

[54] GUN SIGHT SYSTEM FOR USE UNDER LOW AMBIENT LIGHT CONDITIONS

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[51] Int. Cl. F41g 1/34

[58] Field of Search 240/6.41, 2 F, DIG. 6; 33/241, 242, 243; 250/217 R, 217 SS, 205

[56]

References Cited

UNITED STATES PATENTS

1,865,127	6/1932	McKeen.....	240/6.41 X
2,529,057	11/1950	Teffault	240/6.41
2,546,242	3/1951	Stinson	240/6.41
2,912,566	11/1959	Cornett.....	240/6.41
3,128,384	4/1964	Nelson et al.....	250/205
3,264,466	8/1966	Bacon, Jr.....	240/25
3,401,266	9/1968	Cooke-Yarborough.....	250/217 SS
3,678,590	7/1972	Hayward.....	240/6.41

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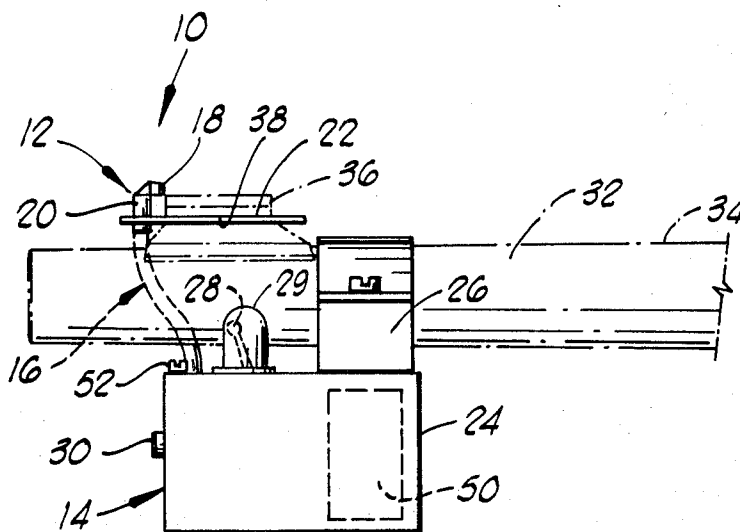
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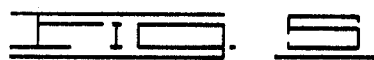
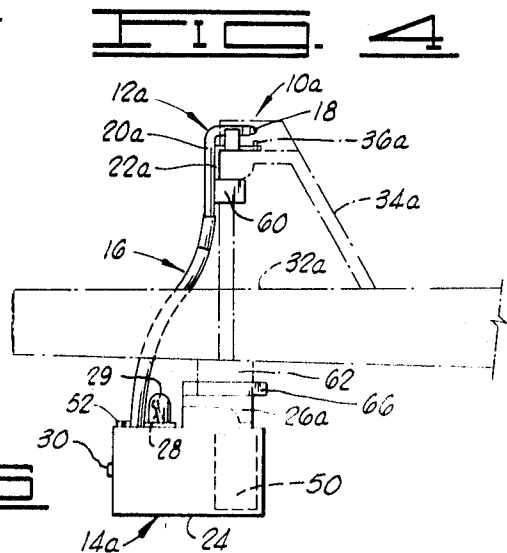
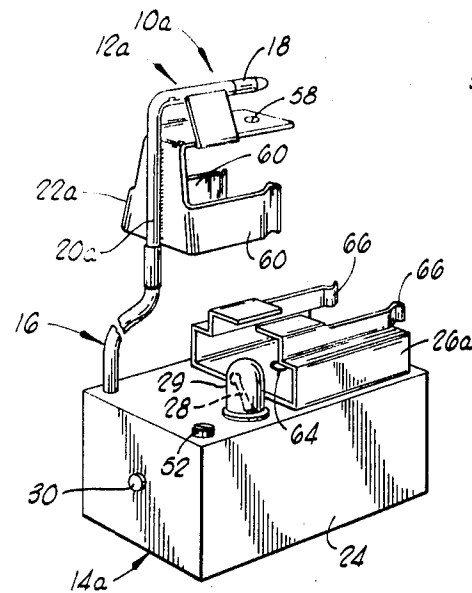
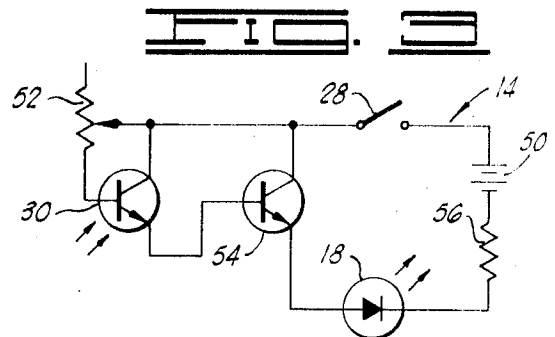
