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(54) Title: BATTERY DOOR ASSEMBLY FOR A BATTERY COMPARTMENT WITHIN A NIGHT VISION DEVICE

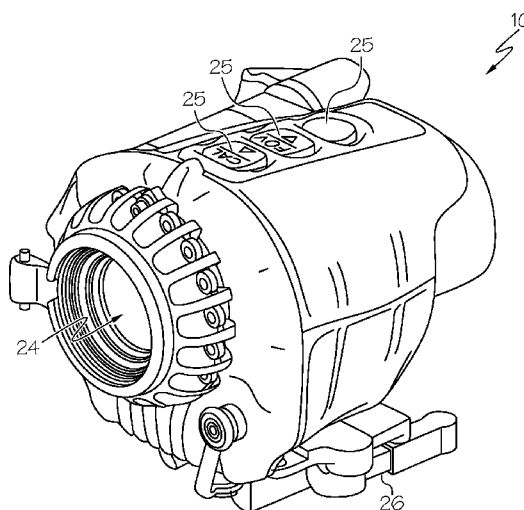


FIG. 1

(57) Abstract: A battery door assembly for a battery compartment is disclosed. The battery door assembly includes a battery cover, glide track, a spring-loaded button, a locking tab and a set of hinges. The set of hinges is pivotally connected to a chassis of a scope. The locking tab keeps the battery cover from opening. The battery cover can be unlocked by first applying pressure on the spring-loaded button, and then sliding the spring-loaded button and the locking tab from one end of the glide track to another end of the glide track while maintaining the applied pressure on the spring-loaded button.



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BATTERY DOOR ASSEMBLY FOR A BATTERY COMPARTMENT
WITHIN A NIGHT VISION DEVICE

TECHNICAL FIELD

[0001] The present disclosure relates to battery door assemblies in general, and in particular to a battery door assembly for a battery compartment within a night vision device.

BACKGROUND

[0002] Night vision devices, also known as image enhancement devices, are optical instruments that allow images to be produced in very low light levels to the point of approaching total darkness. Night vision devices typically include image intensifier tubes and various optics that convert infrared and near infrared light into viewable images. Night vision devices are commonly used by military personnel for conducting operations in low-light conditions.

[0003] Night vision devices can be divided into three broad categories, namely, scopes, goggles and cameras. Scopes, which can be hand-held or mounted on a weapon, are typically monocular having one eye-piece. Goggles, which can be hand-held or worn on the head, are typically binoculars having two eye-pieces and can be integrated with a helmet. Cameras are often permanently mounted on wherever night vision is desired, including buildings and/or properties.

[0004] From a practical standpoint, night vision devices are typically designed to be operated by batteries. As such, night vision devices have to be equipped with a battery compartment for holding one or more batteries, and the battery compartment typically comes with a battery door with a latch to keep the battery door from accidentally opening. A majority of battery door latches designed for military applications must meet certain requirements, such as small, light weight, low cost, etc.

[0005] The present disclosure provides an improved battery door assembly for night vision scopes.

SUMMARY

[0006] In accordance with one embodiment of the present disclosure, a battery door assembly includes a battery cover, glide track, a spring-loaded button, a locking tab and a set of hinges. The set of hinges is pivotally connected to a chassis of a scope. The locking tab keeps the battery cover from opening. The battery cover can be unlocked by first applying pressure on the spring-loaded button, and then sliding the spring-loaded button and the locking tab from one end of the glide track to another end of the glide track while maintaining the applied pressure on the spring-loaded button.

[0007] The features and advantages described herein are not all-inclusive and, in particular, many additional features and advantages will be apparent to one of ordinary skill in the art in view of the drawings, specification and claims. Moreover, it should be noted that the language used in the specification has been selected principally for readability and instructional purposes and not to limit the scope of the inventive subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention itself, as well as its modes of use, further objects, and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

[0009] Figure 1 is an isometric view of a night vision scope in which a battery door assembly, according to one embodiment of the present disclosure, can be incorporated;

[0010] Figure 2 is an exploded view of the night vision scope from Figure 1;

[0011] Figure 3A is a top view of a battery door assembly on the night vision scope from Figure 1, according to one embodiment;

[0012] Figure 3B is a cross-section view of the battery door assembly from Figure 3A, according to one embodiment;

[0013] Figures 4A-4B are isometric views of the battery door assembly from Figure 3A, according to one embodiment;

[0014] Figures 5A-5C are top views of the battery door assembly from Figure 3A having a spring-loaded button at various locations; and

[0015] Figures 6A-6C are cross-section views of the battery door assembly from Figures 5A-5C, respectively.

DETAILED DESCRIPTION

[0016] Referring now to the drawings and in particular to Figure 1, there is illustrated an isometric view of a night vision scope in which a battery door assembly, according to one embodiment of the present disclosure, can be incorporated. As shown, a night vision scope 10 includes a lens 24, multiple control buttons 25 and a clamping mechanism 26. Lens 24 is for receiving light signals. Control buttons 25 are for controlling various viewing functions such as field-of-view, focus, etc. Clamping mechanism 26 is for mounting night vision device 10 onto a rail system of a firearm (not shown). Common rail systems include a Picatinny rail system and a Weaver rail system.

