directly visible to an environment of the housing and is comprised of the same colored, plastic material as the body, the first end of the body advantageously provides visible distinction to the tritium illumination without the need to include and secure additional components, such as a highlighting ring, to the first end of the housing, or require other process steps, such as painting or ink printing the first end, during the manufacture of the tritium housing. Accordingly, the subject tritium housing builds-in or incorporates magnification and illumination of the tritium vial which is otherwise not possible in the prior art tritium housings without additional components, manufacturing steps, and expense.

**[0007]** Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the present disclosure.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0008]** The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations, and are not intended to limit the scope of the present disclosure.

Figure 1 illustrates a perspective view of a first exemplary aspect of a housing which includes a body extending from a first end to a second end to define a hollow for receiving a tritium vial;

Figure 2 illustrates a side, cross-sectional view of the first exemplary aspect of the housing;

Figure 3 illustrates a top view of the first exemplary

aspect of the housing;
Figure 4 illustrates a first end view of the first exemplary aspect of the housing;
Figure 5 illustrates a perspective view of a second exemplary aspect of the housing including a flange integral with and extending from the first end of the body;
Figure 6 illustrates a side, cross-sectional view of the second exemplary aspect of the housing;
Figure 7 illustrates a top view of the second exemplary aspect of the housing;
Figure 8 illustrates a first end view of the second exemplary aspect of the housing;
Figure 9 illustrates a perspective view of a third exemplary aspect of the housing including a spherical lens extending outwardly from the first end of the body;
Figure 10 illustrates a side, cross-sectional view of the third exemplary aspect of the housing;
Figure 11 illustrates a top view of the third exemplary aspect of the housing;
Figure 12 illustrates a first end view of the third exemplary aspect of the housing;
Figure 13 illustrates a perspective view of a fourth exemplary aspect of the housing including a slot defined by the first end of the body for receiving a lens;
Figure 14 illustrates a side, cross-sectional view of the fourth exemplary aspect of the housing;
Figure 15 illustrates a top view of the fourth exemplary aspect of the housing;
Figure 16 illustrates a first end view of the fourth exemplary aspect of the housing;
Figure 17 illustrates a perspective view of a fifth exemplary aspect of the housing including a slit defined by the body and extending from the second end for allowing the tritium vial to be inserted through a side or top of the body;
Figure 18 illustrates a side view of the fifth exemplary aspect of the housing;
Figure 19 illustrates a top view of the first exemplary aspect of the housing;
Figure 20 illustrates a side, cross-sectional view of the fifth exemplary aspect of the housing;
Figure 21 illustrates a first end view of the fifth exemplary aspect of the housing;
Figure 22 illustrates a side, cross-sectional view of an embodiment of the housing including a sleeve disposed within the hollow for receiving the tritium vial and extending from a closed end disposed adjacent the first end of the body to an open end disposed adjacent the lens;
Figure 23 illustrates a top view of the embodiment of the housing;
Figure 24 illustrates a first end view of the embodiment of the housing illustrating the lens including a plurality of radially extending legs encased within the first end of the body and the flange;
Figure 25 illustrates a side, perspective view of another embodiment of the housing illustrating the lens having a plurality of radially extending legs encased within the first end and the flange of the housing as well as a slit extending from the second end; and
Figure 26 is a perspective view of the lens of the embodiments of the present invention illustrating the plurality of radially extending legs disposed equidistantly around the lens.

## DETAILED DESCRIPTION OF THE ENABLING EMBODIMENTS

**[0009]** Exemplary aspects not part of the present invention and example embodiments of a housing which includes or incorporates a tritium vial in accordance with the present disclosure will now be more fully described. Each of these example aspects and embodiments are provided so that this disclosure is thorough and fully conveys the scope of the inventive concepts, features and advantages to those skilled in the art. To this end, numerous specific details are set forth such as examples of specific components, devices and mechanisms associated with the housings to provide a thorough understanding of each of the exemplary aspects and embodiments associated with the present disclosure. However, as will be apparent to those skilled in the art, not all specific details described herein need to be employed, the exemplary aspects and example embodiments may be embodied in many different forms, and thus should not be construed or interpreted to limit the scope of the disclosure.

**[0010]** Figures 1-25 are views of a housing **10** in accordance with various aspects of the subject disclosure. As best shown therein, in each aspect the housing **10** includes a body **12** extending along an axis **A** from a first end **14** to a second end **16** to define a hollow **18** having an inner hollow surface **19** extending therebetween. In a preferred arrangement, the body **12** has a tubular shape and is approximately 10.5mm (+/- 10.0mm) in width and approximately 10.5 mm (+/- 10.0mm) in length. However, other shapes and sizes could be utilized without departing from the scope of the subject disclosure. The housing **10** includes a lens **20** that is preferably integral with and surrounded by the body **12** next adjacent the first end **14.** A glass vial of tritium **22** is disposed within the hollow **18** and is visible by a user through the lens portion **20.** In a preferred arrangement, the lens **20** is comprised of a transparent or translucent material, such as an injection molded plastic, for allowing illumination produced by the tritium vial **22** to be viewable by the user through the lens **20.** However, the lens **20** could also be comprised of glass, sapphire, mineral, silicone, or other type of lens material without departing from the subject disclosure. As will be appreciated by the aforementioned disclosure, when the housing **10** is incorporated into a device, such as a watch, compass, knife, gun, tool, and the like, the tritium vial **22** provides aesthetic benefits for the device by illuminating a portion of the device and allowing a user

to see the device at all times.