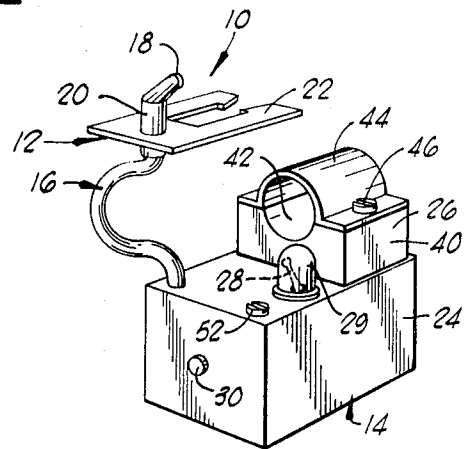
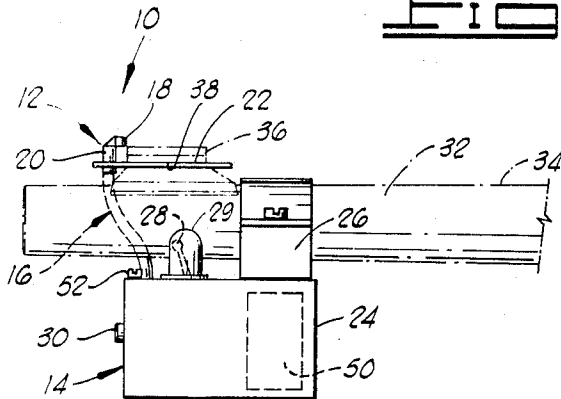
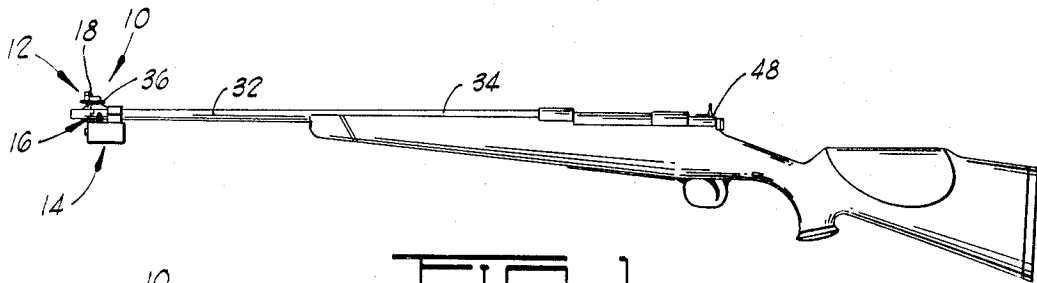
ABSTRACT

A gun sight system for use with a conventional firearm or the like under low ambient light conditions. The system includes a conventional rear sight and an illuminated front sight bead employing a light-emitting diode as the source of visible light for the bead. Also included is a direct current power supply and driving circuit for operating the light-emitting diode. Another aspect of the invention is the employment of a photo-sensitive transistor and associated circuitry for adjusting the light output of the light-emitting diode so that will be proportion from to the ambient light. Thus the intensity of light from the diode increases when the amount of ambient light increases, and alternately, the output of the diode decreases when the amount ambient light decreases.