[0017] With reference now to Figure 2, there is illustrated an exploded view of night vision scope 10, according to one embodiment. As shown, night vision scope 10 includes a front-end optical module 21, a control module 22 and a back-end optical module 23. Front-end optical module 21 includes lens 24, an image sensor device 28 and various electronic components. Control buttons 25 for controlling the various electronic components are located on control module 22. Control module 22 also includes a battery door assembly 30 along with a battery compartment (not shown) for storing batteries that are essential for the normal operations of night vision scope 10. Back-end optical module 23 includes an eye piece 27.

[0018] Referring now to Figure 3A, there is illustrated a top view of battery door assembly 30 for the battery compartment located on control module 22 (from Figure 2), according to one embodiment. As shown in Figure 3A, a battery door assembly 30 includes a battery cover 31, a spring-loaded button 32, and a locking tab 33. Battery cover 31 includes a pair of hinges 34 and a curved glide track (path) 35. Battery cover 31 is pivotally connected to the chassis of control module 22 via hinges 34. Curved glide track 35 is made up of the inside vertical surface of battery cover 31. The curvature of curved glide track 35 is approximately 20° radian in one example. Spring-loaded button 32 and locking tab 33 rest within curved glide track 35.

Batteries, which supply electrical power to the electronics of control module **22**, are located inside the battery compartment (not shown) directly underneath battery cover **31**.

[0019] Referring now to Figure **3B**, there is illustrated a cross-section view of battery door assembly **30** in Figure **3A** along lines A-A, according to one embodiment. As shown, spring-loaded button **32** is connected to a T-shaped pressed-in insert **41** having a head wider than its body. Spring-loaded button **32** is also slidably connected to locking tab **33** via a spring **43** such as a wave spring. Locking tab **33** includes latch feet **45** that engage glide track **35** located on the inside vertical surface of battery cover **31**, which keep spring-loaded button **32** and locking tab **33** attached to battery cover **31** at all times. The shape of latch feet **45** are such that they follow the radius of glide track **35** in order to provide consistent engagement with battery cover **31**. The head of pressed-in insert **41** is shown to be located on top of a locking channel **44**.

[0020] With reference now to Figures **4A-4B**, there are illustrated two isometric views of battery door assembly **30**, according to one embodiment. In Figure **4A**, battery door assembly **30** is shown to be in a closed and locked position. In this closed and locked position, spring-loaded button **32** and locking tab **33** are prevented from moving towards the other end of glide track **35** (with word OPEN). In addition, locking tab **33** engages a slot or tab (not shown) located on control module **22** to prevent battery cover **31** from flipping open. In order to unlock battery cover **31**, an operator may apply pressure (push) on spring-loaded button **32** via a thumb or finger, and then slides spring-loaded button **32** and locking tab **33** towards the other end of glide track **35** while maintaining pressure on spring-loaded button **32**. The applied pressure for operating spring-loaded button **32** is, in one example, approximately 4 pounds. After spring-loaded button **32** and locking tab **33** have been placed at the other end of glide track **35**, battery cover **31** is in an unlocked position, as shown in Figure **4B**, such that locking tab **33** is clear of the slot or tab located on control module **22**, allowing the operator to flip open battery cover **31** in order to install or replace batteries located inside the battery compartment (not shown).

[0021] Figures **5A-5C** are top views of battery door assembly **30** having spring-loaded button **32** placed at various locations on battery cover **31**, and Figures **6A-6C** are cross-section views of battery door assembly **30** from Figures **5A-5C**, respectively. Figures **5A** and **6A** show battery cover **31** being in a closed position, and spring-loaded button **32** being in an "unpressed" state (*i.e.*, not depressed), with the head of insert **41** engaged in a circular feature **47** at the end of a blocking shelf **42**. In this "unpressed" state, spring **43** is uncompressed, insert **41** along with

spring-loaded button **32** and locking tab **33** are prevented from moving along glide track **35** by blocking shelf **42**.

[0022] Figures **5B** and **6B** show that spring-loaded button **32** has been depressed, which compresses spring **43**, and the head of insert **41** moves below blocking shelf **42** and into a channel **44**. After the head of insert **41** has been placed in channel **44**, insert **41** along with spring-loaded button **32** and locking tab **33** are allowed to freely slide along glide track **35** towards an unlock position. At this point, battery cover **31** falls between the locked position and unlocked position.

[0023] Figures **5C** and **6C** show that battery cover **31** in the unlock position, with insert **41** being engaged with a circular feature **47** on the opposite side of blocking shelf **42** shown in Figure **6A**. Spring-loaded button **32** is not pressed in Figure **6C**, and thus spring **43** is uncompressed. At this point, battery cover **31** can be flipped opened. After batteries have been inserted or replaced, spring-loaded button **32** can be depressed, allowing insert **41** along with spring-loaded button **32** and locking tab **33** to be slid back to the locked position, as shown in Figures **5A** and **6A**, where insert **41** will engage its locking feature.

[0024] Channel **44** is open on both ends, which allows any dirt or debris that may be trapped in channel **44** to be pushed out of the way by the head of insert **41** when spring-loaded button **31** is depressed and slid along glide track **34**. In essence, the openings serve as a self-cleaning mechanism for channel **44**.

[0025] As has been described, the present disclosure provides an improved battery door assembly for a battery compartment within a night vision scope.

[0026] While the invention has been particularly shown and described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.