**[0011]** In a preferred arrangement, the body **12** is micro-molded with the lens **20** to establish the integral relationship therebetween. However, when the lens **20** is comprised of glass, the body portion **12** could alternatively be molded around the lens portion **20,** or integrally connected with the lens **20** through any other well-known connection means, such as adhesive bonding, heat sealing, fusing, press-fitting, clamping, or fastening, without departing from the scope of the subject disclosure. In either arrangement, the first end **14** of the body **12** is not obstructed by the lens **20** (or covered by any other components or materials), and thus is directly visible by a user and exposed to the environment of the housing **10** when incorporated into the respective device. As best illustrated in Figures 22-26, in a further preferred arrangement, the lens **20** includes a plurality of radially extending legs **23** which are encased within the first end **14** of the body **12** after the micro-molding, molding, or other suitable manufacturing process. The plurality of radially extending legs **23** are preferably disposed equidistantly around the lens **20.** For example, as best illustrated in Figures 24 and 26, four radially extending legs **23** can be equidistantly spaced around the lens **20,** and thus also equidistantly spaced around the axis **A.** However, any number of radially extending legs **23** could be utilized without departing from the scope of the subject disclosure. In any arrangement, the plurality of radially extending legs **23** improves the stability and manufacturability of the integral relationship or connection between the body **12** and the lens **20.**

**[0012]** The body **12** is comprised of a colored, plastic material, such as a polycarbonate, nylon, or the like, for providing distinction and brightness to the tritium illumination during a daylight use of the tritium housing **10.** Accordingly, the first end **14** of the body **12,** which is also comprised of the same colored, plastic material and directly visible by a user and exposed to the environment of the housing (i.e., not covered by additional components such as rings or painted or printed over by inks) provides a less expensive and more robust approach to magnifying and brightening the tritium illumination during a daylight application of the housing **10** relative to the prior art designs. In a preferred embodiment, the body **12** is comprised of a white, green, yellow, orange, pink, or purple colored material. However, other colors could be utilized without departing from the scope of the subject disclosure. In an even more preferred embodiment, the body **12** is also comprised of a phosphorescent, colored plastic material to provide an additional glowing effect to the illumination produced by the tritium vial **22.**

**[0013]** As previously discussed, any tritium **22** incorporated into the housing **10** is often provided in a glass vial and thus susceptible to damage and/or breakage. However, tritium is a radioactive isotope of hydrogen and thus the use of tritium in products is closely regulated by the various U.S. governmental agencies to protect the health and safety of the public and the environment. Toward that end, the use and incorporation of the tritium glass vials into products must sufficiently establish that the tritium vials are adequately protected from damage or breakage during their regular and everyday use. Absent such proof, the use and incorporation of tritium glass vials into said products is simply not permitted by the various U.S. governmental agencies. The disposal of the tritium glass vials **22** within a housing **10** having a plastic body **12** allows the body **12** to provide protection from such damage and/or breakage and meet these strict governmental regulations.

**[0014]** As best illustrated in Figures 22-23, in an embodiment of the present invention, a sleeve **25** is disposed within the hollow **15** and extends from a closed end **26** disposed adjacent the second end **16** of the housing **10** to an open end **27** disposed adjacent the first end **14** of the body **12** and the lens **20.** The tritium vial **22** is disposed within the sleeve **25** to provide further protection of the tritium vial **22** from damage and breakage within the housing **10.** The packaging of the tritium vial **22** within the sleeve **25** also provides further protection for the tritium sleeve **22** before insertion into the housing **10,** and allows the sleeve **25** and tritium vial **22** to be inserted into the housing **10** as one, unitary package. Put another way, the sleeve **25** provides additional protection for the tritium vial **22** from breakage and/or damage during transport and storage prior to its use and incorporation into the housing **10,** and also improves manufacturability of the housing **10** by simplifying the process. Additionally, even though the tritium vial **22** is disposed within the sleeve **25,** the open end **27** of the sleeve **25** does not obstruct the tritium vial **22** and still allows the illumination produced by the tritium vial **22** to be directly visible by a user through the lens **20.** In a preferred arrangement, the sleeve **25** is comprised of a white, injection molded or extruded, plastic material for providing brightness to this tritium illumination, as well as distinction to the body **12,** when comprised of a green, yellow, orange, pink, purple, blue or red colored material. As best illustrated in Figures 22 and 23, the closed end **26** of the sleeve **25** includes an air hole **30,** preferably aligned along the axis **A,** to allow the sleeve **25** to breathe once the tritium vial **22** is placed therein, both before and after assembly into the housing **10.**

**[0015]** Furthermore, as best shown in Figure 2-3, 6-7, 10-11, 14-15, and 22-23 in an aspect, the second end **16** of the body portion **12** can include an adhesive **24** to encapsulate the tritium vials **22** or the sleeve **25** within the hollow **18** and maintain and secure the tritium vials **22** or sleeve **25** placement within and longitudinally along the housing **10.** Thus, the placement and securement of the glass tritium vial **22** - or the sleeve **25** which includes the tritium vial **22** - between the first and second ends **14, 16** of the housing encapsulates the tritium vials **22** within the hollow **18** and further serves to protect the tritium vials **22** from impact, chemicals, water, or other environmental conditions of the housing **10** which could otherwise damage or break the tritium vial **22.** Put another

way, the housing **10** nests or embeds the tritium vials **22** within its hollow **18,** which can then be secured between the first and second ends **14, 16** to effectively isolate or reduce exposure of the tritium vials **22** to various environmental impacts encountered by the housing **10.** Thus, the housing **10** helps facilitate the meeting of the necessary requirements of the U.S. governmental organizations to incorporate tritium into a number of devices.

**[0016]** With reference to Figures 1-8 and 13-21, the lens **20** could be comprised of a circular, glass or plastic, disk, i.e., hockey puck shaped, which is preferably disposed flush with a first end **14** of the housing **10.** However, as best illustrated in Figures 9-12, in an alternative arrangement the lens **20** could also be comprised of a spherical, glass or plastic, lens **20'** which extends outwardly from a first end **14** of the housing **10** to improve the optics of the illumination produced by the tritium vial **22** disposed within the housing **10.** For example, the spherical lens **20'** allows the illumination produced by the tritium vial **22** to be viewable by the user from a wider range of angles relative to the first end **14** when the housing **10** is incorporated into its respective device. Additionally, because the spherical lens **20'** has a larger viewable surface area than the circular, disk lens **20,** the use of the spherical lens **20'** facilitates the use of a smaller vial of tritium **22** to be used within the housing **10** because the spherical lens **20'** leads to more viewable illumination than that produced by a circular lens **20.** As further illustrated in Figures 22-23 and 26, in a further alternative arrangement, the lens **20** could also be comprised of a hemispherical, glass or plastic, lens **20"** which includes a spherical face **33** that extends outwardly from the first end **14** of the housing **10** and a planar face **34,** disposed in axially opposite relationship with the spherical face **33,** and in adjacent relationship with the tritium vial **22.** When the housing **10** includes a sleeve **25,** the planar face **34** is also disposed in adjacent and facing relationship with the open end **27** of the sleeve **25.** The hemispherical lens **20"** provides space and packaging advantages for incorporating the tritium vial **22** or sleeve **25** into the hollow **18** of the housing **10** while still allowing the spherical face **33** to improve the optics of the illumination produced by the tritium vial **22** disposed within the housing **10.**

