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(54) **FIREARM AIMING DEVICE**

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(30) **Foreign Application Priority Data**

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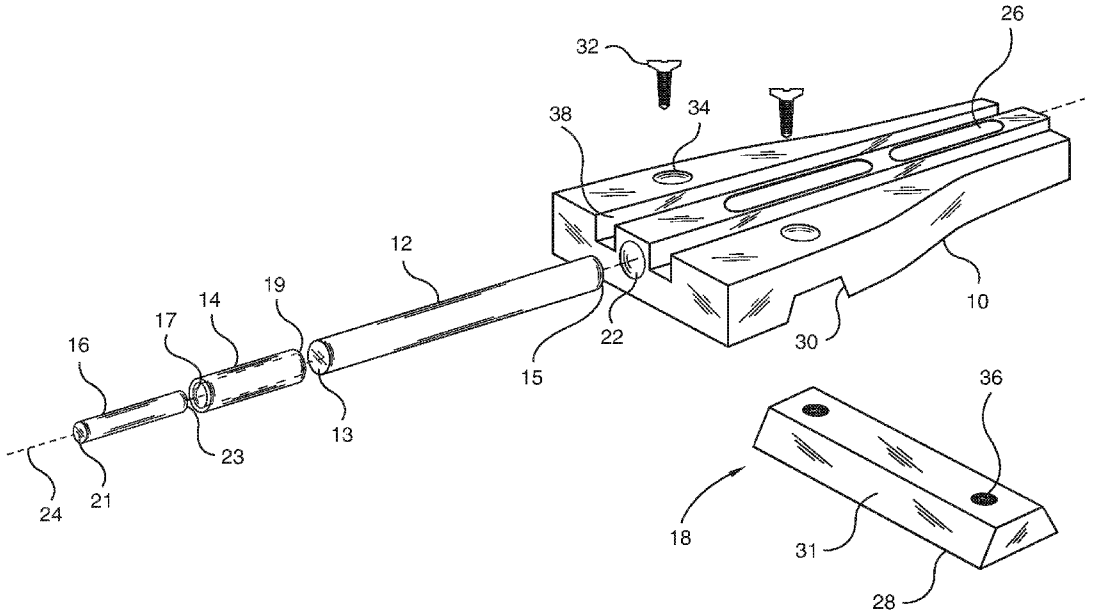
(57) **ABSTRACT**

A rear-sight aiming device to aid a shooter of a firearm. The device includes a housing with a tunnel alignable with the front aiming sight; an elongated optical fiber disposed inboard within the tunnel; an annular light-transmitting cylinder, disposed within the tunnel between the optical fiber and the shooter of the firearm during shooting; and a self-activating light source coaxially and completely disposed within the cylinder.