8 Claims, 6 Drawing Figures



✓ 33/241
✓ X3999



GUN SIGHT SYSTEM FOR USE UNDER LOW AMBIENT LIGHT CONDITIONS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to sighting devices and more particularly, but not by way of limitation, to an illuminated front sight device suitable for use with firearms or the like under conditions of low ambient light.

2. Description of the Prior Art

The front sight devices currently in use in iron sight systems for firearms are, for the most part, constructed of steel or other metallic substances. In most cases, the beads of these devices are formed of blued steel or display some other relatively dark surface finish.

Generally the front sight bead is provided with a dull, non-reflective finish so that ambient light glare off of the sight bead will be reduced to a minimum and the bead will be sharply contrasted with the illuminated target to provide a clear sight picture to the marksman.

It has been found, however, that the prior art front sight devices in iron sight systems are unsatisfactory under conditions of low ambient light. It is extremely difficult for the marksman to discern the dark-colored front sight bead under such conditions and place the front sight bead in visual alignment with the rear sight and the target. To overcome this deficiency, various attempts have been made to provide low-light sight systems which variously employ expensive optical systems, infrared projection and reception systems, and various other means for illuminating the target for the marksman.

SUMMARY OF THE INVENTION

The present invention is directed to a front sight device for use under low ambient light conditions with a conventional firearm or the like having a rear sight member carried thereon. The novel front sight device includes light-emitting means for radiating visible light in response to the application of electric current thereto, and means for securing the light-emitting means to a conventional firearm. The front sight device further includes power means for providing electric current to the light-emitting means, means for conducting electric current from the power means to the light-emitting means, and means for securing the power means to a conventional firearm.

An object of the present invention is to provide a front sight device for use with a conventional firearm or the like having a rear sight member carried thereon which provides means for accurately aligning the firearm under conditions of low ambient light.

Another object of the present invention is to provide a front sight device for use in a sight system under low ambient light conditions which is simple to operate and relatively inexpensive to manufacture and maintain.

Still another object of the present invention is to provide a sight system for visually aligning an apparatus such as a conventional firearm under conditions of low ambient light which is ruggedly constructed and not susceptible to accidental damage.

A further object of the present invention is to provide a front sight device for use under low ambient light conditions which includes light-emitting means which

radiates visible light within very narrow wave length limits thereby minimizing the possibility of destroying the night vision of the marksman using the device.

Still another object of the present invention is to provide an illuminated iron sight device for use under low light conditions which is economical to build, easily installed, simple to adjust, capable of operating for an extended period of time, and inexpensive to operate.

Other objects and advantages of the present invention will be evident from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation view of one form of the present invention installed on a firearm.

FIG. 2 is an enlarged side elevation view of the embodiment illustrated in FIG. 1.

FIG. 3 is a perspective view of the embodiment illustrated in FIG. 1.

FIG. 4 is a schematic drawing illustrating the electrical circuitry of the present invention.

FIG. 5 is a side elevation view of an alternate form of the present invention.

FIG. 6 is a perspective view of the embodiment of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, and to FIGS. 1, 2 and 3 in particular, the front sight device of the present invention is generally designated by the reference character 10. The front sight device 10 comprises a light-emitting portion 12, a power supply portion 14 and electrical interconnecting means 16 interconnecting the light-emitting portion 12 and the power supply portion 14.

The light-emitting portion 12 includes a light-emitting solid state device, preferably in the form of a light-emitting diode 18. The light-emitting diode 18 is carried in a housing 20 and is preferably potted thereto by means of a suitable form of epoxy resin or the like. Suitable mounting means 22 is fixedly secured to the housing 20 for securing the light-emitting portion 12 to a firearm or the like as will be discussed in greater detail hereinafter.