CLAIMS

What is claimed is:

1. A battery door assembly comprising:
 - a battery cover;
 - a curved glide track;
 - a spring-loaded button configured to be slid along said curved glide track;
 - a locking tab for preventing said battery door from being flipped open; and
 - a plurality of hinges pivotally connected to a battery compartment, wherein said battery door is configured to be unlocked by applying pressure on said spring-loaded button, and then sliding said spring-loaded button and said locking tab from a first end of said glide track to a second end of said glide track while maintaining said applied pressure on said spring-loaded button.
2. The battery door assembly of Claim 1, wherein said curved glide track is made up of an inside vertical surface of said battery cover, and said locking tab includes latch feet that engage said curved glide track.
3. The battery door assembly of Claim 1, wherein said curved glide track is approximately 20° radian.
4. The battery door assembly of Claim 1, wherein said applied pressure on said spring-loaded button is approximately 4 pounds.
5. The battery door assembly of Claim 1, wherein said battery door assembly is integrated within a night vision device.
6. The battery door assembly of Claim 1, wherein said spring-loaded button is slidably connected to said locking tab via a wave spring.

7. The battery door assembly of Claim 1, wherein said spring-loaded button is connected to a T-shaped insert.

8. The battery door assembly of Claim 7, wherein said T-shaped insert is located in a blocking shelf when said spring-loaded button is located in said first end of said glide track.

9. The battery door assembly of Claim 7, wherein said T-shaped insert is located in a blocking shelf when said spring-loaded button is located in said second end of said glide track.

10. The battery door assembly of Claim 7, wherein said T-shaped insert is located in a channel when said spring-loaded button is located between said first and second ends of said glide track.

11. A night vision device comprising:

an optical module having a lens; and

a control module having a battery compartment and a battery door assembly, wherein said battery door assembly includes

a battery cover;

a curved glide track;

a spring-loaded button configured to be slid along said curved glide track;

a locking tab for preventing said battery door from being flipped open; and

a plurality of hinges pivotally connected to said battery compartment, wherein said battery door is configured to be unlocked by applying pressure on said spring-loaded button, and then sliding said spring-loaded button and said locking tab from a first end of said glide track to a

second end of said glide track while maintaining said applied pressure on said spring-loaded button.

12. The night vision device of Claim 11, wherein said curved glide track is made up of an inside vertical surface of said battery cover.

13. The night vision device of Claim 11, wherein said curved glide track is approximately 20° radian.

14. The night vision device of Claim 11, wherein said applied pressure on said spring-loaded button is approximately 4 pounds.

15. The night vision device of Claim 11, wherein said locking tab includes latch feet that engage said curved glide track.

16. The night vision device of Claim 11, wherein said spring-loaded button is slidably connected to said locking tab via a wave spring.

17. The night vision device of Claim 11, wherein said spring-loaded button is connected to a T-shaped insert.

18. The night vision device of Claim 17, wherein said T-shaped insert is located in a blocking shelf when said spring-loaded button is located in said first end of said glide track.

19. The night vision device of Claim 17, wherein said T-shaped insert is located in a blocking shelf when said spring-loaded button is located in said second end of said glide track.

20. The night vision device of Claim 17, wherein said T-shaped insert is located in a channel when said spring-loaded button is located between said first and second ends of said glide track.