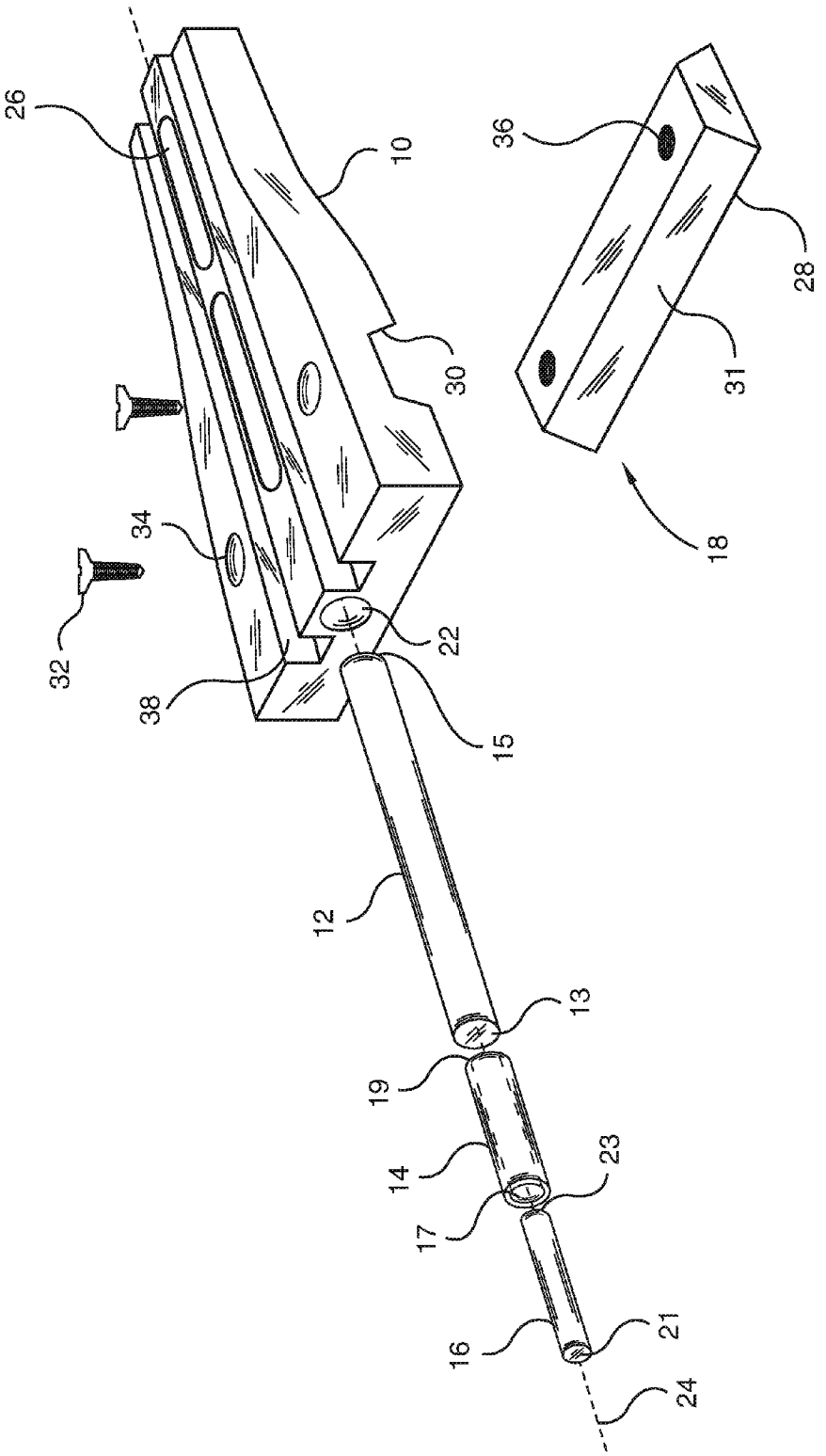


FIG. 1

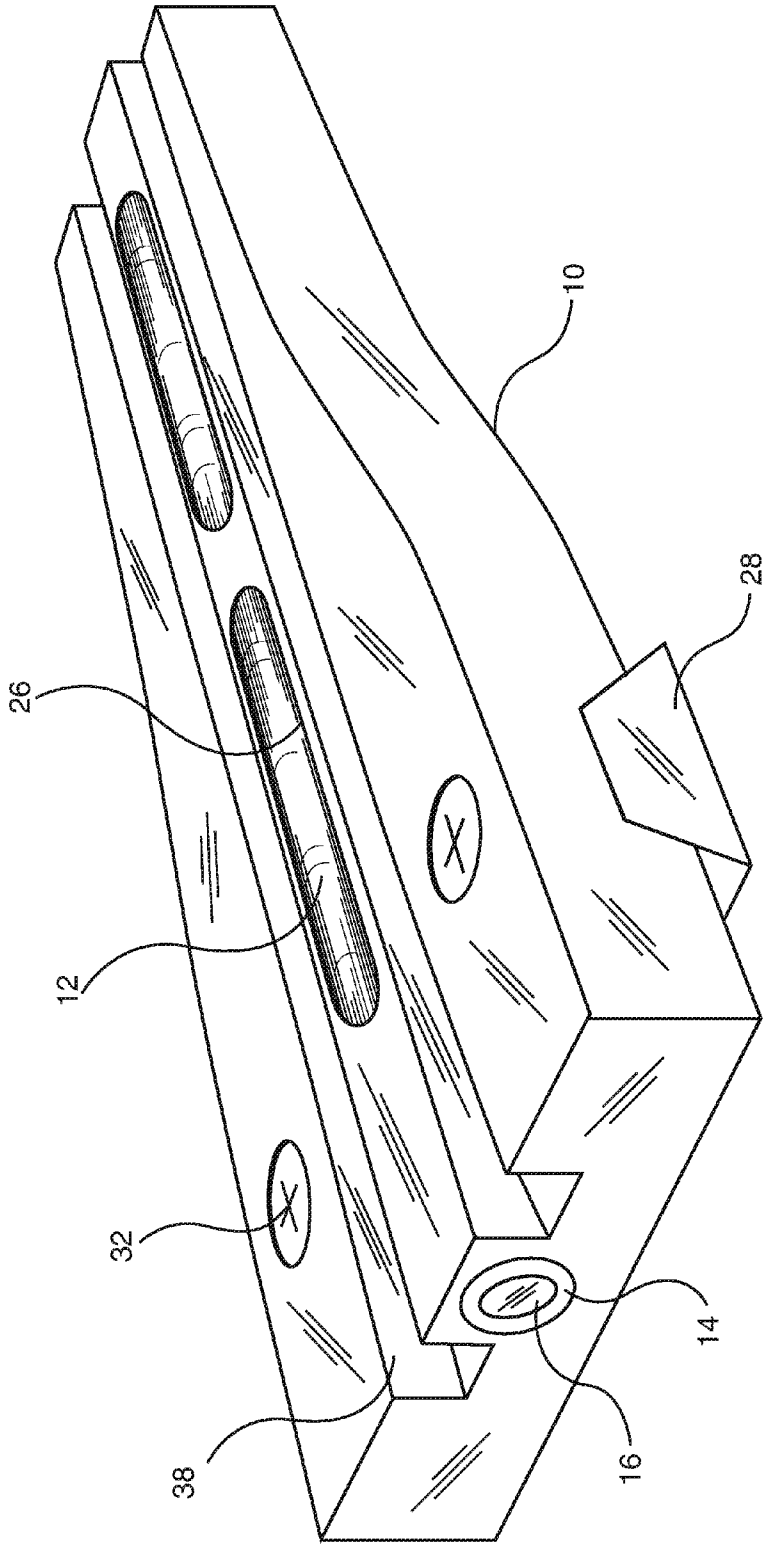


FIG. 2

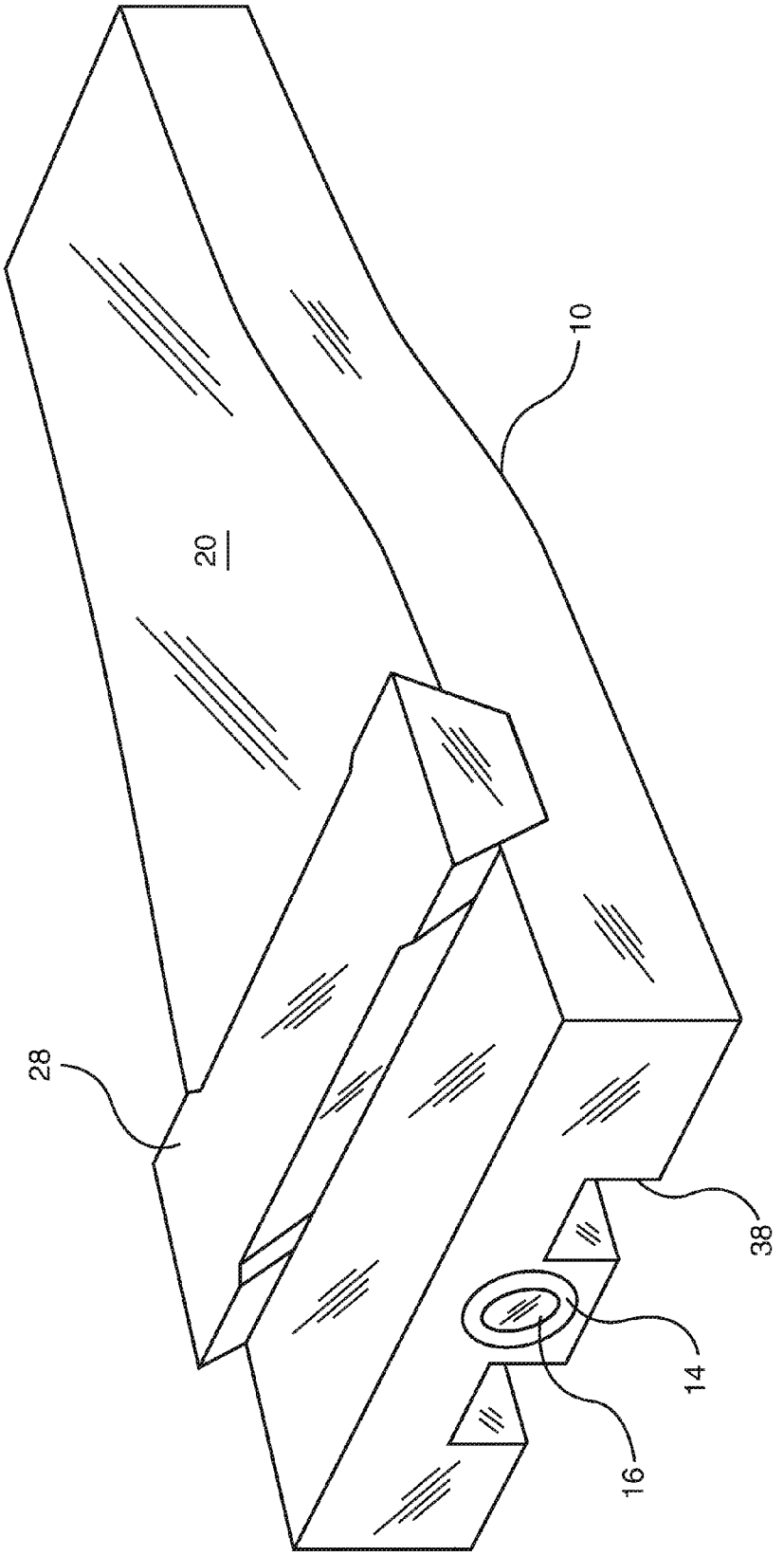


FIG. 3

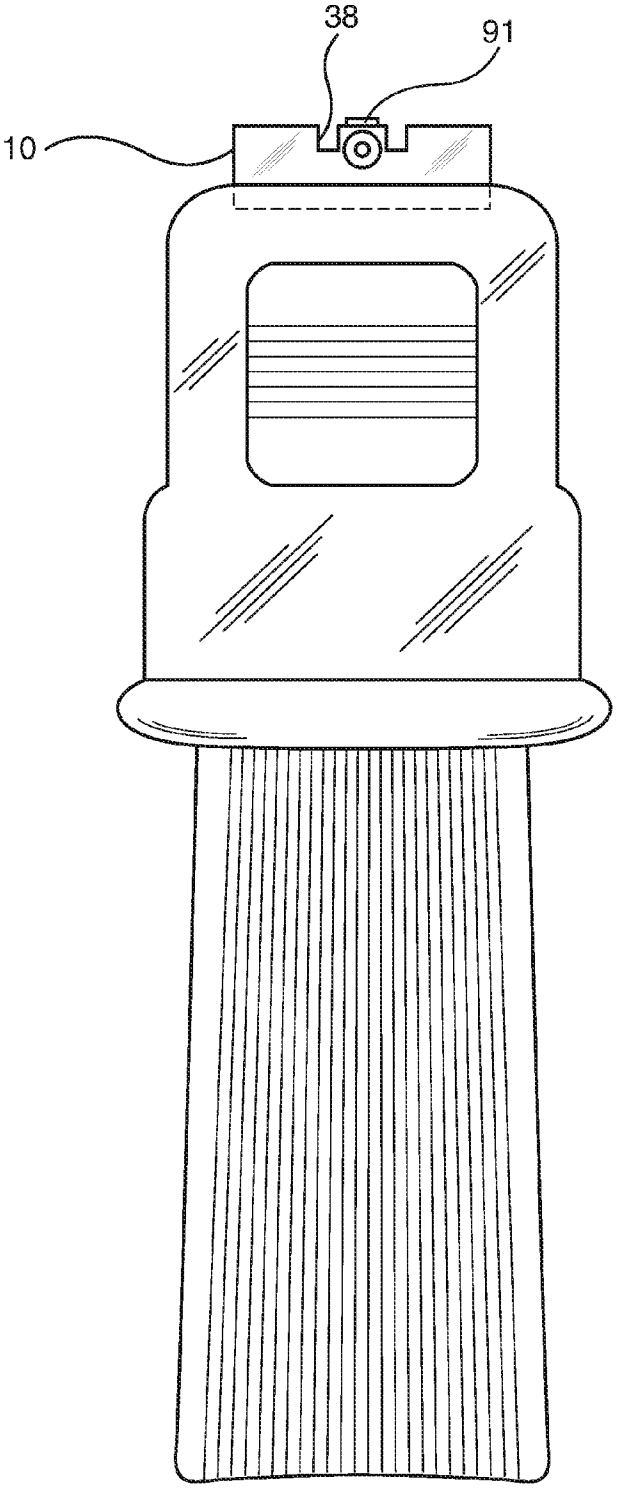


FIG. 4

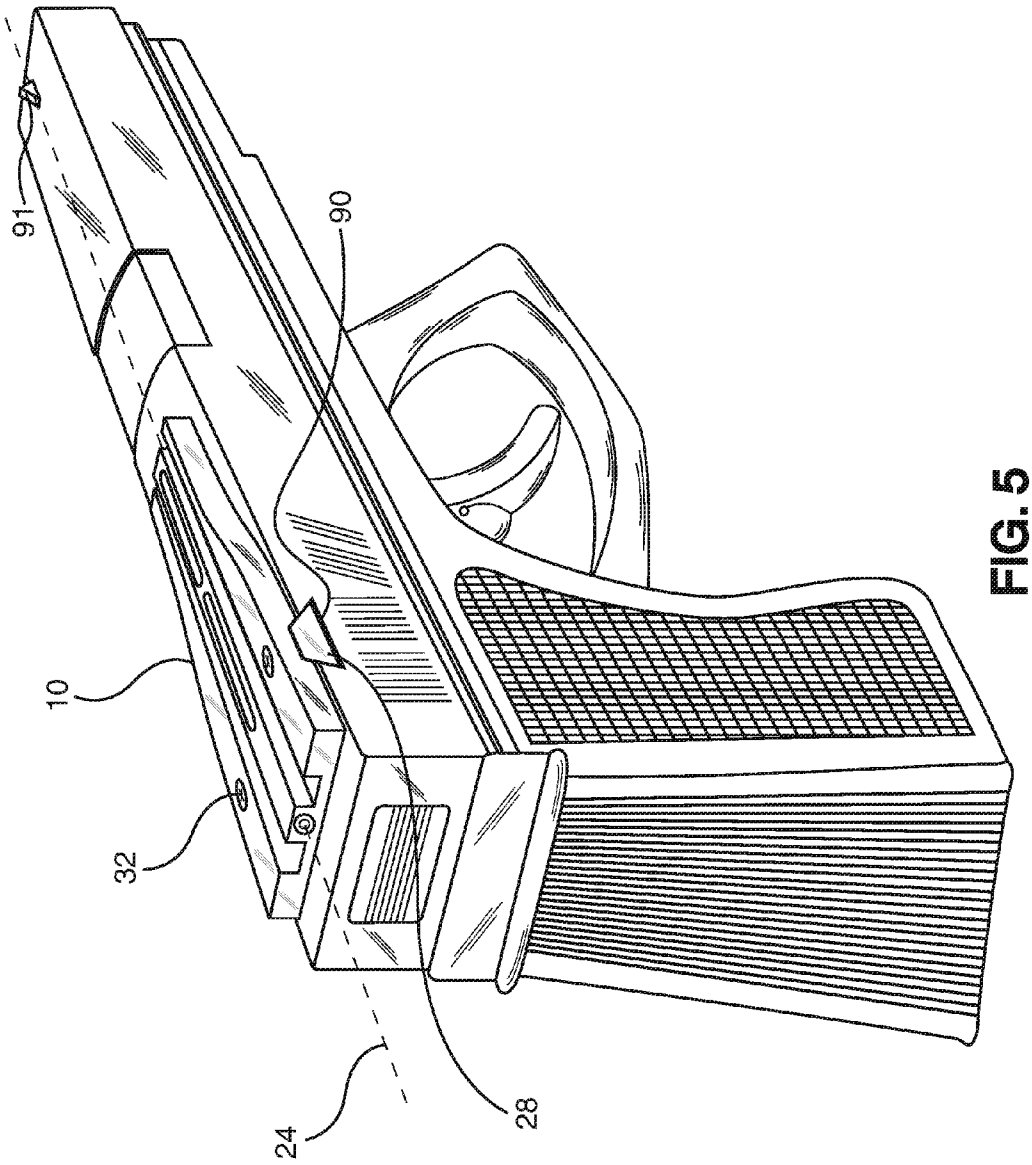