The power supply portion 14 is preferably carried in a housing 24. Mounting means 26 is carried by the housing 24 for securing the power supply portion 14 to a firearm or the like as will be described more fully hereinafter. On-off switch means 28, preferably in the form of a miniature toggle switch, is carried by the housing 24 for turning the power supply portion 14 on and off. A rubber boot or the like 29 is positioned over the switch means 28 and carried by the housing 24 to prevent the entrance of dirt and moisture into the housing 24 around the switch means 28.

The power supply portion 14, also includes a phototransistor 30 which is exposed to ambient light rays for controlling the output of the light-emitting diode 18. The function of the phototransistor 30 and the electrical circuitry associated therewith will be described in more detail hereinafter.

As shown in FIGS. 1 and 2, the front sight device 10 is advantageously mounted on the barrel 32 of a conventional firearm 34. The light-emitting portion 12 of each front sight device 10 is suitably secured to the ex-

isting front sight 36 of the firearm 34 by means of the mounting means 22. It will be appreciated by those skilled in the art that, owing to the multiplicity of existing designs of front sights for conventional firearms, no single form of mounting means 22 can be reasonably set forth as being preferred. One suitable form of mounting means 22, as shown in FIG. 3, would be a U-shaped member which could be sized and shaped to engage the existing parallel grooves 38 of a front sight 36. Such parallel grooves are usually formed in the front sight to slidably receive a conventional removable front sight hood therein.

Suitable mounting means 26 for securing the housing 24 to the barrel 32 of the firearms 34 is also illustrated in FIG. 3 and comprises a lower member 40 secured to the upper portion of the housing 24 and having a U-shaped groove 42 formed therein for receiving the barrel 32. An upper member 44, sized and shaped to conform to the barrel 32 is secured to the lower member 40 by means of a pair of screws 46 or the like to secure the housing 24 to the barrel 32.

A suitable light-emitting diode for use as the light-emitting solid state device 18 is the Opcoa model OSL-1. This light-emitting diode produces a tiny pinpoint of red light. The pinpoint of light is approximately .062 inches square and radiates red light having a wave length of between 6,200 and 7,000 angstrom units and preferably approximately 7,000 angstrom units. The wave length and intensity of the red light radiated by the light-emitting diode 18 is such that it will not destroy night vision of a shooter using the front sight device.

As shown in FIGS. 1 and 2, the light-emitting diode 18 is properly positioned at a point directly over and to the front of the existing front sight blade or bead 36. The light-emitting diode 18 is positioned facing the rear sight 48 so that the shooter can readily discern the pinpoint of light generated by the light-emitting diode when sighting through the rear sight 48. It should be noted that the pinpoint of light radiated by the light-emitting diode 18 is not visible from a position downrange from the firearm 34.

The housing 20 may be suitably constructed by brass tubing which is soldered to the brass base of the light-emitting diode 18. The single conductor from the light-emitting diode extends through the housing 20 and is electrically connected to the inner conductor of the electrical interconnecting means 16. The electrical interconnecting means may be suitably constructed of Teflon coated armored cable. The outer conductor of the electrical interconnecting means 16 is preferably soldered to the brass housing 20. The brass base of the light-emitting diode 18 provides the second electrical connection thereto and is electrically connected to the interconnecting means 16 through the housing 20 to the outer conductor thereof. The electrical connection between the interconnecting means and the housing 20 may be suitably protected by means of heat-shrinkable tubing positioned around the solder connection between the interconnecting means 16 and the housing 20 and extending a short distance up the housing 20 and down the interconnecting means 16.