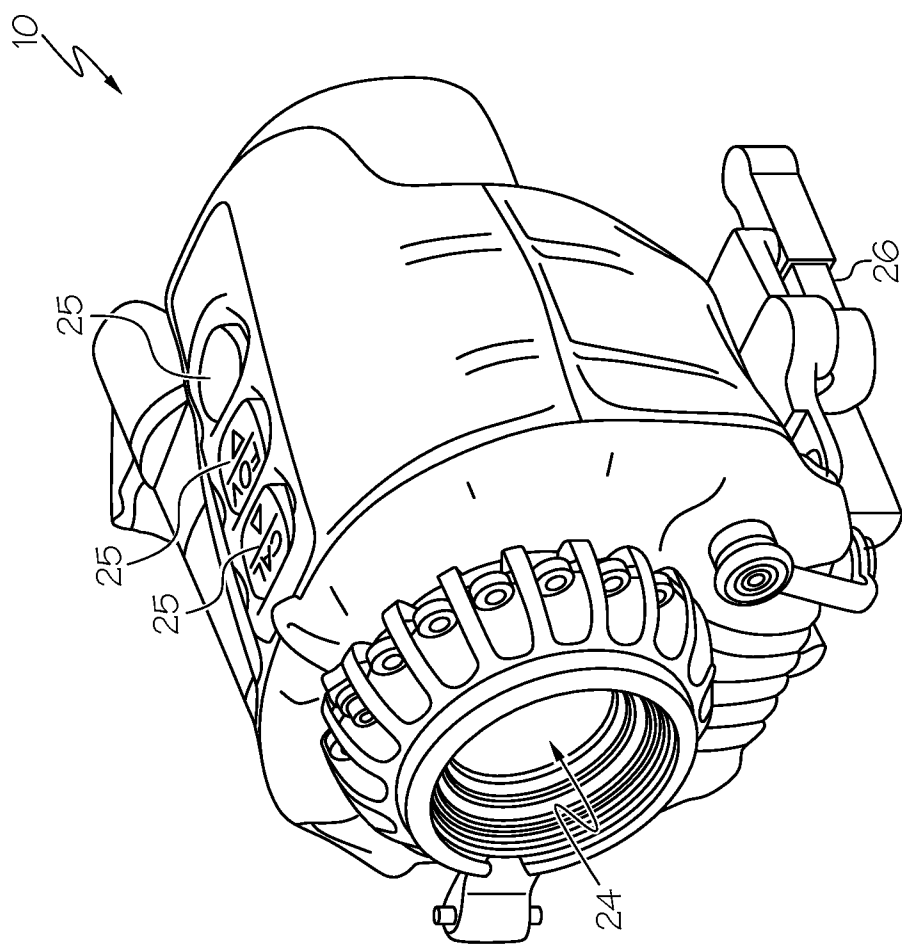


FIG. 1

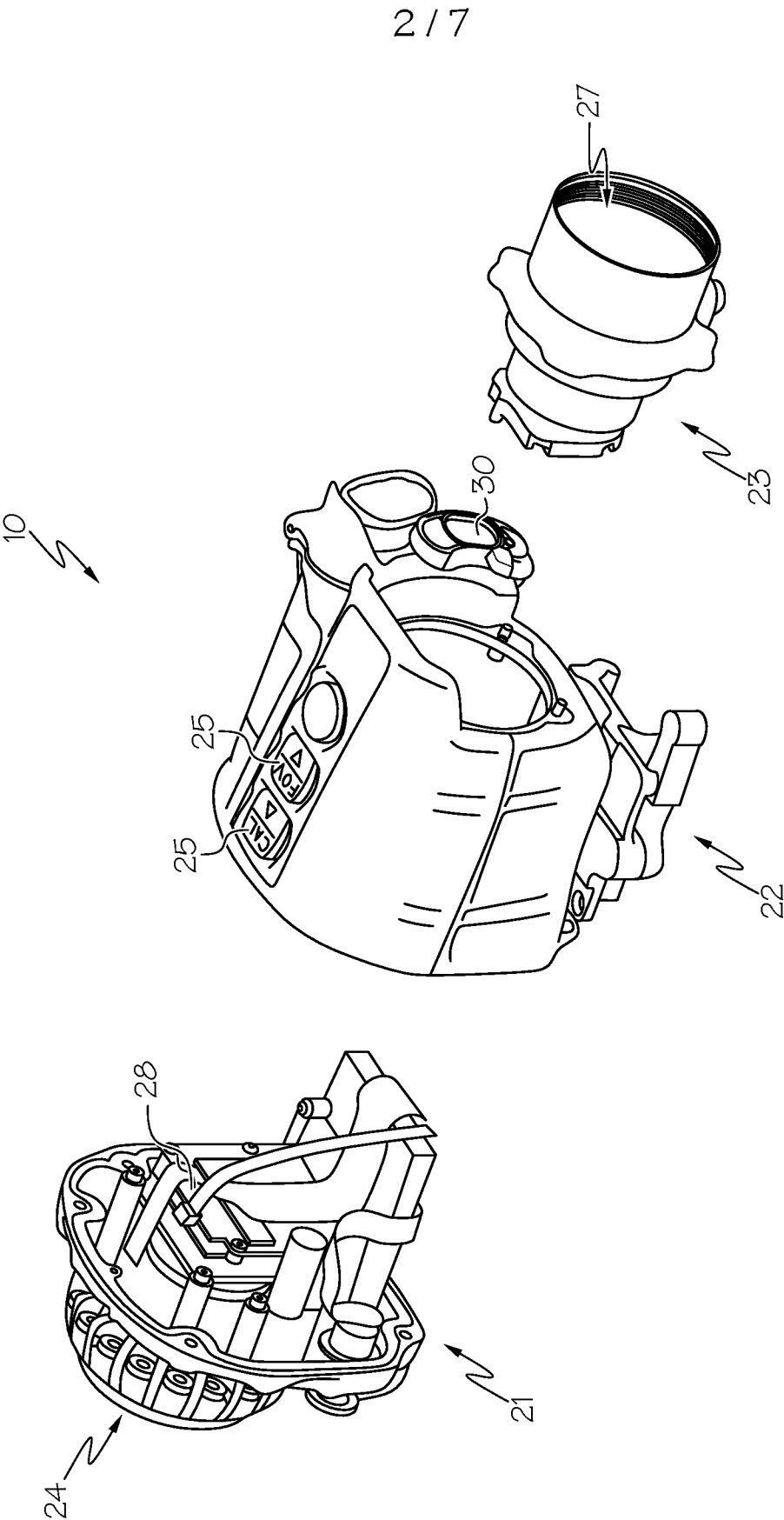


FIG. 2

3 / 7

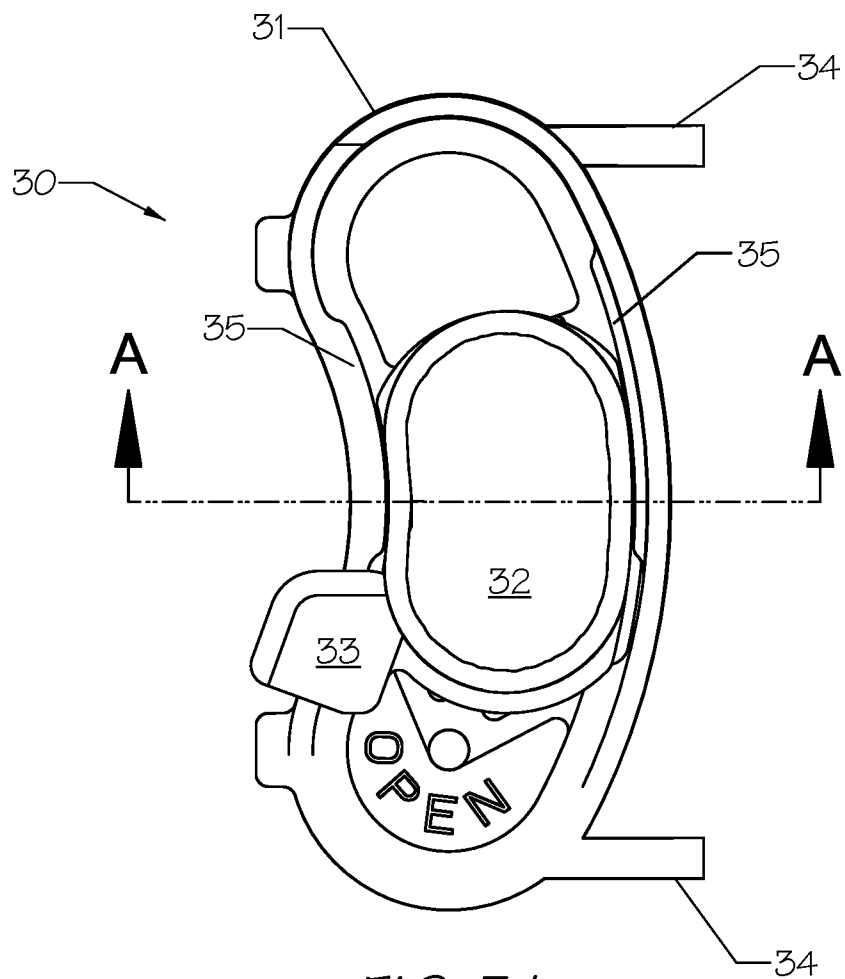


FIG. 3A

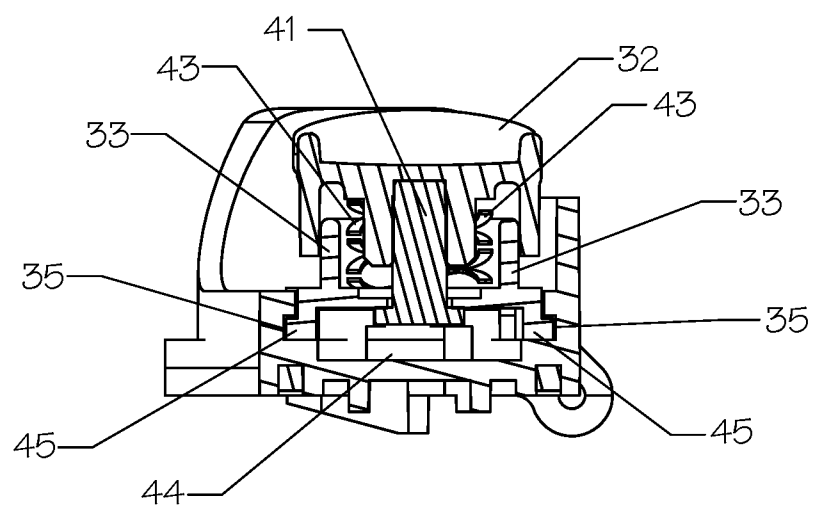


FIG. 3B

4 / 7

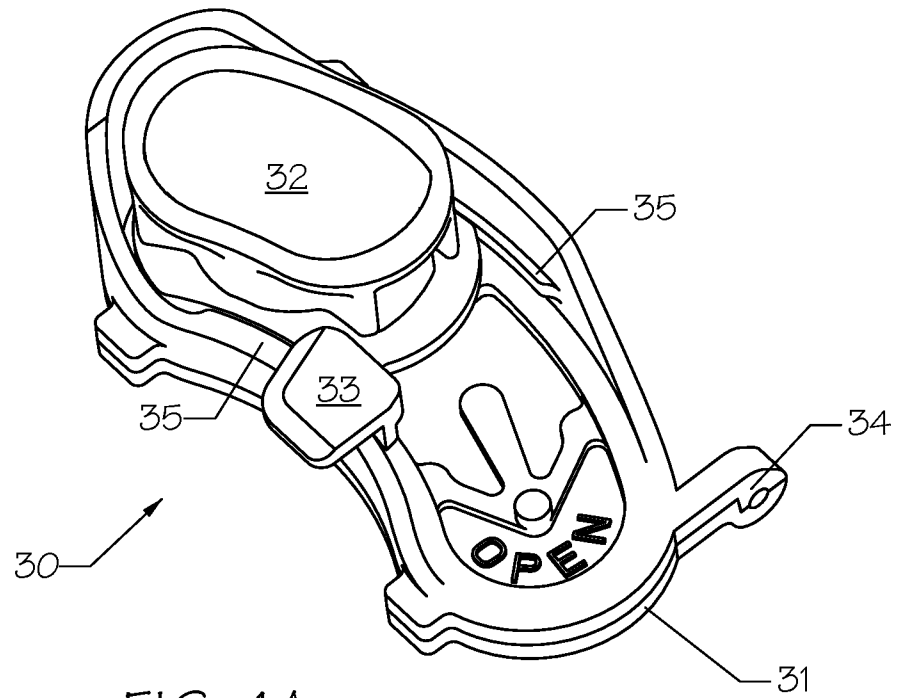


FIG. 4A

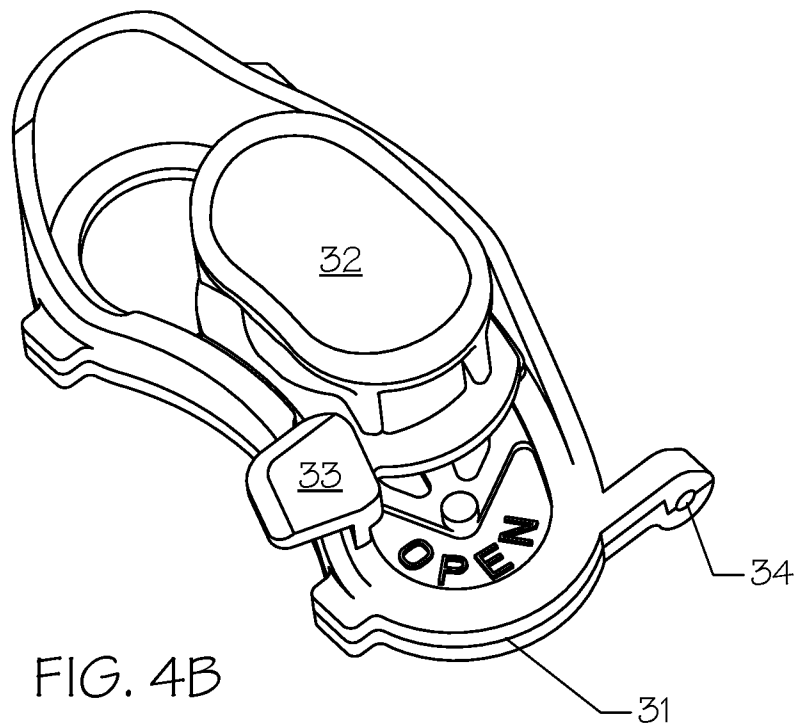


FIG. 4B

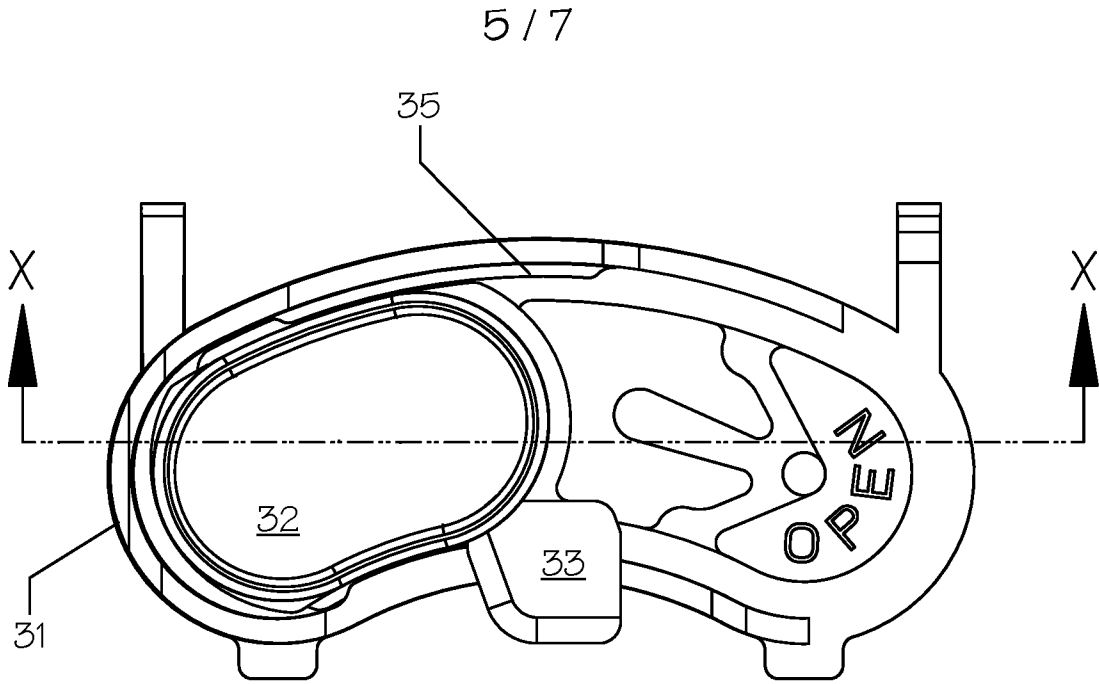


FIG. 5A