FIG. 5

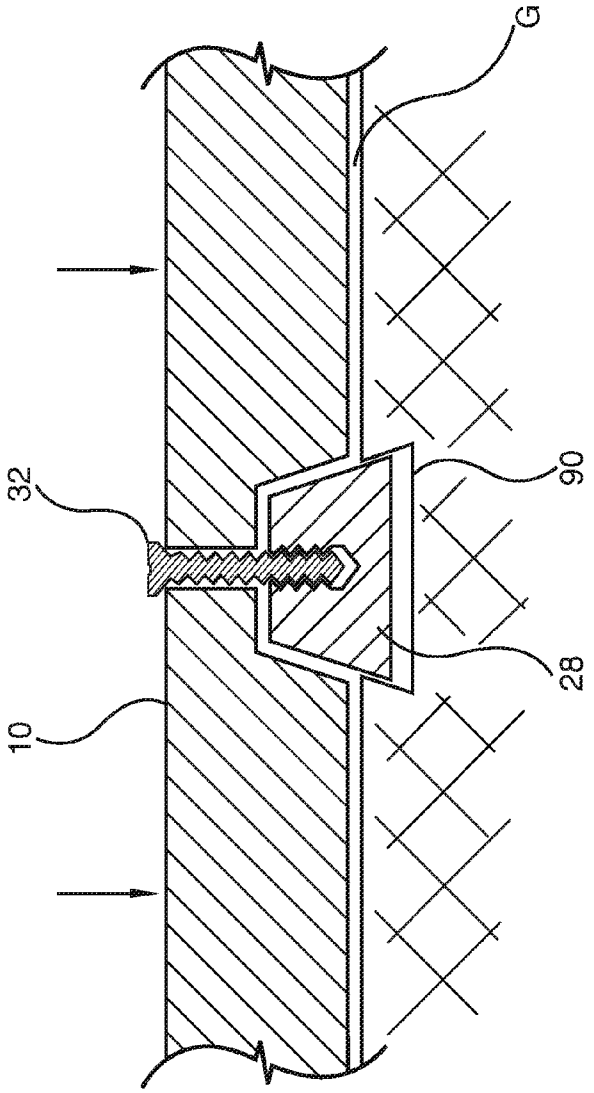


FIG. 6

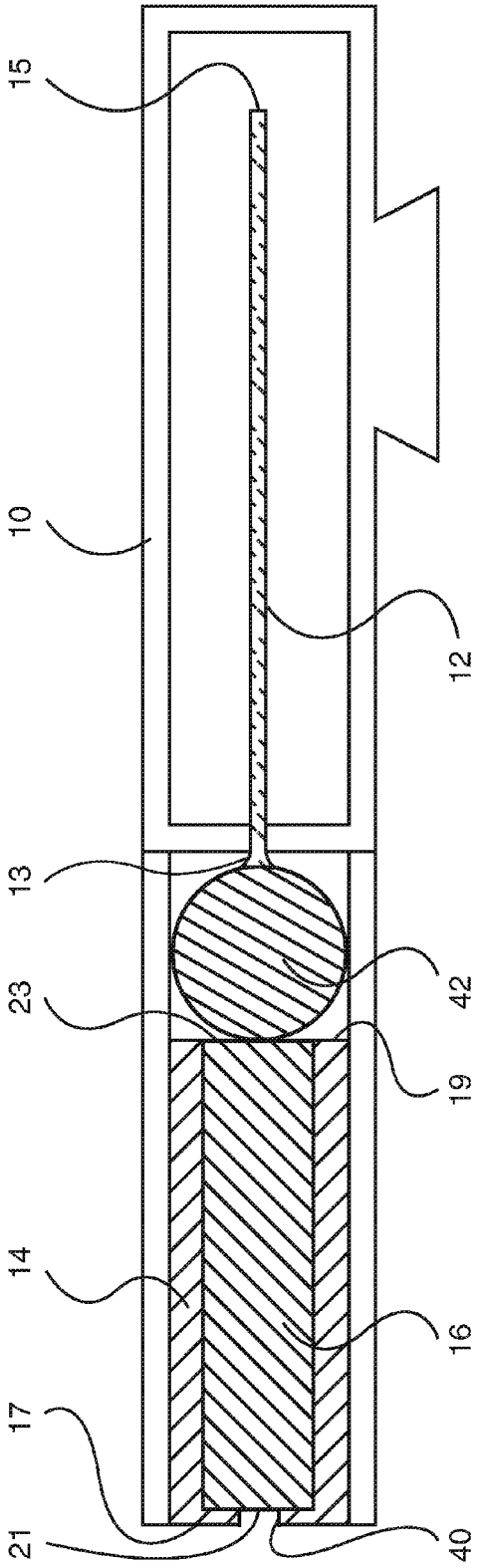


FIG. 7

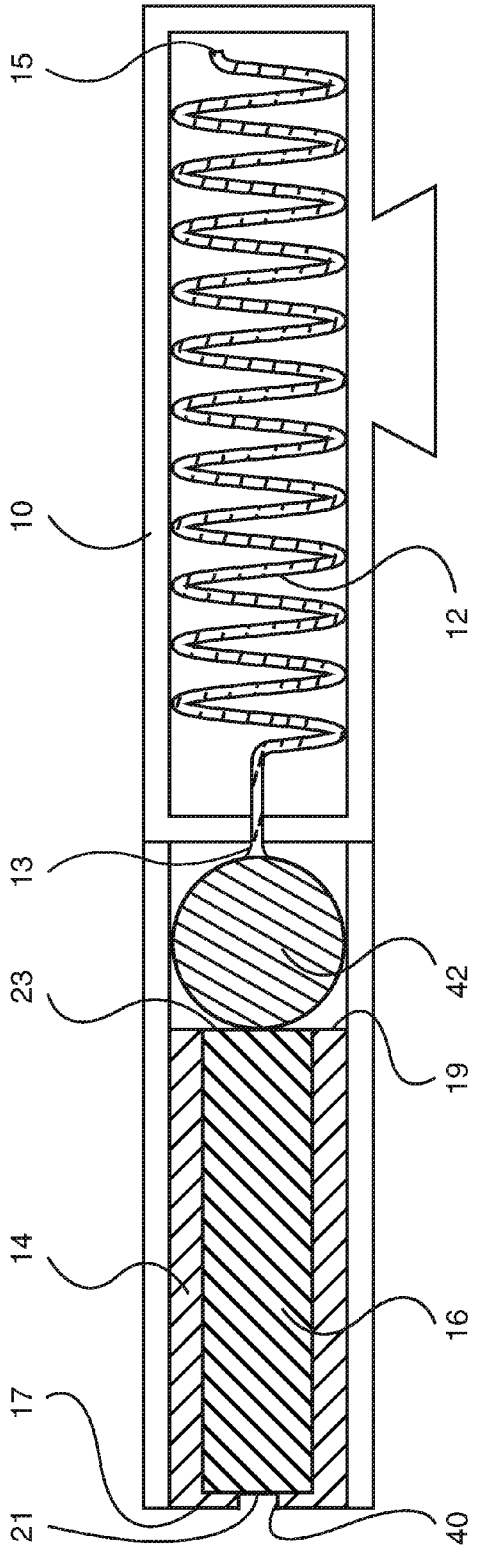


FIG. 8

FIREARM AIMING DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present invention is a Continuation-in-Part (CIP) of U.S. patent application Ser. No. 14/212,869, entitled FIREARM AIMING DEVICE AND ATTACHMENT MECHANISM THEREFOR, filed on filed Mar. 14, 2014, which claims priority from Israel patent application IL 225266 entitled FIREARM AIMING DEVICE AND ATTACHMENT MECHANISM THEREFOR, filed on 17 Mar. 2013, the complete disclosures of each of which are hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to firearms, in particular aiming devices therefor.