The power supply portion 14 contains within its housing 24 a suitable DC voltage source and a solid state electrical circuit for driving the light-emitting diode 18. This circuitry is schematically illustrated in FIG. 4. The DC voltage source 50 is preferably pro-

vided by a pair of 1.4 volt N size alkaline dry cells which are conventional in nature and commonly available. Alternately, a pair of series 401 Mercury dry cells may be used to provide the suitable DC voltage. However, the Mercury dry cells are found to provide relatively poorer performance under low temperature conditions. The use of carbon zinc dry cells is not recommended due to the possible damage to the power supply portion 14 if such dry cells were to corrode therein.

The circuit further includes the switch 28, previously mentioned above, for alternately turning the power supply portion 14 on or off. One pole of the switch 28 is electrically interconnected to the positive side of the DC voltage source 50. The other pole to the switch 28 is electrically interconnected to the wiper of a potentiometer or rheostat 52 and to the collectors of the previously mentioned phototransistor 30 and and a suitable NPN transistor 54. The base of the photo transistor 30 is electrically connected to one end of the resistance element of the potentiometer 52. The base of the transistor 54 is electrically connected to the emitter of the phototransistor 30. The emitter of the transistor 54 is electrically connected to the anode of the light-emitting diode 18. The cathode of the light-emitting diode 18 is electrically connected to one terminal of a load resistor 56 while the other terminal of the load resistor 56 is electrically connected to the negative side of the DC voltage source 50.

The nature of the circuit shown in FIG. 4 is such that when the switch 28 is closed current flows there-through from the DC voltage source 50 through the transistor 54 to the light-emitting diode 18, and thence from the light-emitting diode 18 through the load resistor 56 to the negative post of the DC voltage source 50. When the switch 28 is closed, current also flows there-through from the DC voltage source 50 to the collector of the phototransistor 30, through the base and from the emitter thereof to the base of the transistor 54. Current also flows from the closed switch 28 through the potentiometer 52 to the base of the phototransistor 30.

Adjustment of the potentiometer 52 provides a suitable positive voltage at the base of the phototransistor 30 relative to the base of the transistor 54. When ambient light is absorbed by the base of the phototransistor 30 a multiplied photocurrent is produced by transistor action which in turn causes an increase in conductivity at the transistor 54 thereby increasing the current flow through the light-emitting diode 18 and increasing the light output thereof.

It will be readily apparent that the circuitry described above permits the shooter to first vary the light output of the light-emitting diode by adjusting the potentiometer 52. It will then be seen that when the phototransistor 30 is exposed to relatively bright ambient light downrange, the light output of the light-emitter diode 18 is proportionately increased so that it may be more easily discerned by the shooter. Similarly, when the ambient light from downrange is relatively low, the light output of the light-emitting diode 18 is proportionately reduced so as not to be unduly bright under low-light conditions. It has been found that a suitable phototransistor 30 is the GE 2N5777 photoresistor. However, other readily available phototransistors can be utilized in this circuit. The circuitry, with the exception of the light-emitting diode 18 and the DC voltage source 50,

is enclosed in the housing 24 and secured therein by suitable epoxy potting compound. The housing 24 is preferably formed of a suitable heat resistant thermoplastic material. All transistors in the circuitry are preferably high reliability silicon devices.

The front sight device 10 constructed as described above is totally waterproof and has an operating temperature range, when using alkaline dry cells, of from -30° F. to 200° F. The potting of the components of the device 10 provides a high degree of protection from vibration and impact.

DESCRIPTION OF THE EMBODIMENT OF FIGS. 5 and 6

A slightly modified front sight device 10a is shown in FIGS. 5 and 6. The device 10a is specifically adapted for installation on the bayonet lug and front sight of the AR15/M16, AR180/AR18 types of weapons. Elements identical to the previously described front sight device 10 carry the same reference characters.

The slightly modified light-emitting portion 12a includes a slightly modified housing 20a having an L-shaped configuration. The housing 20a is suitably secured to a slightly modified mounting means 22a which is preferably formed of stamped sheet metal such as steel.