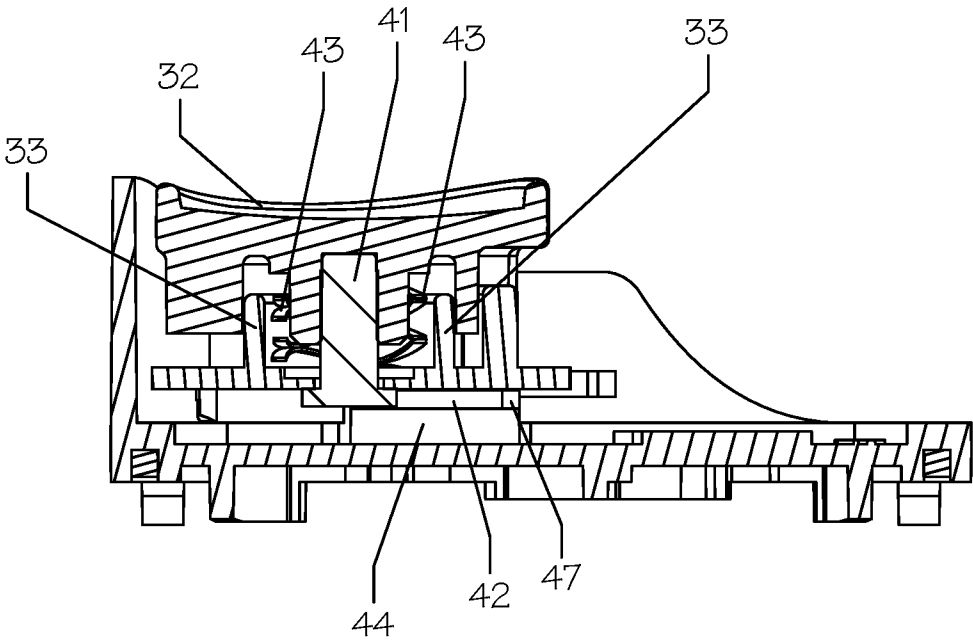


FIG. 6A

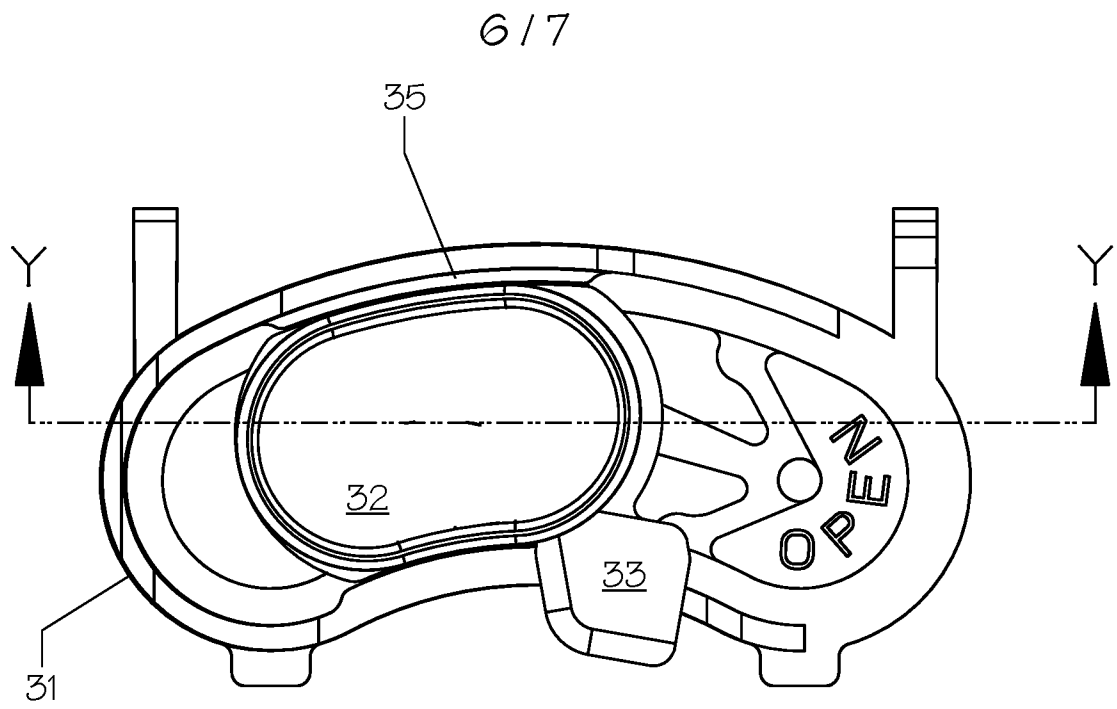


FIG. 5B

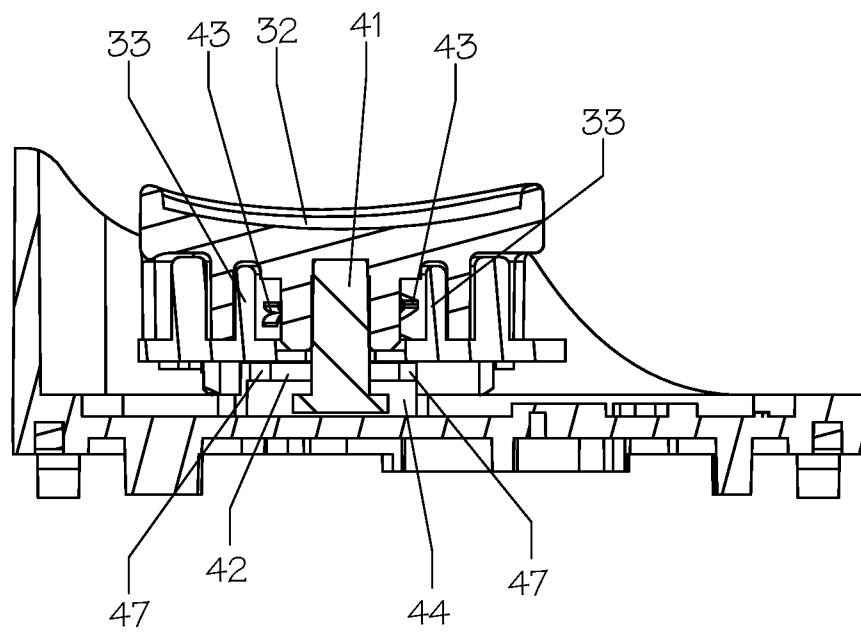


FIG. 6B

7/7

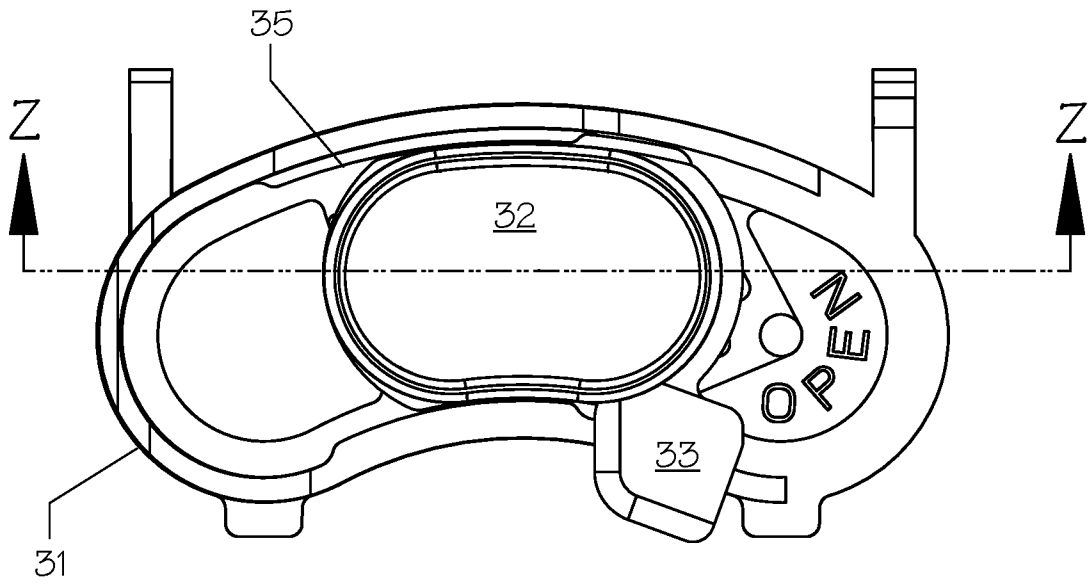


FIG. 5C

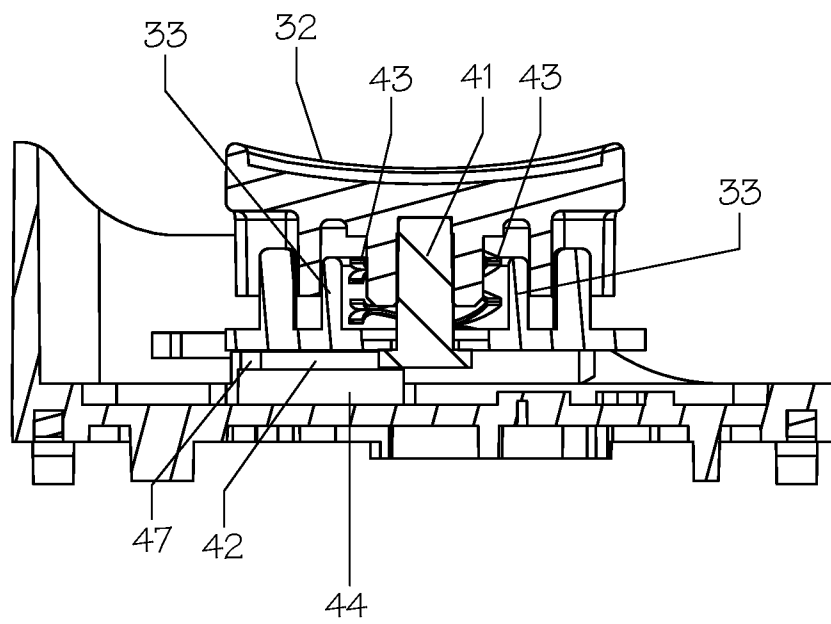


FIG. 6C

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 10/61025

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G02B 13/00, H01M 2/00 (2019.01)

CPC - G02B 13/00, G02B 13/008, G02B 13/14, G02B 13/16, G02B 23/00, G02B 23/02, G02B 23/10, G02B 23/12, G02B 23/16, H01M 2/00, H01M 2/02, H01M 2/0202, H01M 2/022, H01M 2/0237, H01M 2/024, H01M 2/04, H01M 2/10, H01M 2/1005, H01M 2/1016, H01M 2/1022, H01M 2/105, H01M 2/1055, H01M 2/1077

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)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006/0188249 A1 (NOGUCHI) 24 August 2006 (24.08.2006), entire document	1-20
A	US 5,600,139 A (MLADJAN et al.) 4 February 1997 (04.02.1997), entire document	1-20
A	US 2007/0205208 A1 (UEDA) 6 September 2007 (06.09.2007), entire document	1-20
A	US 2012/0113503 A1 (GRASHEIM et al.) 10 May 2012 (10.05.2012), entire document	1-20
A	US 2012/0114983 A1 (STOKES et al.) 10 May 2012 (10.05.2012), entire document	1-20
A	US 2017/0176139 A1 (HUNTERCRAFT LIMITED) 22 June 2017 (22.06.2017), entire document	1-20
A	US 9,476,676 B1 (KNIGHT'S ARMAMENT Co.) 25 October 2016 (25.10.2016), entire document	1-20

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Date of mailing of the international search report

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