BACKGROUND OF THE INVENTION

[0003] Fire arms, particularly hand-held fire arms are conventionally aimed by aligning a front sight with a rear sight and pointing the front sight to the target point. The ease and speed of the alignment of such aiming devices can be critical. As well, ease of assembly and adjustment of the aiming device is an important factor.

[0004] It is believed that the technology relevant to the present invention is disclosed in U.S. Pat. No. 8,161,675 (Sne, et al.); U.S. Pat. No. 7,921,591 (Adcock); U.S. Pat. No. 7,627,976 (Olson); U.S. Pat. No. 7,562,486 (LoRocco); U.S. Pat. No. 6,385,855 (Tymianski); U.S. Pat. No. 6,360,471 (Stein); U.S. Pat. No. 5,065,519 (Bindon); U.S. Pat. No. 4,945,667 (Rogalski, et al.); U.S. Pat. No. 4,918,823 (Santiago); U.S. Pat. No. 1,852,875 (Endrezze); US 2013/185,983 (Glimpse); US 2012/151,817 (Howe et al.); US 2011/249,428 (Profus); US 2010/088,944 (Callihan); US 2007/107,292 (Bar-Yona, et al.); and AU 2010/326,607 (Profus).

SUMMARY OF THE INVENTION

[0005] The present invention relates to an aiming device or gun sight for firearms and an attachment mechanism therefor. The aiming device and attachment mechanism are particularly useful for aiming/using hand-held guns, such as pistols and revolvers or short range rifles.

[0006] In accordance with embodiments of one aspect of the present invention there is provided a rear-sight aiming device to aid a shooter of a firearm. The firearm has a barrel, an aiming device attachment member receiving slot of the tapering type, and a front aiming sight. The rear-sight aiming device includes: an elongated housing having a tunnel therein, the tunnel being configured so it is parallely arrangeable with the firearm's barrel and alignable with the front aiming sight and having at least one light admitting opening to the tunnel, the housing further having an inwardly tapered groove that is generally crosswise to the longitudinal axis of the elongated housing; an elongated optical fiber having a front end and a rear end, and the optical fiber is disposed inboard within the tunnel whereby at least a portion of the optical fiber is operably associated with the at least one light admitting opening; an annular light-transmitting cylinder, with a front annular surface and a rear annular surface, being open at both ends thereof and having an outer diameter and an inner diameter, the translucent annular light-transmitting cylinder being disposed within the tunnel between the optical fiber and the shooter of the firearm during shooting; a self-activating light source having a front end and a rear end, the self-activating light source being disposed coaxially within the annular light-transmitting cylinder and completely housed within the annular light-transmitting cylinder, whereby the self-activating light source is proximal the shooter of the firearm during shooting during shooting of the firearm; and an attachment mechanism configured to attach the aiming device to the firearm,

[0007] This design allows the firearm to be aimed in a light or dark environment by aligning, with the front aiming sight of the firearm, the self-activating light source or the annular light-transmitting cylinder, which provide a shooter of the firearm with an illuminated dot by the self-activating light source or an illuminated annular surface produced by the optical fiber, as transmitted through the light-transmitting cylinder.

[0008] In the specification and claims, the term "aiming device", or derivatives thereof, may be used interchangeably with the term "gun sight" or derivatives thereof. Likewise, the terms "gun", "firearm", "pistol" and the like, and their derivatives, may be used interchangeably herein the specification and claims.

[0009] Particular features of some embodiments of the present aiming device that it is conveniently used in both conditions of light and darkness; it is easy to manufacture and assemble; and it includes an attachment mechanism that is easy to use and allows easy and convenient adjustment, even in the field.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention will be understood and appreciated more fully from the following detailed description taken in conjunction with the appended drawings in which:

[0011] FIGS. **1-3** are view of embodiments of an aiming device of the present invention, FIG. **1** being an exploded perspective view;

[0012] FIG. **2** being an assembled view of FIG. **1**; and

[0013] FIG. **3** being an bottom perspective view of FIG. **1**;

[0014] FIGS. **4-5** are views of a firearm with embodiments of the present aiming device attached thereto, FIG. **4** being a rear view and FIG. **5** being a perspective view;

[0015] FIG. **6** is a sectional view illustrating an embodiment of an attachment mechanism for the present aiming device; and

[0016] FIGS. **7-8** are side sectional views illustrating further embodiments of the present aiming device.

[0017] The following detailed description of embodiments of the invention refers to the accompanying drawings referred to above. Dimensions of components and features shown in the figures are chosen for convenience or clarity of presentation and are not necessarily shown to scale. Wherever possible, the same reference numbers will be used throughout the drawings and the following description to refer to the same and like parts.

DETAILED DESCRIPTION OF THE INVENTION

[0018] Illustrative embodiments of the invention are described below. In the interest of clarity, not all features/components of an actual implementation are necessarily described.

[0019] FIGS. **1-3** show embodiments of an aiming device of the present invention. The aiming device includes an elon-

gated housing **10**, which in particular embodiments is opaque; an elongated optical fiber **12** disposed within the housing; an annular light-transmitting cylinder **14** aligned with the optical fiber; a self-activating light source **16**, disposed coaxially within the cylinder; and a gun sight attachment mechanism **18** for attaching the aiming device to a gun. Light source **16** may include or be constituted by a gaseous tritium light source (GTLS), for example a Trigalight™, which is particularly convenient as it is self-activating and requires no outside power source.

[0020] Optical fiber **12** is preferably in the form of a rod or bar, which are common and inexpensive forms for an optical fiber, i.e. without any lumen or hollow portion. Optical fiber **12** has a front end **13** (facing the shooter when aiming) and a rear end **15**. Annular light-transmitting cylinder **14** has a front annular surface **17** (facing the shooter when aiming) and a rear annular surface **19**. Self-activating light source **16** has a front end **21** (facing the shooter when aiming) and a rear end **23**. Light-transmitting cylinder **14** has an annular end-profile and thus defines a cavity configured for receiving self-activating light source **16**, and the self-activating light source **16** is completely housed within the light-transmitting cylinder **14**.

[0021] In other words, no portion of self-activating light source **16** is housed within optical fiber **12** nor within any other component that may be found in such aiming systems, such as a lens or the like. As such, the present aiming sight design allows for simple assembly and manufacturing by precluding a more complicated and/or expensive optical fiber or lens, etc.

[0022] In some embodiments, self-activating light source **16** is disposed within annular light-transmitting cylinder **14** such that front end **21** of light source **16** is flush with front annular surface **17** of light-transmitting cylinder **14**. Self-activating light source **16** can be held within light-transmitting cylinder **14** via a variety of means including, for example, a pressure fit, adhesive, or mechanical means, an example of which is described herein below. In some embodiments, self-activating light source **16** is disposed within light-transmitting cylinder **14** such that front end **21** of light source **16** is somewhat inboard of (recessed from) front annular surface **17** of light-transmitting cylinder **14**, as described below.

[0023] Housing **10** is typically an elongated structure with a generally flat bottom surface **20** that interfaces with the top of the gun's barrel, or slide in the case of guns with a slide. Optical fiber **12** typically fits inboard and typically snugly within an elongated recess or tunnel **22** within housing **10** and typically along the longitudinal axis **24** of the housing. Tunnel **22** has at least a portion thereof that faces generally upward and is open to the surrounding or significantly transparent for allowing ambient light to reach optical fiber **12**, and will be referred to as a light admitting opening or window **26** (two illustrated).

[0024] Optical fiber **12** is disposed (inserted) a bit inboard within elongated tunnel **22** to allow space for the insertion of annular light-transmitting cylinder **14** within the tunnel. As mentioned, light source **16** is coaxially disposed (inserted) within cylinder **14**; i.e. completely housed therein. As such, the shooter will be provided an illuminated mark (a dot by way of the light source if at night/darkness; and an annular surface or circle via the cylinder **14** if during daylight) dot or thereby transferring light from optical fiber **12** toward the shooter. Thus, the aiming device can be conveniently used both in daylight and at night or other such low-light conditions.

[0025] An exemplary, and particularly utilitarian attachment mechanism **18** is illustrated that includes an outwardly flaring/angled dove-tail shaped attachment member **28** slidingly fitting into a correspondingly shaped tapered groove **30** that is generally transverse or crosswise to longitudinal axis **24**. As such, attachment member has smoothly surfaced and flat side walls **31** that angle outwardly. Attachment mechanism **18** also includes at least one and typically two screws **32** passing through respective through-holes **34** in housing **10** at the location of groove **30**. Screws **32** correspond to respective threaded female screw receiving recesses **36**, in attachment member **28**. As such, tightening screws **32** pulls attachment member **28** upward into groove **30**. This tightening makes bottom surface **20** of housing **10** lay flush (flat) on the top of the gun, as can be seen. Prior to fully tightening screws **32**, housing **10** can be is adjusted right/left (i.e. crossways with respect to the gun and front aiming sight **91**) to align the illumination "marks" with the front aiming sight. Such attachment mechanism **18** is particularly convenient as it allows easy adjustment of the aiming device in the field, if required. And, no zeroing is required.

[0026] FIGS. **4-6** illustrate how the aiming device is mounted and the firearm is aimed. Tunnel **22** is parallel to the gun barrel. The aiming device is attached to the gun via attachment mechanism **18**, which is typically accomplished as follows. Screws **32** are inserted into through-holes **34** and partially screwed into female screw receiving recesses **36** of attachment member **28**. Attachment member **28**, now with the remainder of the aiming device attached thereto, is slid into the aiming device attachment member receiving slot **90** of the tapering type, which is a common feature of such guns. Tunnel **22** is aligned with the front aiming sight **91** of the gun and then screws **32** are tightened to hold the aiming device securely and ensure also that bottom surface **20** rests flat on the top of the gun's barrel so that the tunnel is parallel to the gun's barrel. The just-mentioned attachment method is contrast to the typical pressure fit used and easily allows both assembly and adjustment.

[0027] Side walls **31** of attachment member **28** are configured, flat and smooth as noted above, so that the side walls readily slide upwardly in receiving slot **90** when attachment mechanism **18** is tightened (i.e. when the aiming device is assembled onto the firearm) whereby housing **10** firmly abuts the top face of the gun barrel. When screws **32** are tightened, attachment member **28** is pulled upward whereby side walls **31** abut tapered groove **30** in the firearm and also housing **10** is thus pulled downward toward the gun's barrel, to close the gap G (FIG. **6**).

[0028] In some embodiments, the housing has a pair of channels **38** in the top side of the housing, parallel to optical fiber **12**, one groove on each side of the optical fiber. These channels **38** make it easier for the shooter to see if the front sight is properly aligned, or more appropriately stated, if not properly aligned. This alignment aid provided by channels **38** is particularly helpful if housing **10** is opaque. This alignment feature provided by channels **38** can be most readily understood with reference to FIG. **4** where one can understand that at least the sides of front aiming sight **91** would be visible via channels **38** if the gun was improperly aimed to the right or left.

[0029] The aiming system allows the use of only two reference points to align the firearm both side-to-side and up and down with a target, those reference points being the front aiming sight **91** and either a luminous dot produced by light source **16** or an illuminated annular surface/circle produced by optical fiber **12**, as transmitted through annular light-transmitting cylinder **14**. In use, during aiming, the gun is typically tilted upward just a bit so that the front sight is visible to the shooter, and aligned with the aforementioned luminous dot, or illuminated circle. By using only two reference points (the front aiming sight **91** and either the luminous dot or luminous circle) aiming is more easily performed, even when the shooter keeps both eyes open and is aiming at a relatively distant target. The just mentioned aligning of luminous dot, or illuminated circle, with the front aiming sight **91** also properly affects side to side alignment, as noted above.

[0030] FIG. **7** shows another embodiment wherein annular light-transmitting cylinder **14** includes an inwardly facing shoulder **40** adjacent to front annular surface **17** thereof. Shoulder **40** may be annular and may be formed by any known means, including for example molding or drilling a first tunnel of a diameter equal to the inner diameter of the shoulder and then drilling a second wider tunnel to a point shortly before front annular surface **17**. Shoulder **40** can be useful to help place and hold self-activating light source **16** within light-transmitting cylinder **14**.

[0031] FIG. **7** shows another embodiment wherein optical fiber **12** is particularly thin, with a diameter smaller than the inner diameter of light-transmitting cylinder **14**, and in some embodiments also thinner than self-activating light source **16**. Such small diameter of optical fiber **12** can result in a lower cost optical fiber. In some embodiments, front end **13** of optical fiber **12** is mushroomed shaped or flared, as illustrated, which can help disperse/transmit light from the optical fiber. Optical fiber **12** can be held in tunnel **22** of housing **10** by any suitable mechanism.

[0032] FIG. **7** further shows an embodiment wherein the aiming device includes a lens **42** disposed intermediate optical fiber **12** and self-activating light source **16**, as well as light-transmitting cylinder **14**. Lens **42** has a diameter equal to the outer diameter of cylinder **14**. As seen, lens **42** can be a simple spherical lens which is inexpensive. Lens **42** increases the diameter of the light transmitted by optical fiber **12** in order to ensure the light is transmitted to light-transmitting cylinder **14**.

[0033] FIG. **8** shows embodiments wherein optical fiber **12**, in a relatively thin (small diameter) form, as illustrated in FIG. **7**, and is arranged in an exemplary non-linear (high surface area) configuration. FIG. **8** illustrates an exemplary serpentine configuration, however a spiral or screw-thread like or coil-spring configuration may be used, or any other non-linear configuration to produce more surface area to receive light. Non-linear configurations provide more surface area for light exposure and thus light transmission to the shooter than where optical fiber **12** is linear/straight, as in FIG. **7**. The specific orientation of such non-linear optical fibers **12** can be in a variety of configurations, for example more tightly packed or in other geometries or forms, and not limited to the examples shown. In a specific example, the spiral configuration can be wound with its axis parallel to the tunnel (e.g. like a coil spring); with its axes perpendicular to the tunnel (e.g. like adjacent stacks of springs); or any other achievable winding/spiraling.

[0034] It should be understood that the above description is merely exemplary and that there are various embodiments of the present invention that may be devised, mutatis mutandis, and that the features described in the above-described embodiments, and those not described herein, may be used separately or in any suitable combination; and the invention can be devised in accordance with embodiments not necessarily described above.

What is claimed is:

1. A rear-sight aiming device to aid a shooter of a firearm, the firearm having a barrel, an aiming device attachment member receiving slot of the tapering type, and a front aiming sight, the rear-sight aiming device comprising:

an elongated housing having a tunnel therein, the tunnel being configured so it is parallely arrangeable with the firearm's barrel and alignable with the front aiming sight and having at least one light admitting opening to the tunnel, the housing further having an inwardly tapered groove that is generally crosswise to the longitudinal axis of the elongated housing;

an elongated optical fiber having a front end and a rear end, and the optical fiber is disposed inboard within the tunnel whereby at least a portion of the optical fiber is operably associated with the at least one light admitting opening;

an annular light-transmitting cylinder, with a front annular surface and a rear annular surface, being open at both ends thereof and having an outer diameter and an inner diameter, the translucent annular light-transmitting cylinder being disposed within the tunnel between the optical fiber and the shooter of the firearm during shooting;

a self-activating light source having a front end and a rear end, the self-activating light source being disposed coaxially within the annular light-transmitting cylinder and completely housed within the annular light-transmitting cylinder, whereby the self-activating light source is proximal the shooter of the firearm during shooting during shooting of the firearm; and

an attachment mechanism configured to attach the aiming device to the firearm,

whereby the firearm can be aimed in a light or dark environment by aligning, with the front aiming sight of the firearm, the self-activating light source or the annular light-transmitting cylinder, which provide a shooter of the firearm with an illuminated dot by the self-activating light source or an illuminated annular surface produced by the optical fiber, as transmitted through the light-transmitting cylinder.

2. The aiming device of claim **1**, wherein the optical fiber has a diameter smaller than the inner diameter of the annular light-transmitting cylinder.

3. The aiming device of claim **2**, wherein the optical fiber is configured in a non-linear configuration.

4. The aiming device of claim **3**, wherein the optical fiber is configured in a serpentine configuration.

5. The aiming device of claim **3**, wherein the optical fiber is configured in a spiral configuration.

6. The aiming device of claim **3**, wherein the optical fiber has a flared front end.

7. The aiming device of claim **1**, wherein the light transmitting cylinder has a shoulder adjacent the front annular surface thereof configured to help retain the self-activating light source within the light-transmitting cylinder.

8. The aiming device of claim **7**, wherein the shoulder is annular.

9. The aiming device of claim **1**, further comprising a lens disposed between the optical fiber and the self-activating light source.

10. The aiming device of claim **9**, wherein the lens is a spherical lens.

11. The aiming device of claim **9**, wherein the lens has a diameter essentially equal to the outer diameter of the light-transmitting cylinder.

12. The aiming device of claim **1**, wherein the housing further comprises a pair of channels adjacently straddling the tunnel for aiding in side-to-side aiming of the firearm.

13. The aiming device of claim **1**, wherein the housing is opaque.

14. The aiming device of claim **1**, wherein the attachment mechanism comprises a pair of screws and the attachment member comprises a pair of respective threaded female screw receiving recesses.

15. The aiming device of claim **1**, wherein the optical fiber is formed in a solid rod-like or bar-like configuration.

16. The aiming device of claim **1**, wherein the entire elongated optical fiber is disposed behind the self-activating light source.

17. The aiming device of claim **1**, wherein the optical fiber has a diameter smaller than that of the self-activating light source.

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