**[0017]** As best illustrated in Figures 5-25, in a preferred arrangement, the housing **10** includes a flange **28** which is integral with the body **12** and extends radially outwardly from the first end **14** for use in facilitating placement of the housing **10** within the respective device. In other words, the body **12** is a monolithic structure inclusive of the first end **14** and the flange **28** extending radially therefrom. If the housing **10** is to be incorporated into a sighting device, the sighting device can include an orifice for receiving a tritium vial, with the orifice often being stepped to define at least one shoulder. Accordingly, the flange **28** advantageously mates with the corresponding shoulder of the sighting device to facilitate easy and reliable placement of the housing **10** within the gun sight cavity, preferably placing the lens **20** flush with an exterior surface of the sighting device. Similar results would stem from incorporation of the housing **10** into any other devices, such as a thumb stud of a knife, which also can define an orifice which is stepped to define at least one shoulder. Since the flange **28** is integral with the body, the flange **28** is also comprised of the same, colored plastic material and thus provides a larger visible colored surface of the first end **14** for further distinction and brightness to the illumination produced by the tritium vial **22.** As best illustrated in Figures 22-25, when the body **12** includes a flange **28,** the plurality of radially extending legs **23** associated with the lens **20** extend into and are encased with both the first end **14** of the body **12** and the flange **28.**

**[0018]** As best illustrated in Figures 13-16, in an alternative arrangement, the flange **28** of the housing **10** can define a slot **30** or side opening for receiving the circular disk lens **20.** However, if the housing **10** does not include a flange **28,** the first end **14** of the body portion **12** could define the slot **30.** In either arrangement, the circular disk lens **20** can be slid through the slot **30** to enclose the hollow **18.** Once the circular disk lens **20** is in place, the slot **30** can be closed, such as through glue, or the like, to secure the circular disk lens **20** within the housing **10** and secure the tritium vial **22** within the hollow **18** defined by the body **12.**

**[0019]** As best illustrated in Figures 17-21, in an alternative arrangement, the body **12** defines a slit **32** extending from the second end **16** for allowing the tritium vial **22** to be inserted into the hollow **18** through a side or top of the housing **10** instead of through the second end **16** of the housing **10,** as required by each of the other aspects. As previously mentioned, in an aspect, the body **12** and flange **28** of the housing **10** are over-molded to the lens portion **20.** Thus, it can sometimes be difficult to insert the tritium vial **22** through an opening provided in the second end **16** of the housing **10.** The slit **32** advantageously provides for an easier insertion of the tritium vial **22** into the hollow **18,** namely through the top or side of the housing **10.** Additionally, the slit **32** allows for the insertion of the tritium vial **22** to more easily be automated, namely because insertion of the tritium vial **22** through the top or side of the housing provides for a relatively hands-off procedure. As illustrated in Figure 25, in an alternative arrangement, the housing **10** can include the slit **32** extending from the second end **16** of the body **12** as well as the lens **20** having a plurality of radially extending legs **23** encased with the first end of the body **12** and the flange **28.** Although not expressly illustrated, when the housing **10** includes the sleeve **25,** the slit **32** allows the sleeve **25** to be inserted into the hollow **18** through a side or top of the housing **10** instead of through the second end **16** of the housing **10,** as required by the other aspects illustrated in Figures 22-23.

**[0020]** As described previously, in accordance with the other aspects, the tritium vial **22** is secured between the first and second ends **14, 16** by placing adhesive **24,** bonding material, or the like within the hollow **18** through

the second end **16.** However, the adhesive **24** or bonding material can end up displaced out of the second end **16** of the housing, or even disposed between the lens portion **20** and the tritium vial **22** after assembly, thus reducing or blocking some of the viewable illumination produced by the tritium vial **22.** Accordingly, as best illustrated in Figures 1-2, 5-6, 9-10, 13-14, and 22-23, the body **12** can define at least one weep hole **34** disposed adjacent the first end **14** and in fluid communication with the hollow **18** for providing an area for excess adhesive **24** to escape and correspondingly prevent build-up of adhesive **24** between the lens **20** and tritium vial **22.** In a preferred arrangement, the at least one weep hole **34** includes a plurality of weep holes **34** disposed in spaced relationship circumferentially along the body **12** adjacent the first end **14.**

**[0021]** With reference to Figures 17-21 and 25, the slit **32** does not require the incorporation of weep holes **34** into the body as the slit **32** allows a first layer of the adhesive **24** or bonding material to be placed along the inner hollow surface **19** of the housing **22** before laying the tritium vial **22** inside the hollow **18.** Accordingly, the tritium vial **22** - or the sleeve **25** which includes the tritium **22** - does not displace or force adhesive **24** out of the second end **16** of the housing or between the lens **20** and the tritium vial **22** - or the sleeve **25** - when it is laid over-top of the first layer of adhesive **24.** The slit **32** also allows another second layer of adhesive **24'** or bonding material to be placed over the tritium vial **22** - or the sleeve **25** - and extending along the slit **32** once the tritium vial **22** - or the sleeve **25** - is disposed within the hollow **18.** Accordingly, the slit **32** provides an improved method of securing the tritium vial **22** within the hollow **18** which avoids adhesive ending up between the lens portion **20** and the tritium vial **22** without the need to employ weep holes in the body **12** of the housing **10.**

**[0022]** In any of the aforementioned aspects, the adhesive **24, 24'** or bonding material can be comprised of a reflective material to provide brighter illumination through the lens portion **20.** In other words, a reflective adhesive **24, 24'** or bonding material can provide superior tritium illumination output and improve visibility of the tritium housing **10** during both day and nighttime conditions.

**[0023]** The foregoing description of the exemplary aspects and embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and can be used in a selected embodiment, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the disclosure, and all such modifications are intended to be included within the disclosure.