The mounting means 22a includes an aperture 58 formed therein through which the sight bead of the front sight 36a of the weapon 34a extends, as illustrated in FIG. 5. When properly installed, the light-emitting diode 18 is positioned directly above the front sight bead of front sight 36a. A pair of spring clip elements 60 engage the front sight 36a to secure the light-emitting portion 12a in proper position.

The slightly modified power supply portion 14a is secured to the weapon 34a by a slightly modified mounting means 26a. The mounting means 26a engages the bayonet lug 62 of the weapon 34a which extends downwardly from the barrel 32a, as shown in FIG. 5. The mounting means 26a is preferably stamped from suitable sheet metal, such as steel, and is preferably secured to the housing 24 by means of a suitable rivet 64 or the like. The mounting means 26a further includes a pair of spring clip elements 66 for engaging the bayonet lug 62 to secure the power supply portion 14a to the weapon 34a.

OPERATION OF THE PREFERRED EMBODIMENT

To properly utilize the front sight device 10, the power supply portion 14 is first secured to the barrel 32 proximate to the front sight 36 of the firearm 34. The power supply portion 14 is secured by means of the mounting means 26. The light-emitting portion 12 is then secured to the front sight 36 with the light-emitting diode 18 positioned in front of and directly over the blade or bead of the front sight 36. This position is clearly illustrated in FIG. 2.

The on-off switch 28 is then placed in the on position and the potentiometer 52 is adjusted to provide the preferred light output from the light-emitting diode 18 under the ambient light conditions. Once a satisfactory setting of the potentiometer 52 is found, no further adjusting of the potentiometer 52 need be made during the operation of the device 10.

The shooter then places the firearm 34 in shooting position and visually aligns the illuminated light-

emitting portion 12 with the rear sight 48 in a conventional manner. The proper sight picture is formed when the shooter, looking through the rear sight 48, positions the pinpoint of light radiating from the light-emitting diode 18 directly on the target. Improper sight alignment will cause the pinpoint of light to appear distorted when viewed through a rear sight 48 having a peep formed therein. Proper sight alignment will be evident when the pinpoint of light is centered in the peep.

It should be noted that the front sight device 10 will also operate satisfactorily with the rear sight 48 of the open notch type. Proper sight alignment with an open notch type rear sight is obtained when the pinpoint of light radiating from the light-emitting diode is positioned in the notch of the rear sight. The pinpoint of light should be equidistant from the sides of the notch in the rear sight 48.

It should be noted that the illuminated front sight device 10 permits a shooter to obtain proper sight alignment of the firearm while keeping both eyes open to view the target under low light conditions.

When not in use, the on-off switch 28 should be placed in the off position to prevent undue current drain from the DC voltage source 50. Due to the relatively small physical dimensions of the power supply portion 14 of the front sight device 10, which is approximately 1.5 by 1.5 by 1.25 inches, the front sight device 10 may be left on the firearm 34 when the firearm is laid away and not in use.

It should be further noted that the operation of the embodiment of the present invention illustrated in FIGS. 5 and 6 is substantially identical to the operation described above for the front sight device 10. It is therefore believed unnecessary to describe the operation of the front sight device 10a in detail again.

It will be readily apparent that, while the present invention may be advantageously employed with various types of firearms, the present invention may also be used for visually aligning apparatus other than firearms under conditions of low light. A few such additional applications would be with archery equipment, directional telescopic microphones, and any other form of instrument or apparatus which might be placed in proper alignment through the visual alignment of a target, an illuminated front sight and a rear sight.

From the foregoing detailed description of the front sight device of the present invention, it may be readily seen that the present invention obtains the objectives set forth herein. Changes may be made in the arrangement or combination of parts or elements shown in the drawing and described in the specification without departing from the spirit and scope of the invention as defined in the following claims.