## Claims

**1.** A tritium housing (10), comprising:

a body (12) extending along an axis **A** from a first end (14) to a second end (16) to define a hollow extending therebetween;
a lens (20") disposed adjacent and surrounded by said first end (14) of said body (12);
a tritium vial (22) disposed within said housing (10) to produce illumination visible through said lens (20"); and
said lens (20") being hemispherical and including a spherical face extending outwardly from said first end (14) of said body (12) for allowing said tritium illumination to be viewable from a wider range of angles defined relative to said first end (14) of said body (12) and a planar face disposed in axially opposing relationship with said spherical face and adjacent said tritium vial (22).

**2.** A tritium housing (10) as set forth in claim 1, wherein said lens (20") includes a plurality of radially extending legs (23) encased within said first end (14) of said body (12).

**3.** A tritium housing (10) as set forth in claim 2, wherein said plurality of radially extending legs (23) are disposed equidistantly around said lens (20").

**4.** A tritium housing (10) as set forth in claim 1, wherein said housing (10) defines a slit (32) extending from said first end for allowing the tritium vial (22) to be inserted into said hollow.

**5.** A tritium housing (10) as set forth in claim 4, further comprising a sleeve (25) disposed within said hollow and extending from a closed end disposed adjacent said second end (16) of said housing (10) to an open end disposed adjacent said planar face of said lens (20"), and wherein said tritium vial (22) is disposed within said sleeve (25).

**6.** A tritium housing as set forth in claim 5, wherein said sleeve (25) is comprised of a white plastic material, and said body is comprised of a green, yellow, orange, pink, purple, blue or red colored plastic material for magnifying and brightening said tritium illumination during a daylight use of said tritium housing (10).

FIG. 1

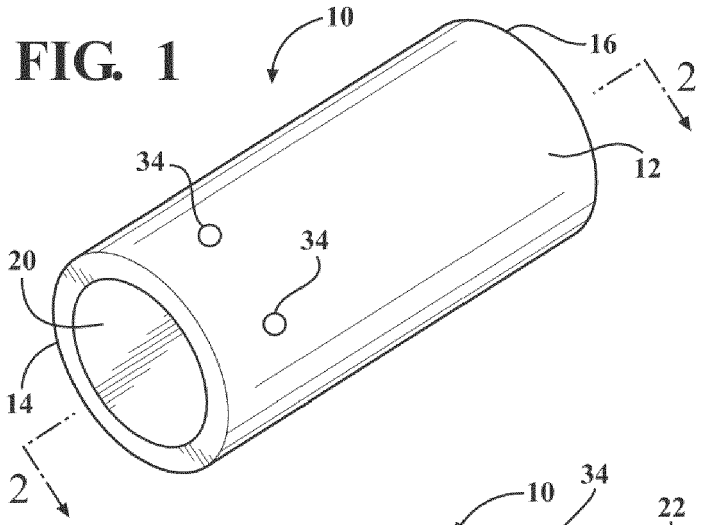



FIG. 2

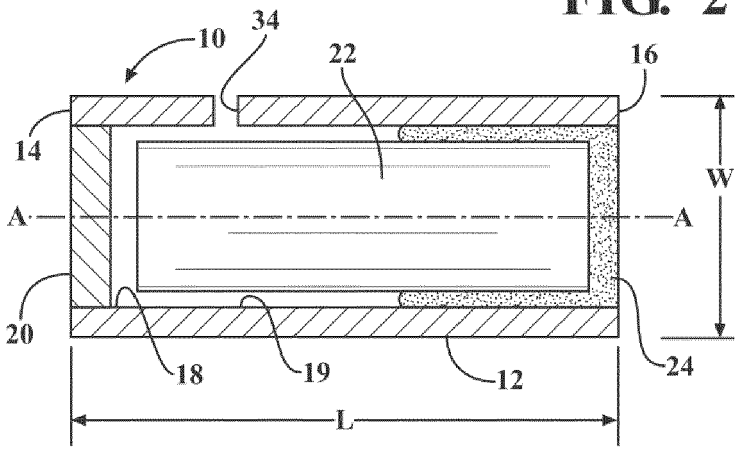



FIG. 3

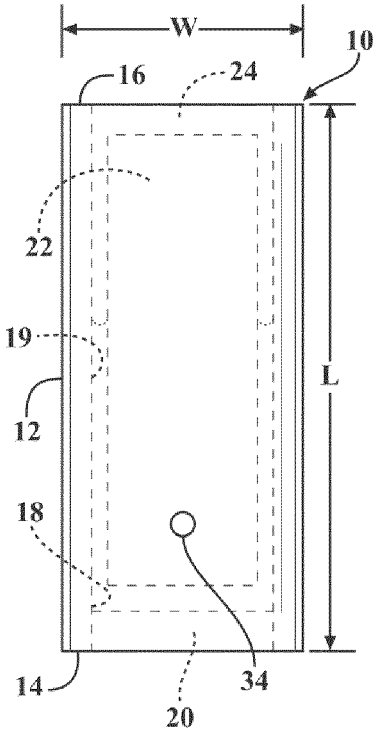



FIG. 4

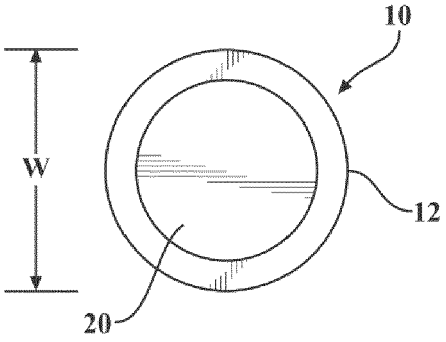


FIG. 5

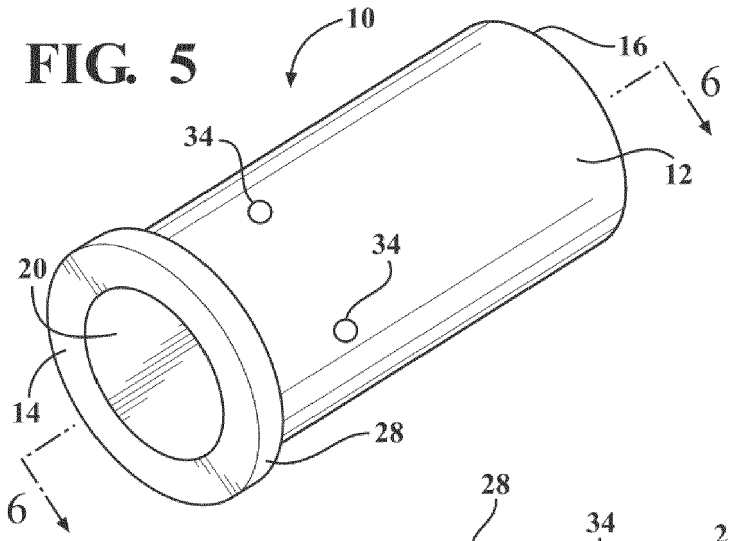



FIG. 6

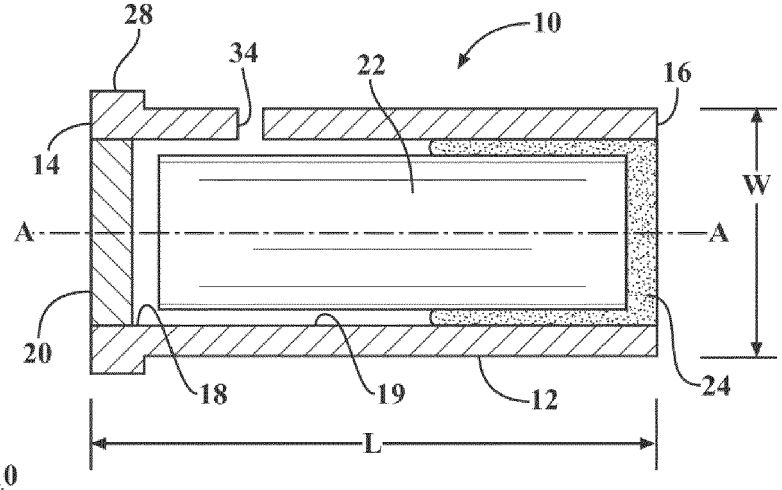



FIG. 7

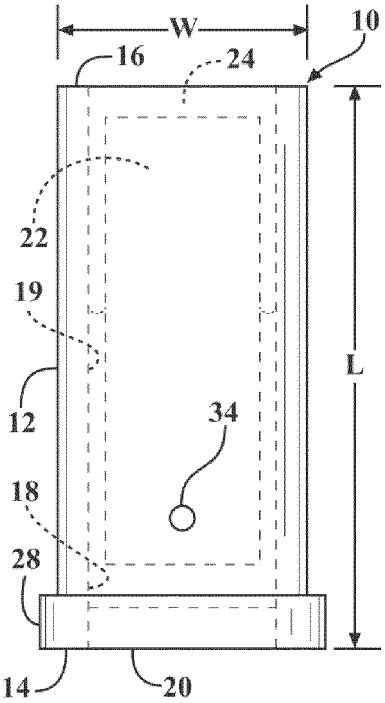



FIG. 8

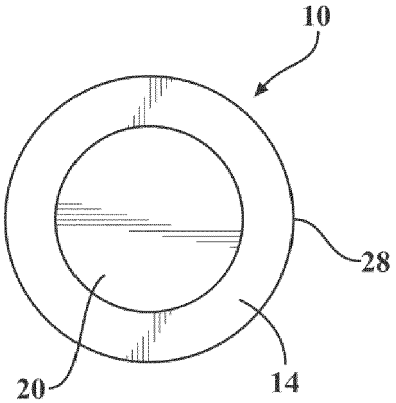


FIG. 9

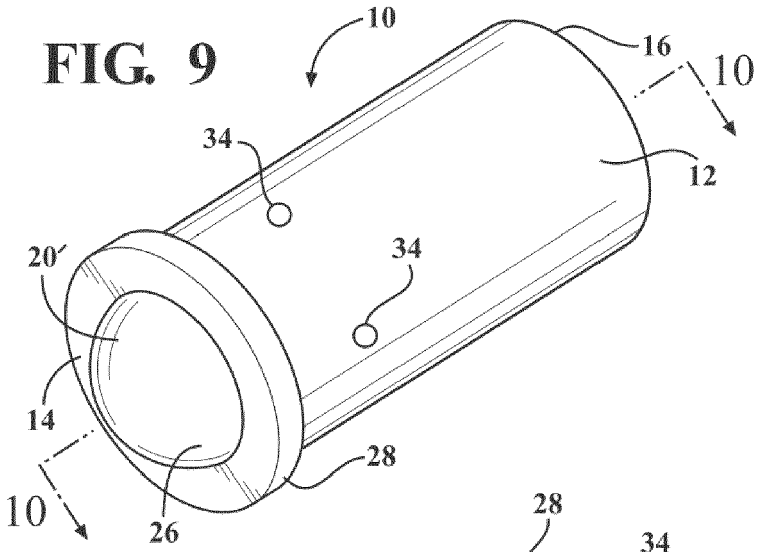
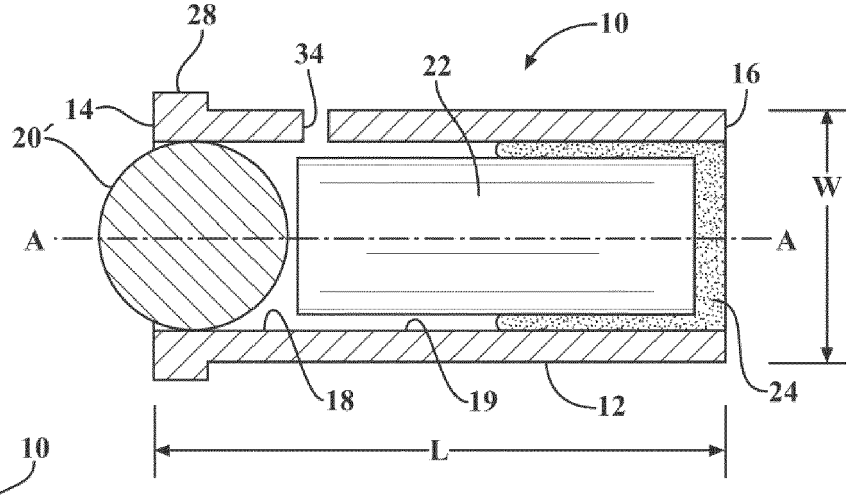



FIG. 10



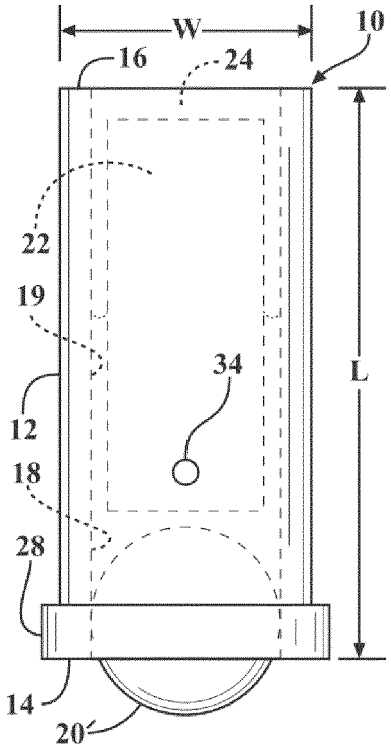




FIG. 11

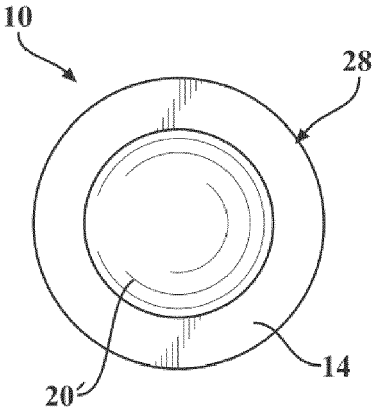



FIG. 12

FIG. 13

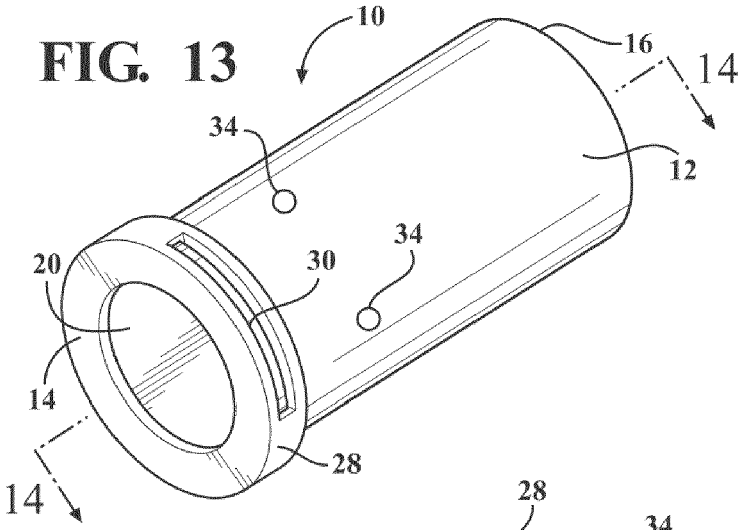
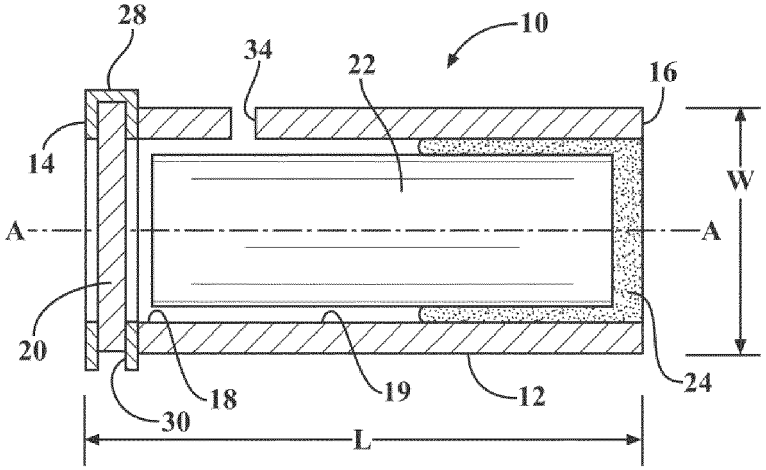



FIG. 14



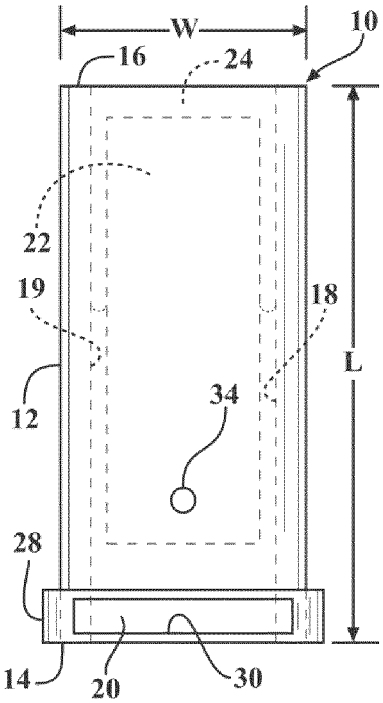




FIG. 15

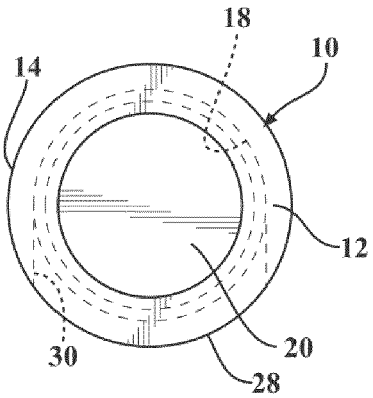



FIG. 16

FIG. 17

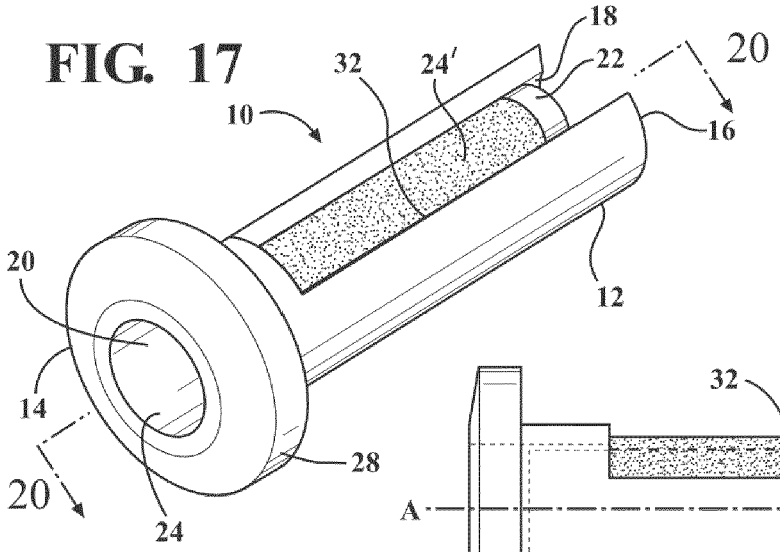
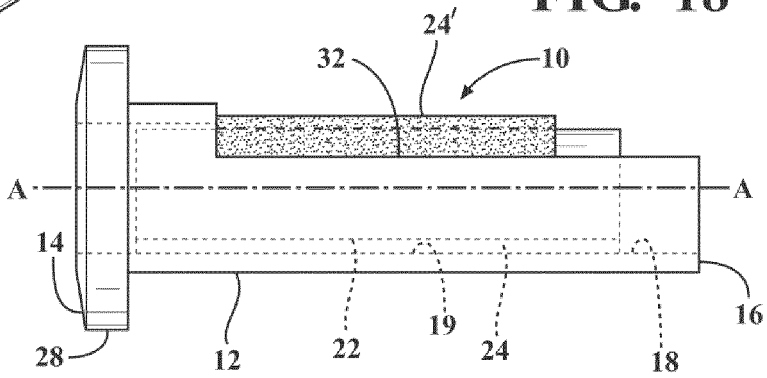



FIG. 18



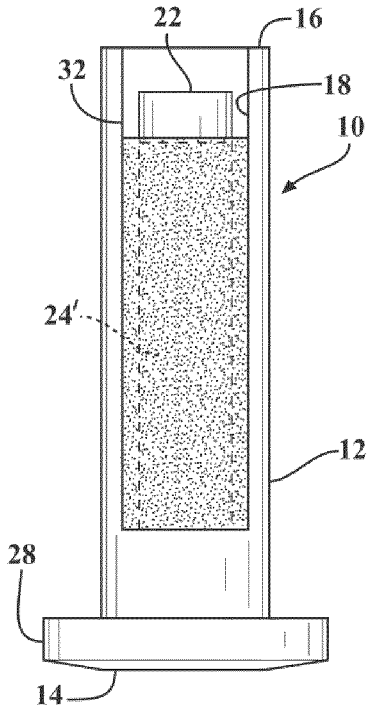




FIG. 19

FIG. 20

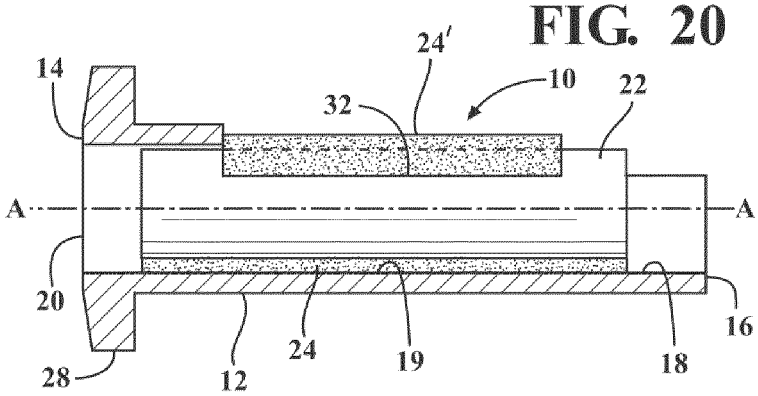



FIG. 21

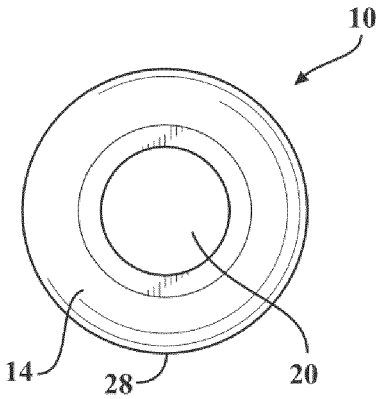
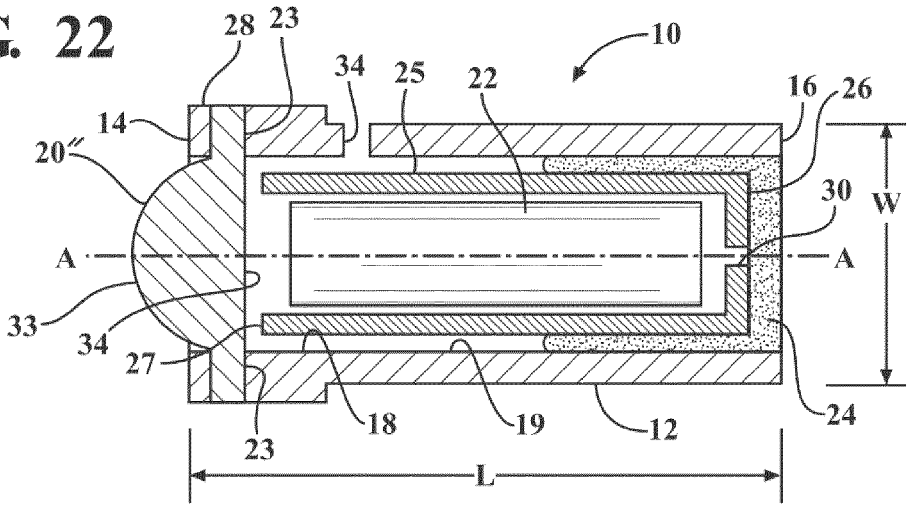


FIG. 22



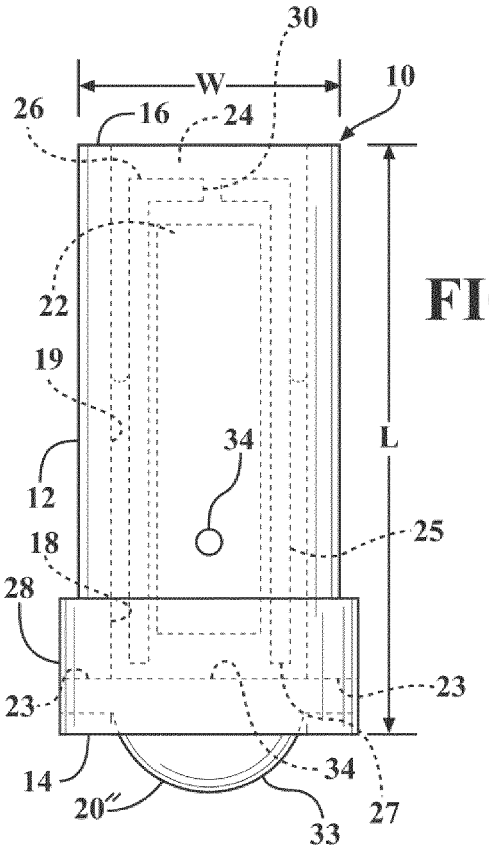




FIG. 23

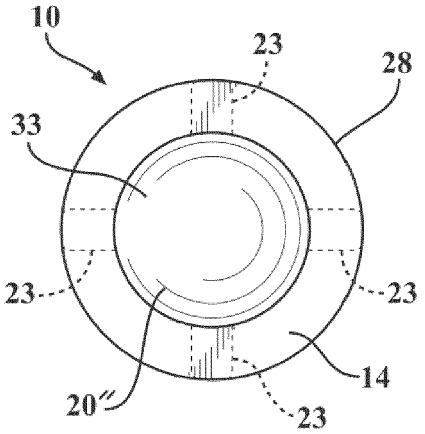



FIG. 24

FIG. 25

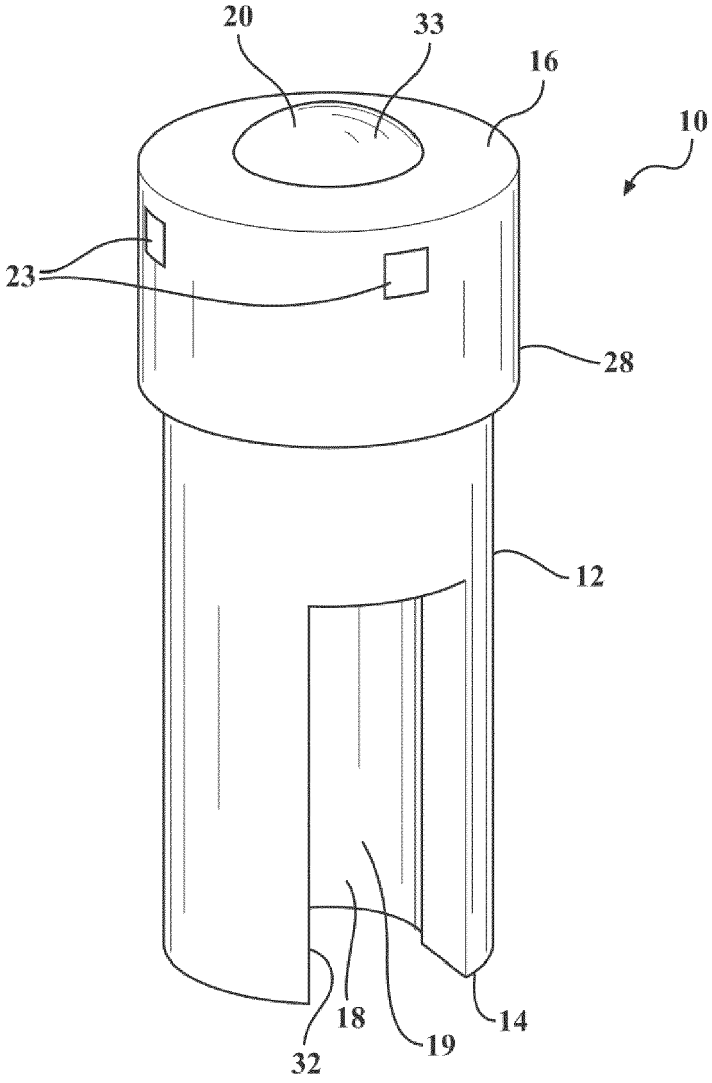
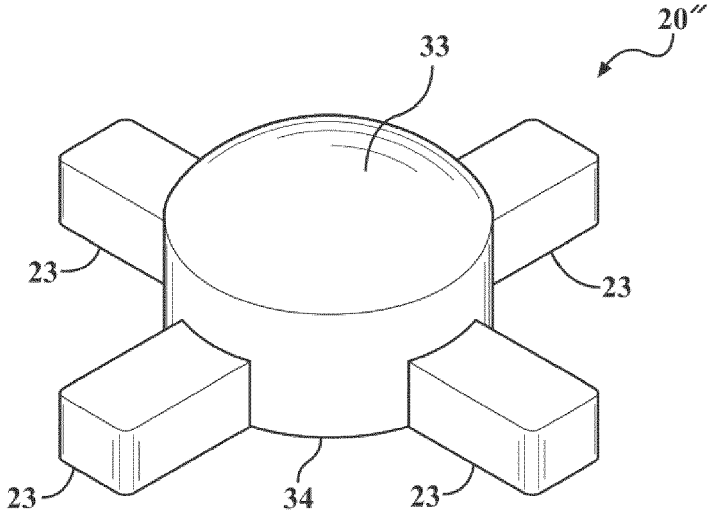



FIG. 26



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Application Number
EP 20 21 2998

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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
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| X<br>A | US 2017/246749 A1 (KARCHON CHRISTOPHER J [US] ET AL) 31 August 2017 (2017-08-31)<br>* paragraphs [0035] - [0056]; figures 1-17 *<br>----- | 1<br>2-6 | INV.<br>F41G1/34 |
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F41G

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
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| The Hague | 16 March 2021 | Kasten, Klaus |

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