What is claimed is:

1. A front sight device for use under low ambient light conditions with a conventional firearm or the like having a rear sight member carried thereon, said front sight device comprising:

light-emitting means for radiating visible light toward the rear sight member in response to the application of electric current thereto;

means for securing the light-emitting means to a conventional firearm;

means for providing electric current to said light-emitting means;

means for conducting electric current from said power means to said light-emitting means, said

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> means including adjusting means responsive to ambient light rays for automatically adjusting current flow from said power means to said light-emitting means so that the intensity of visible light radiation from said light-emitting means increases as the intensity of the ambient light rays increases and, alternately so that the intensity of visible light radiation from said light-emitting means decreases as the intensity of the ambient light rays decreases; and
means for securing said power means to a conventional firearm.

2. The front sight device as defined in claim 1 wherein said light-emitting means is characterized further to include:
a light-emitting semiconductor device.

3. The front sight device as defined in claim 1 wherein said light-emitting means is characterized further to include:
a light-emitting diode.

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4. The front sight device as defined in claim 1 wherein said adjusting means for automatically adjusting current flow from said power means to said light-emitting means is characterized further to include:
photosensitive means for absorbing ambient light rays and producing an increased electric current output in response to an increase in intensity of ambient light rays and, alternately, producing a decreased current output in response to a decrease in intensity of ambient light rays;
circuit means responsive to the current output of said photosensitive means for increasing the electric current provided to said light-emitting means in response to increased current output of said photosensitive means and, alternately, decreasing the electric current provided to said light-emitting means in response to decreased current output of said photosensitive means;
means for electrically interconnecting said photosensitive means and said circuit means; and
means for electrically interconnecting said circuit means and said light-emitting means.

5. The front sight device as defined in claim 4 wherein said adjusting means is characterized further to include:
manual adjusting means for adjusting the input-to-output ratio of said photosensitive means to a predetermined standard; and
switch means for alternately electrically connecting and disconnecting said light-emitting means to said

power means.

6. A sight system for visually aligning an apparatus such as a conventional firearm under conditions of low ambient light, comprising:
a conventional rear sight mounted on the apparatus;
a front sight device carried by the apparatus and characterized further to include:
light-emitting means for radiating visible light toward said rear sight in response to an electric current input thereto;
power means for providing an electric current output; and
means for electrically interconnecting said light-emitting means and said power means to provide the electric current input to said light-emitting means from the electric current output of said power means, said means including adjusting means responsive to ambient light rays for automatically adjusting current flow from said power means to said light-emitting means so that the intensity of visible light radiation from said light-emitting means increases as the intensity of the ambient light rays increases and, alternately, so that the intensity of visible light radiation from said light-emitting means decreases as the intensity of the ambient light rays decreases.

7. The sight system as defined in claim 6 wherein said light-emitting means is characterized further to include:
a light-emitting diode.

8. The sight system as defined in claim 6 wherein said adjusting means is characterized further to include:
photosensitive means for absorbing ambient light rays and producing an electric current output in response thereto;
circuit means responsive to the output of said photosensitive means for varying the electric current provided to said light-emitting means;
means for electrically interconnecting said photosensitive means and said circuit means;
means for electrically interconnecting said circuit means and said light-emitting means;
manual adjusting means for adjusting the input-to-output ratio of said photosensitive means to a predetermined standard; and
switch means for alternately electrically connecting and disconnecting said light-emitting means to said power means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,833,799 Dated September 3, 1974

Inventor(s) Normand A. Audet

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract, lines 10 and 11, after the word "diode" delete "so that will be proportion from to the ambient light" and insert --so that it will be discernable from the ambient light--.

In Column 1, line 32, "opticals" should be --optical--.

In Column 3, line 43, "by" should be --of--.

In Column 4, line 15, "to" should be --of--.

In Column 4, line 64, "photoresistor" should be --photo-transistor--.

In Column 6, line 64, before the word "means" insert the word --power--.

Signed and sealed this 19th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents