United States Patent

Knutsen et al.

[15] **3,641,676**

[45] **Feb. 15, 1972**

[54] **RADIOLUMINESCENT GUNSIGHT AND METHOD**

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[73] Assignee: **Nite-Site, Inc.**, Rosemount, Minn.

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[21] Appl. No.: **848,152**

[52] **U.S. Cl.** .....**33/52**, 42/1 S, 33/47

[51] **Int. Cl.** **F41g 1/30**, F41g 1/32, F41g 1/34

[58] **Field of Search** 33/52, 47, 53; 42/15

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Assistant Examiner—Paul G. Foldes
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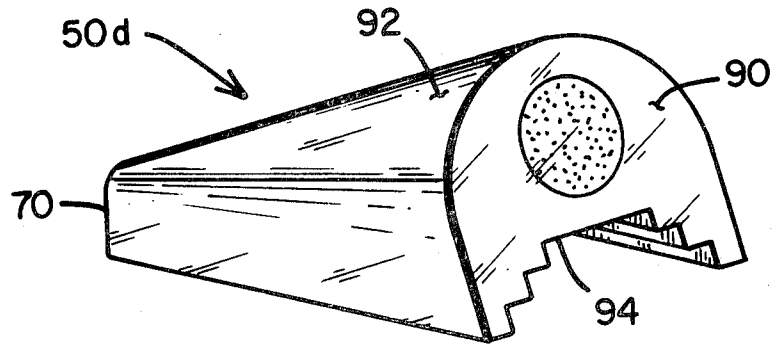
[57] **ABSTRACT**

An improved gunsight utilizing radioluminescent material for permitting sighting of the gun in darkened conditions is described. Particular housings for holding the radioluminescent material are also described, together with methods of applying the radioluminescent material to the sights of guns.

9 Claims, 37 Drawing Figures



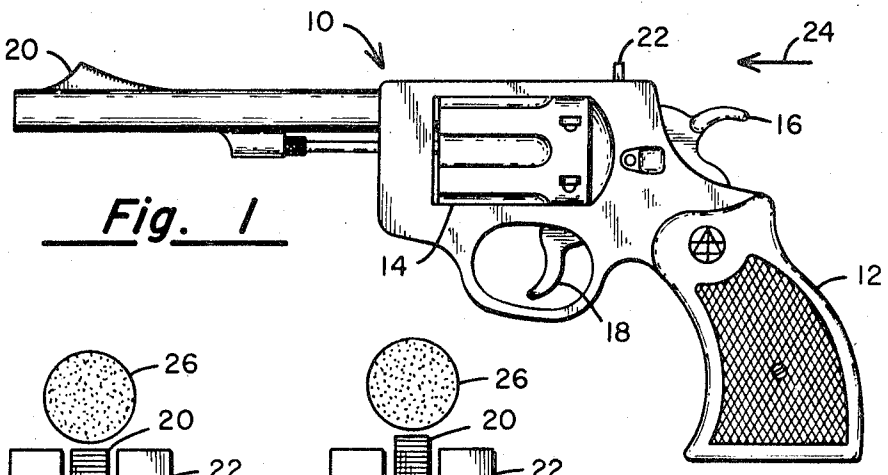
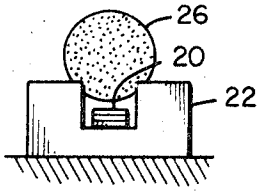


Fig. 1

Fig. 2

Fig. 3



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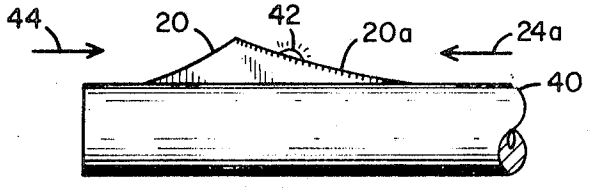

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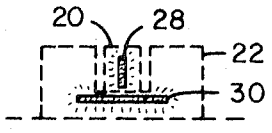

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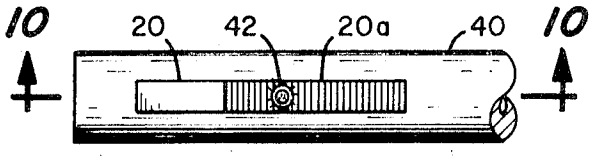

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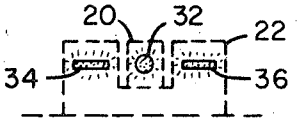

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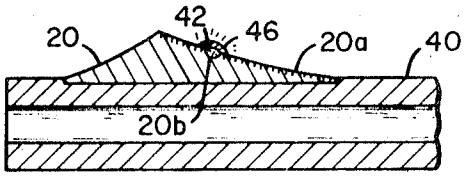

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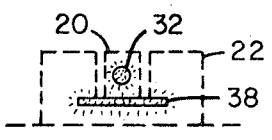

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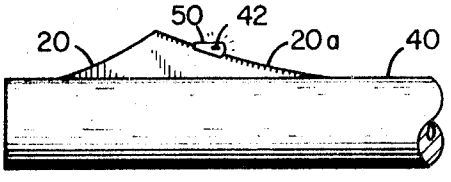

Fig. 11

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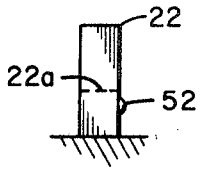

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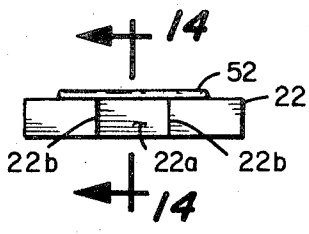

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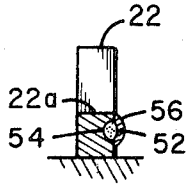

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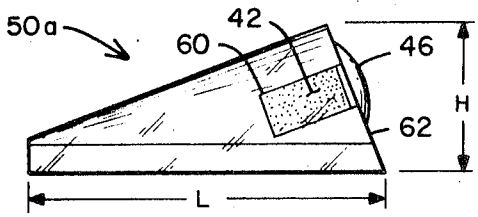

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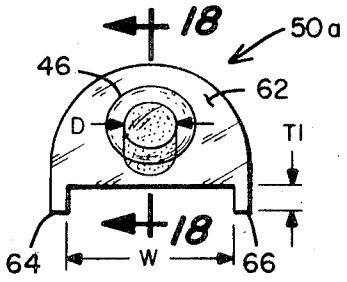

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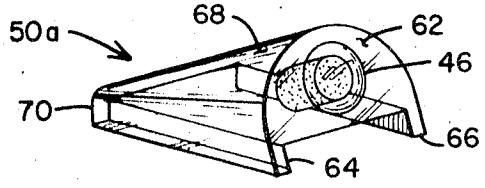

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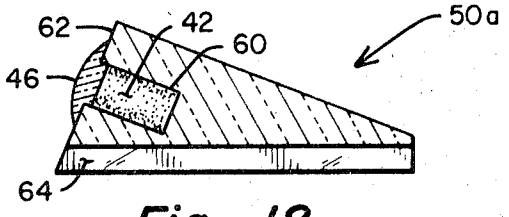

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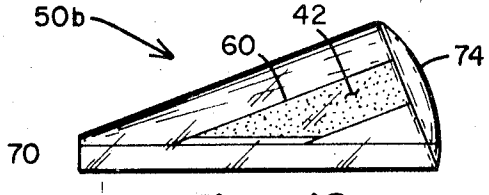

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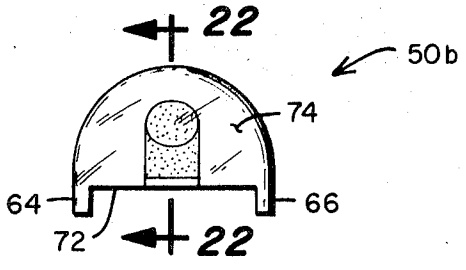

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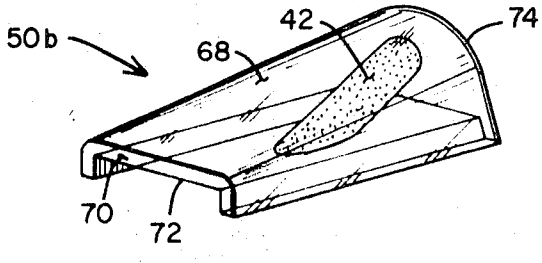

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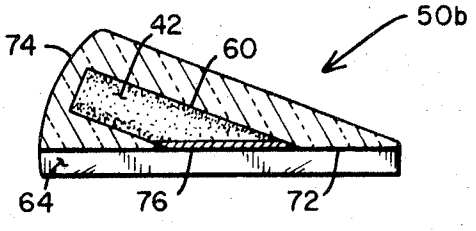

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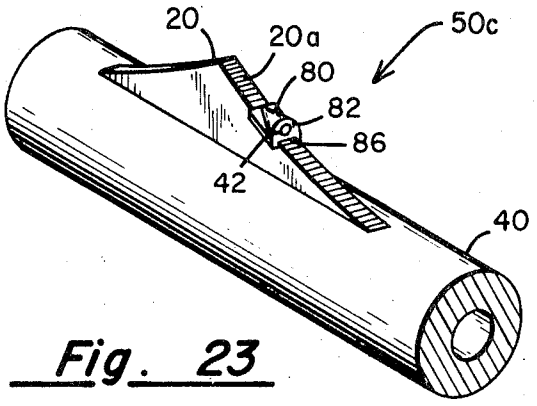

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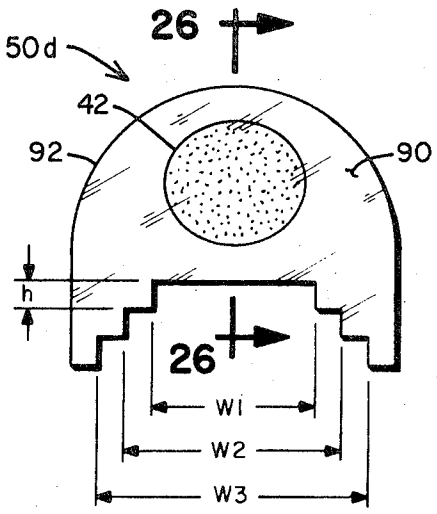

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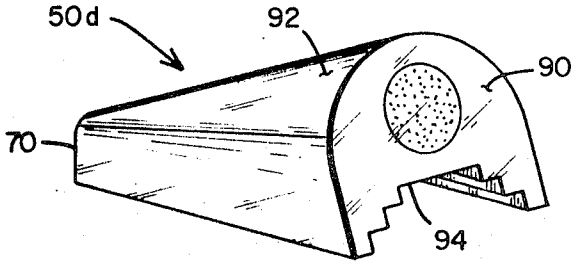

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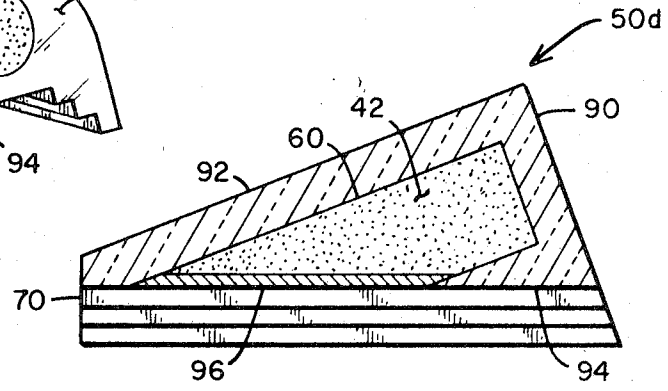

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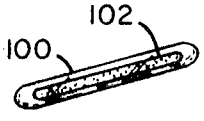

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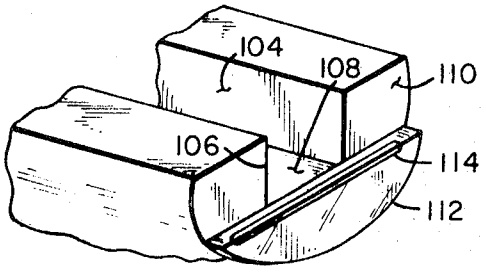

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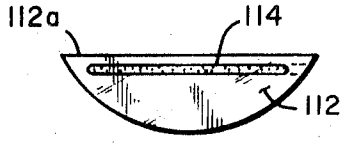

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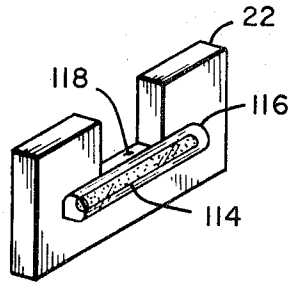

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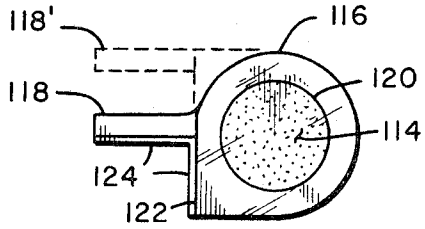

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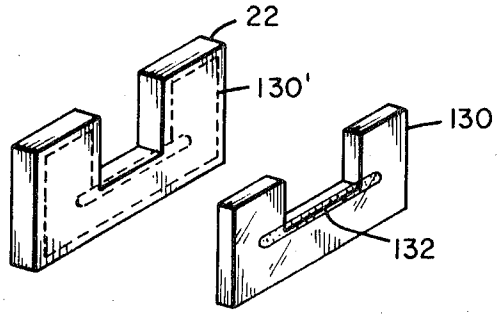

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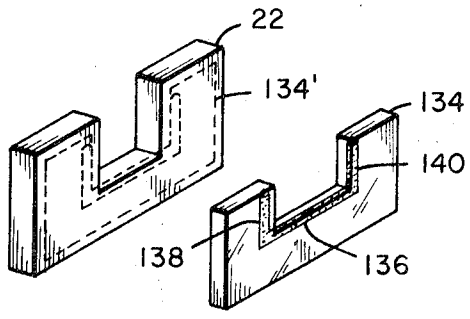

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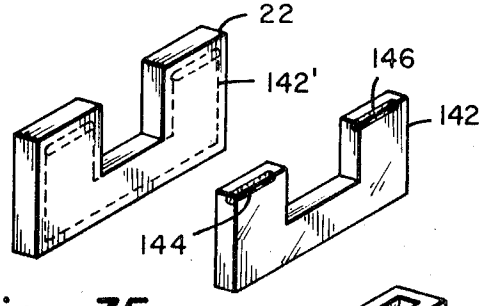

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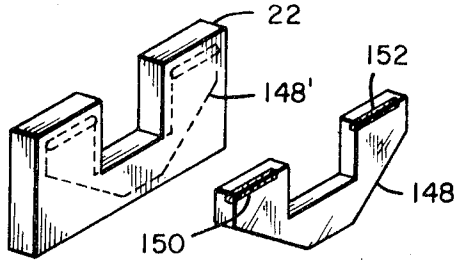

Fig. 36

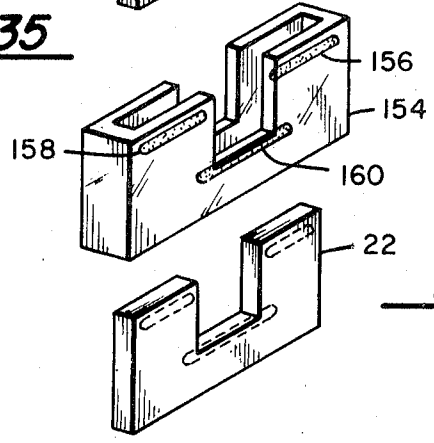

Fig. 37

RADIOLUMINESCENT GUNSIGHT AND METHOD

BACKGROUND OF THE INVENTION

1. Field Of The Invention

This invention relates generally to the field of gun sights. More specifically, it relates to the field of gun sights that can be utilized both in lighted and darkened conditions.

2. State Of The Prior Art

The prior art has recognized the desirability of having facilities for sighting a gun in darkened conditions. This is particularly true in the field of law enforcement where police officers very often have to enter darkened buildings to investigate burglaries and break-ins, and where they have to operate during the nighttime hours on unlighted streets and in other darkened areas. Under these severe conditions, a characteristic practice for police officers is to utilize a flashlight or other hand-held light, extended as far as possible from the police officer's body, while directed at the object that may be fired at. This procedure allows the officer to see the target, but does not allow him to accurately sight his gun in darkened conditions. This operation becomes more of a pointing operation rather than actually sighting. The primary drawback to this mode of operation is that the criminal or other party under investigation has a clearly visible target in the flashlight to shoot at, thus exposing the police officer to an extreme hazard. This hazard is over and above the nearly impossible task of quickly and accurately aiming the gun.

Another attempt at solving the problem of aiming and shooting a gun under darkened conditions has been to equip the hand gun or the like with a mount for mounting a flashlight. For this operation, the police officer is directing his gun wherever the light is pointed. Again, this becomes a pointing operation with very little ability to accurately sight the weapon. Further, the light source clearly identifies the location of the officer and provides an extremely vulnerable target; and, again, puts the police officer in a very dangerous position for receiving return fire. Further, the flashlight mount does not conform to the usual type of holster or carrying case, and renders quick use of the weapon virtually impossible.

Still another type of device that has been developed in the prior art utilizes a light reflective material, for instance, in the area of the front sight of a gun, such that any light impinging thereon will be concentrated and will render the front sight visible during periods of lower intensity light, than normally would be available for guns without such devices. It is clear, however, that such devices require some light from the external sources whether it be sunlight, or artificial light, in order to be operative at all. For periods of close to total darkness, these devices are no better than the normal type of metallic gun sight. Considering daylight as the source of illumination, it can be said that these types of devices would render a weapon useable for approximately an additional hour at sunrise and at sunset, but would be totally ineffective in the darkness hours.

Still another type of prior art device involves the use of a source of infrared light with an infrared scope sight. This type of equipment is very expensive, and is very bulky. This type of equipment has been available for a relatively long period of time, and has received acceptance primarily in the military applications where expense is no object and for certain types of very specific uses. The infrared devices require special power sources, together with the light generating equipment. It should be noted further, that the infrared devices do not in fact illuminate the sights of the weapon, but are arranged such that the telescopic sight that is utilized in the infrared system acts as the sighting element. The complexity, expense, and undue weight and unwieldiness of this infrared equipment renders it unacceptable for use by police officers and other law enforcement officers that have many other duties other than merely carrying their weapon and light source.

From a consideration of the various prior art devices mentioned above, it can be seen that the net result for most hand guns utilized by law enforcement officers is that the guns are essentially effective only during daylight hours or in situations during darkness wherein there is adequate artificial light to illuminate the conventional sights and the target. The use of the radio luminescent sight of this invention overcomes all of the foregoing problems inherent in the prior art devices. That is, no auxiliary light source, such as a flashlight, is necessary, thereby rendering the user relatively more free of detection and giving an assailant nothing to shoot at. Further, the improved sight of this invention acts as its own power source, and is not subject to failure due to batteries wearing out, or other such power failures. Neither does the improved gun sight of this invention require any external light for its activation. Finally, there is absolutely no necessity of any auxiliary power equipment and sighting apparatus as is required in the infrared systems. It can generally be stated, that the radioluminescent gun sight of this invention can be seen and utilized in periods of total darkness, its effectiveness only requiring that the user be able to detect some form of target to aim at.

SUMMARY

In summary, then, it can be stated that this invention comprises a deposit of radioluminescent material on the front sight of a gun together with a deposit of a radioluminescent material on the rear sight of the gun, the arrangement being such that in darkness the visible light emitted by the material on the front sight can be aligned with another form of the visible light on the rear sight in a manner similar to conventional sighting. More specifically, the invention comprises a novel manner of encapsulating and utilizing radioluminescent material for application to the front and rear sights of guns for rendering such guns capable of being sighted even in total darkness. In order to achieve the maximum light intensity with a minimum amount of fringing, or haloing, novel encapsulation devices have been developed, as described more fully below. These novel encapsulations are arranged for containing predetermined amounts of radio luminescent material, and are so designed as to provide a maximum strength to prevent breakage from the normal type of impact that would be derived from inserting or removing the gun in a holster or case, or from dropping the gun. Further, these housings are so designed to render their installation on various types and designs of conventional gun sights relatively easy, while insuring proper alignment of the front and rear sights during the installation.

The primary object, then, of this invention is to provide a novel self-illuminated gun sight for use front and rear sights of hand guns, or the like, for rendering the guns so equipped capable of being sighted in periods ranging from total light to total darkness. Still another object of this invention is to provide an illuminated gun sight that utilizes radioluminescent material as the source of light energy for both the front and rear sights. Yet another object of this invention is to provide novel encapsulations for application to the front and rear sights of conventional guns, the encapsulations arranged for holding predetermined amounts of radioluminescent material, the housings being substantially transparent for providing a minimum diffusion of the light provided by the radioluminescent material. Another object of this invention, is to provide novel methods of manufacturing self-illuminated sights for use on both the conventional front and rear sights for guns. These and other more detailed and specific objectives will become apparent to those skilled in the art from a consideration of the following detailed description of the preferred embodiments, the drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a characteristic hand gun illustrating the sight arrangement capable of utilizing this invention;

FIG. 2 is a correct sight-view of the gun sight as aimed at a target;

FIG. 3 is an incorrect sighting pattern with the front of the gun held too high;

FIG. 4 is another incorrect sight pattern with the front sight of the gun held too low;

FIG. 5 illustrates one configuration of the self-lighted front and rear gun sights of this invention;

FIG. 6 is yet another embodiment of the invention wherein the front sight has a circular dot of radioluminescent material and the rear sight has a pair of bars of radioluminescent material mounted at each side of the notch of the rear sight;

FIG. 7 is still another embodiment of the invention wherein the front gun sight again has a dot of radioluminescent material and the rear sight has a single bar of radioluminescent material mounted under the rear sight notch;

FIG. 8 is a side view of the end of the barrel and the front sight of a gun with the radioluminescent front sight attached;

FIG. 9 is a top view of the portion of the barrel illustrated in FIG. 8;

FIG. 10 is a sectional view taken along line 10—10 in FIG. 9 and illustrates the radioluminescent material embedded in the front sight and covered by protective material;

FIG. 11 is an alternative arrangement of the front sight, utilizing a housing for holding the radioluminescent material;

FIG. 12 is a side view of a rear gun sight with radioluminescent material affixed thereto;

FIG. 13 is a top view of the sight of FIG. 12;

FIG. 14 is a sectional view taken along lines 14—14 in FIG. 13;

FIG. 15 is a side view of a transparent housing for containing radioluminescent material;

FIG. 16 is a front face view of the housing of FIG. 15;

FIG. 17 is a perspective view of the housing shown in FIG. 15; and

FIG. 18 is a sectional view taken along line 18—18 in FIG. 16;

FIG. 19 is a side view of an alternative embodiment of a front sight housing that is to be loaded from the bottom;

FIG. 20 is a front face view of the housing illustrated in FIG. 19;

FIG. 21 is a perspective view of the housing of FIG. 19 viewed from the rear thereof;

FIG. 22 is a sectional view taken along lines 22—22 in FIG. 20 illustrating the aperture for filling the housing from the bottom;

FIG. 23 is a perspective view of an end of a gun barrel and front sight with an alternative housing attached;

FIG. 24 is a front view of an alternative embodiment of a front sight housing;

FIG. 25 is a perspective view of the housing of FIG. 24;

FIG. 26 is a sectional view taken along line 26—26 in FIG. 24;

FIG. 27 is an encapsulation for attaching to a blade-type front gun sight or a rear gun sight;

FIG. 28 is an alternative encapsulation shown in perspective on a rear sight;

FIG. 29 is a front view of the encapsulation of FIG. 28;

FIG. 30 is a side view of the encapsulation illustrated in FIG. 29;

FIG. 31 is an alternative embodiment for an encapsulation, or housing, for attaching to the rear gun sight, having a tab for holding the encapsulation in alignment during assembly;

FIG. 32 is an end view of the housing illustrated in FIG. 31;

FIG. 33 is an alternative arrangement for encapsulating radioluminescent material for mounting near the notch of the rear gun sight;

FIG. 34 is a perspective view of yet another embodiment for encapsulating radioluminescent material at both sides and beneath the notch of a rear gun sight;

FIG. 35 is a perspective view of still another embodiment for encapsulating radioluminescent material at both sides only of the notch of the rear gun sight;

FIG. 36 illustrates still another embodiment for encapsulating radioluminescent material for mounting at the sides of the notch of the rear gun sight; and

FIG. 37 illustrates an encapsulation housing for holding radioluminescent material and is arranged for sliding over the rear gun sight.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1 there is illustrated a side view of a characteristic hand gun, referred to generally as 10, having a handle portion 12, a cylinder portion 14 for holding cartridges, and a hammer 16 for activating the cartridges when the trigger 18 is pulled. The gun has a front sight 20 and a rear sight 22. Correct sighting is in the direction of arrow 24, and such sighting during light hours is relatively easily accomplished.

A correct sighting pattern would be as illustrated in FIG. 2, wherein a rear sight 22 is so aligned with a front sight 20 that the upper surfaces of each of these front and rear sights is substantially aligned, and held just below the target 26 at which aim is being taken. An incorrect pattern is shown in FIG. 3, wherein the front sight 20 is held substantially higher than the upper surface of rear sight 22, when aiming at target 26. Yet another incorrect sighting pattern is illustrated in FIG. 4, wherein the rear sight 22 is held substantially higher than the upper surface of the front sight 20, when aiming at the target 26. As indicated above, these sighting arrangements can readily be made during periods when there is sufficient light to view both the target and the sights.

It has long been recognized, that sighting guns during times of darkness would be desirable, but previously no satisfactory method for performing this type of sighting has been available. While methods have been devised for providing artificial light, and by the use of infrared apparatus, there has been no readily adaptable solution to this problem of being able to sight a gun in periods of relative darkness. The subject invention has considered this problem and has solved it. Directing attention to FIGS. 5, 6 and 7, there are illustrated three configurations of radioluminescent material applied to both the front and rear sights. Radioluminescent material that can be utilized for this application, can be selected from any isotope that will energize a phosphor to a sufficient light output to render the sights readily alignable. In this regard, naturally occurring radium can be utilized, as can be such elements as tritium or promethium-147. The use of tritium or promethium-147 is in conjunction with a phosphor, for example zinc sulphide. As mentioned above, no limitation to the type of material is intended, with these materials all providing adequate light output in relatively small quantities to permit the easy sighting of a gun in darkness. Sufficient light output to provide the adequate sighting requirements, can be achieved by a radioluminescent material that will provide light output from approximately 20 microlamberts of light to as much light as would be required. The amount of light output will be dependent upon the isotope utilized, in conjunction with the phosphor. Of course naturally occurring radium will be utilized by sufficient weight to provide the desired light output. Materials of these types are available commercially.

Turning to a detailed consideration of FIGS. 5, 6 and 7, it will be seen that the front sight 20 is shown in dashed line, as is the rear sight 22. In FIG. 5, the front sight 20 has a bar, or line, 28 of radioluminescent material applied thereto while the rear sight 22 has a bar 30 transverse to bar 28, and applied immediately at the base of the notch of the rear sight. For proper sighting, then, it is necessary in darkness only to put the bottom of the bar 28 of the front sight substantially at the surface of, and in the middle of the bar 30 on the rear sight 22 to accomplish a correct sight. Turning to a consideration of FIG. 6, it can be seen that the front sight 20 has a circular dot 32 applied thereto. The rear sight 22 has a pair of substantially horizontal bars 34 and 36 of radioluminescent material applied at the sides of the notch and substantially parallel to the bottom of the notch. To accomplish a correct sight for this embodiment, it is necessary only to bring the circular dot 32 of the front sight into alignment with the ends of bars 34 and 36 and the gun is properly sighted. Yet another embodiment is shown in FIG. 7, with a dot 32 of radioluminescent material applied to the front sight 20. In this configuration, the rear sight 22 has a substantially horizontally arranged bar of

radioluminescent material 38 applied immediately below the bottom of the notch of the rear sight, and extending beyond the vertical edges of the notch. For this configuration, a correct sighting is achieved by centering the dot 32 over the middle of the bar 38, as illustrated, to achieve a correct sighting pattern. Each of the patterns illustrated in FIGS. 5, 6, and 7, will be rendered relatively easy for a gun handler to sight with relatively little practice. It is of course understood that the bar-shape of radioluminescent materials applied to the rear sights, can also be curved upward or downward, as might be desired.

The configurations of radioluminescent material can be applied by painting the material on the surfaces of the sights. These painted markings are then covered with a transparent coating, for example epoxy, varnish, or the like, to provide protection to the material. The surfaces of the sights can be grooved, as by milling, or the like, prior to applying the radioluminescent material.

Various methods and apparatus for applying the radioluminescent material to the front and rear sights will be described below. Additionally, various housings for containing the radioluminescent material for application to the front and rear sights will also be described. Throughout the discussion, the same or similar elements will be given the same reference numerals in the various views.

FIG. 8 is a side view of the end of the barrel 40 and the front sight 20 of a gun with a radioluminescent front sight 42 applied thereto. The same arrangement is shown in FIG. 9, which is a top view of the portion of the barrel 40 and the sight 20 illustrated in FIG. 8. In this configuration, the radioluminescent material 42 is arranged as a dot on the surface 20*a* of sight 20, facing the user of the gun, and can be viewed when viewing in the direction of arrow 24*a*. It will be noted that the location of the radioluminescent material 42 is positioned at a point on the sight 20 at approximately one-half the maximum height of the sight. This arrangement renders the radioluminescent material 42 visible immediately adjacent the bottom of the notch of the rear sight 22 when a correct sighting pattern is held. (See FIG. 7) It can be seen also, that an observer viewing the barrel 40 in the direction of arrow 44 will not see any portion of the light generated by the radioluminescent material 42.

The radioluminescent material 42 illustrated in FIGS. 8 and 9, can be applied by painting a dot right on the surface 20*a* of the sight 20. Normally, when the radioluminescent material is painted on, it is necessary to apply a protective transparent coating over the radioluminescent material 42 to assure that it does not get worn or abraided away, as mentioned above. It is noted, that the rear surface 20*a* of the sight 20 is often roughened or knurled to prevent glaring during daylight sighting. For such a roughened surface, the painting of the radioluminescent material directly onto the knurled or roughened surface does not lend itself to achieving the desired dot pattern. The same is true for the bar pattern of FIG. 5. To remedy this situation an alternative method of applying the radioluminescent material is illustrated in FIG. 10, which is a sectioned view taken along line 10—10 in FIG. 9. In this view, it can be seen that the rear surface 20*a* has an indentation 20*b* milled therein. The milled indentation is then filled with radioluminescent material 42 and covered with the transparent coating 46. Characteristically, this transparent coating can be of an epoxy resin, which is very hard, and will protect the radioluminescent material 42 from being removed from the sight 20 when the gun is being inserted and withdrawn from holsters, and the like.

While the radioluminescent material 42 can be applied directly to the sight as described above, this method of application does not lend itself particularly to applying the improved gun sights of this invention to guns already in use. While these arrangements work as intended, they do require modification of the sights of the gun in order to achieve a firm housing and bond to the sight. An alternative to this situation is shown in FIG. 11, which is a side view of a front sight 20 on a barrel 40 utilizing a transparent housing 50 for holding the radioluminescent material 42 therein. In this arrangement, there is no necessity for modifying the surface 20*a* of the front sight 20, and the housing 50 can be attached directly thereto. The forms of the housing 50 and the methods of attaching it to the surface 20*a* will be described in more detail below.

Next turning to a consideration of the rear sight 22, attention should be directed to FIGS. 12, 13, and 14. FIG. 12 is a side view of a rear sight 22 having a bar of radioluminescent material 52 mounted right below the bottom surface 22*a* of the notch. FIG. 13 is a top view of the sight illustrated in FIG. 12, and illustrates that the radioluminescent material 52 extends beyond the edges 22*b* of the notch. As in the case of the front sight 20, the radioluminescent material 52 can be painted directly onto the rear surface, as illustrated, and covered with a protective transparent coating. A preferable method of application is shown in FIG. 14, which is a sectional view taken along lines 14—14 in FIG. 13, and illustrates that a groove 54 is milled along the width of the sight 22 immediately below surface 22*a* and is filled with radioluminescent material 52. The radioluminescent material 52 is then covered over with a transparent coating 56. This completely encapsulates the radioluminescent material 52 and prevents it from being scraped from the rear sight, or in any way dislodged. Again, this method of applying the rear sight requires a modification to the existing gun sight. Should it be desired to provide this type of gun sight without modification to the existing notched sight 22, the radioluminescent material can be housed in transparent housings to be described in more detail below.

Turning now to a consideration of various configurations of housings for the application of the radioluminescent material to the front sight, several embodiments will be described. Various views of one of these embodiments are shown in FIG. 15, 16, 17, and 18. FIG. 15 is a side view of a housing 50*a* made of a clear material, such as clear plastic, glass, or the like. The housing 50*a* has a characteristic length of approximately 0.250 inch and a characteristic height of approximately 0.1562 inch. An opening, shown in dashed line 60, extends from the viewing face 62 into the body of the housing 50*a*. This opening 60 is for holding the radioluminescent material 42. The viewing end of the opening 60 is plugged with a transparent material 46, such as an epoxy resin, a plastic plug, or the like. FIG.114 16 is a front face view of the housing illustrated in FIGURE 15, and illustrates that the front surface 62 has the opening 60 approximately in the center thereof, and extending downwardly into the body of the housing 50*a*. The inside diameter D of opening 60 is approximately 0.0625 inch, and the transparent closure 46 extends beyond the surfaces of opening 60. A characteristic width W is in the order of approximately 0.125 inch. A pair of alignment members 64 and 66 are provided along the length L of housing 50*a*, and are utilized for aligning the housing 50*a* on the surface 20*a* of the front sight 20. A characteristic height T1 of these alignment members is in the order of approximately 0.0312 inch. FIG. 17 is a perspective view of the housing 50*a* illustrated in FIGS. 15 and 16, and illustrates that the upper surface 68 is rounded from the front surface 62, extending toward the rear surface 70. FIG. 18 is a sectional view taken along lines 18—18 in FIG. 16, and illustrated the radioluminescent material 42 in the opening 60, and further illustrates that the face surface 62 is sealed by transparent material 46, as described above. To apply the housing 50*a* to surface 20*a* of a front sight 20, it is necessary only to apply an appropriate adhesive, such as epoxy, to the surfaces of the channel formed by the inside surfaces of members 64 and 66 and the bottom of housing 50*a*. The housing 50*a* is then aligned on the appropriate position of surface 20*a* and the adhesive is allowed to set. Alternatively, a contact adhesive is applied directly to these surfaces, with adhesion occurring when the contact adhesive is brought into contact with the surfaces of the front sight 20. The epoxy adhesive as well as the contact-type adhesives are available commercially.

An alternative embodiment is illustrated in FIGS. 19, 20, 21, and 22. FIG. 19 is a side view of this alternative embodiment of the front sight housing 50*b*, and illustrates an embodiment wherein the radioluminescent material 42 is mounted in a tubular opening 60 from a bottom surface 72. In this configuration, the tubular opening 60 extends upwardly into the transparent body of the housing 50*b* a predetermined distance, but does not extend outwardly through the viewing surface 74. In this configuration, the viewing surface 74 is curved for providing additional strength for protecting the radioluminescent material 42, and to provide a lensing effect for sighting. FIG. 20 is a front face view of the housing illustrated in FIG. 19, and illustrates that viewing surface 74 is continuous over the surface thereof, and illustrates that the alignment members 64 and 66 are again present. Overall dimensions for this embodiment are substantially the same as those described above. FIG. 21 is a perspective view of the housing of FIG. 19 viewed from the rear surface 70 thereof. Again, it is illustrated that the overall surface 68 is curved upwardly extending toward the viewing surface 74. FIG. 22 is a sectional view taken along lines 22—22 in FIG. 20 and illustrates that the tubular opening 60 extends from the lower surface 70 of housing 50*b* upwardly toward viewing surface 74. The radioluminescent material is loaded in the opening 60 and sealed by applying a plastic-type plug, or epoxy material 76 into the bottom opening. In this configuration, when the housing 50*b* is assembled and mounted on the sight 20, the radioluminescent material 42 cannot be removed from the tubular opening 60, without destroying the housing 50*b*, or removing the housing 50*b* from the sight 20 and removing the sealing material 76. This embodiment of the housing 50*b* can be applied to the front sight 20 in the same manner described above, that is, by the use of epoxy-type adhesives, or contact adhesives.

FIG. 23 illustrates yet another embodiment of a housing 50*c* for use on a front sight 20, and the figure is a perspective view of a portion of a gun barrel 40 and the front sight 20 with the alternative housing 50*c* attached thereto. This configuration is substantially similar to that illustrated in FIGS. 15 through 22, with the exception that the shape of the upper surface 80 is substantially conical extending from the viewing surface 82 toward the rear surface 84. Again, the dimensions are approximately the same as those mentioned above. For this embodiment of housing 50*c*, the radioluminescent material 42 is inserted through an opening in the bottom surface 86 and is visible as a light dot.

FIGS. 24, 25, and 26 are views of yet another embodiment of a housing 50*d*. For this embodiment, FIG. 24 is a front face view of a viewing surface 90, which is substantially flat. Again, the radioluminescent material 42 is provided in a substantially circular dot at the viewing surface 90. It has been recognized that many different guns have different widths for the front sights 20. In this embodiment, these varying widths are accommodated to housing 50*d* by the stepped arrangement illustrated. A characteristic minimum width W1 can be considered to be in the order of approximately 0.0625 inch. A characteristic intermediate width W2 can be considered to be in the order of approximately 0.095 inch. Finally, a characteristic maximum width W3 can be considered to be in the order of approximately 0.135 inch. Each of these widths W1, W2 and W3 can stand a tolerance of at least plus or minus 0.05 inch. The height 'h' of each of the ridges can be in the range of approximately 0.0156 inch to 0.0312 inch. Of course greater heights 'h' can be utilized, it being kept in mind that it is desirable to maintain a minimum overall height H (see FIG. 15) in order to keep the housing 50*d* from protruding as high as the upper edge of sight 20. FIG. 25 is a perspective view of the housing 50*d* of FIG. 24, and illustrates that the upper surface 92 is rounded downwardly from the viewing surface 90 toward the rear surface 70. FIG. 26 is a sectional view taken along lines 26—26 in FIG. 24, and illustrates that a tubular opening 60 extends from the bottom surface 94 toward the viewing surface 90. As in the embodiment illustrated in FIGS. 19, 20, 21 and 22, the openings 60 does not extend completely through to the viewing surface 90. When the radioluminescent material 42 is inserted in opening 60, the lower opening is sealed with a sealing material 96, such as epoxy, or a plastic sealing insert, or the like. To apply housing 50*d* to the varying widths of front sights 20, it is necessary only to apply a coating of epoxy over the entire undersurface of the ridged arrangement, center the housing 50*d* on the front sight 20, and press downwardly. A narrow sight 20 will be accommodated by width W1; an intermediate width sight 20 will be accommodated by width W2; and a maximum width front sight 20 will be accommodated by width W3. In this way, this embodiment can be utilized for all characteristic widths of front sights 20. The wide sights will merely have an additional amount of epoxy above surface 20*a* underneath housing 50*d* in the vicinity of widths W1 and W2. It will be seen that these small dimensions are such that this will still provide a good adhesive bond of the housing 50*d* to the front sight 20.

In FIG. 27 there is shown an encapsulation 100 comprised of clear material such as plastic, or glass tubing, having a deposit of radioluminescent material 102 encapsulated therein. This encapsulation 100 can be formed of tubular material, having one end closed off, for instance by heat treatment, or formed closed, followed by an insertion of the radioluminescent material 102. When the material is thus inserted, the other end can be sealed, for instance, by insertion of a plug, by actually heat sealing the encapsulation, or by filling with a bonding material. Once formed, the assembly can be used on either the front or rear sights. Turning attention briefly to FIG. 5, it will be seen that the front sight 20 has a bar of radioluminescent material 28. This bar can be the encapsulation 100 placed on end, and bonded to the upper surface of the front sight 20. It will also be seen in FIG. 5, and in FIG. 7, that the rear sight 22 has a bar-shaped deposit of radioluminescent material identified as 30 and 38, respectively. It can be seen that the encapsulation illustrated in FIG. 27 can be bonded to the rear sight 22, as shown, for forming the rear illumination. The bonding can be accomplished by use of commercially available adhesives such as epoxy, by contact-type adhesives, or the like.

Certain types of guns do not have a free-standing rear sight 22 of the type illustrated, for instance, in FIG. 2. Some of these alternative rear sight arrangements include a notched channel extending along the rear portion of the gun toward the barrel. The general cross section area of the notch is of the same general dimension as the notch of the conventional-type sight 22. An example of this is illustrated in perspective in FIG. 28, with most of the gun broken away. In this arrangement, it can be seen that there is a notch comprised of sidewalls 104 and 106 and a bottom surface 108. In this arrangement, it is characteristic that the shape of the opening in the vicinity of the hammer 16 is generally semicircular as illustrated by a surface 110. In order to accommodate this shape, an alternative embodiment of an encapsulation 112 has been developed. This encapsulation 112 has a generally semicircular downwardly extending shape, and is arranged for holding a deposit of radioluminescent material 114. FIG. 29 illustrates a face view of the encapsulation 112 and more clearly illustrates the generally partially circular shape of the lower portion together with the substantially level upper surface 112*a*. Again, the encapsulation 112 is formed of clear material allowing the radioluminescent material 114 to shine therethrough. FIG. 30 is an end view of the encapsulation 112 illustrated in FIG. 29, and indicates that the radioluminescent material is filled through an end, with the filling opening ultimately being sealed. For this configuration, referring to FIG. 29, it will be understood that the maximum height of the encapsulation 112 will be in the order of approximately 0.25 inch, with a thickness of the encapsulation being in an order of magnitude of 0.094 inch, and having a maximum width not in excess of 0.1875 inch.

FIG. 31 is an alternative embodiment for an encapsulation 116 for attaching to the rear gun sight 22. The encapsulation

116 is wider than the notch of the rear sight and includes a tab 118 resting on the bottom surface of the notch. The radioluminescent material 114 is completely enclosed within the encapsulation or housing 116. The arrangement can be more clearly seen in FIG. 32, which is an end view of the housing 116 illustrated in FIG. 31. In FIG. 32, it can be seen that the housing 116 is generally circular, and extends to the tab 118. The tab 118 is arranged approximately in the middle of the opening 120 that houses the radioluminescent material 114. The housing 116 also has a bearing surface 122 for resting against the rear surface of the rear sight 22. The surface 122 and the lower surface of the tab 118 has adhesive 124 applied thereto for firmly bonding the housing 116 to the rear sight. In the arrangement just described, the tab 118 is narrower than the overall length of the housing 116, and it can be seen that the radioluminescent material 114 is raised upward into the notch of the rear sight 22. Raising the radioluminescent material thus allows for a sighting pattern either as shown in FIG. 5 or FIG. 7, and also accommodates the sight arrangement illustrated in FIG. 28. The opening 120 can be of a inside diameter characteristically of approximately 0.030 inch. When the radioluminescent material has been filled into the opening 120, the open end is sealed by insertion of a mating plug, or by inserting well known sealing materials such as epoxy. The outside diameter of the housing 116 would be characteristically in the order of approximately 0.070 inch. The thickness of tab 118 can be quite small, for instance, 0.015 inch and is utilized primarily for aligning housing 116 during installation on the rear sight to assure that the housing 116 remains level and properly positioned. The width of tab 118 would normally be no greater than 0.125 inch with the total width of housing 116 being no greater than 0.1875 inch. An alternative arrangement of tab 118 is illustrated in dashed line with the tab being identified by reference numeral 118' and the rear portion of the body 116 being modified such that the tab 118' extends from the upper surface of the housing 116. In this arrangement, the relative positioning of the radioluminescent material 114 would be relatively lower on the rear sight. Any intermediate positioning of tab 118 can be utilized.

FIGS. 33, 34, 35, 36, and 37 are alternative embodiments for providing various forms of encapsulations and various positions for radioluminescent material on the rear sight. In these figures, which are shown in perspective, the ultimate position of the radioluminescent material and its encapsulation is shown in dashed line on the rear surface of the rear gun sight 22, with the actual configuration of the encapsulation being shown spaced apart from the gun sight. Each of these embodiments will be considered separately.

In FIG. 33 there is shown an arrangement for encapsulating radioluminescent material in a transparent housing 130 that conforms generally to the shape of the rear surface of the rear sight 22. In this arrangement, the radioluminescent material 132 is encapsulated such that when the housing 130 is applied as shown in dashed line 130', the radioluminescent material will be just even with or slightly above the lower surface of the notch.

In FIG. 34 there is shown yet another embodiment of a transparent housing 134 that provides for encapsulating radioluminescent material 136 horizontally, together with upright portions of radioluminescent material 138 and 140. In this arrangement, when the housing 134 is applied to the rear surface of the gun sight 132, as indicated by dashed line 134', the radioluminescent material will substantially frame the notch. That is, there will be a bar of radioluminescent material 136 at the bottom of the notch together with the upright portions of radioluminescent material 138 and 140 at the sides of the notch.

FIG. 35 is a perspective view of still another transparent embodiment for encapsulating radioluminescent material and includes a transparent housing 142 for encapsulating radioluminescent material 144 and 146 at both sides of the notch. When the housing 142 is attached to the rear surface of the sight 22 as indicated by dashed line 142', it can be seen that the radioluminescent materials 144 and 146 will provide the sight picture as illustrated for FIG. 6.

FIG. 36 illustrates still another embodiment for encapsulating the radioluminescent material at both sides of a notch. In this arrangement, the housing 148 has angular downwardly extending sides, and would be used for those guns not having a standard rear sight, for example as described in relation to FIG. 28. It should be understood that these angulated downwardly extending sides could equally as well be curved. In this arrangement, a pair of radioluminescent material deposits 150 and 152 are arranged for being positioned at both sides of the notch. As can be seen from a view of the dashed line representation 148' on the rear surface of the sight 22, this also yields a sight pattern as illustrated in FIG. 6. The vertical positioning in the housings 142 and 148 of the radioluminescent material 144, 146 and 150, 152 respectively, can be adjusted to be relatively near the top of the sight 22, relatively near the center of the sight, or relatively near the bottom of the sight. The precise location for these configurations is a matter of choice.

FIG. 37 illustrates an encapsulation 154 that is transparent, and is so arranged as to slide downwardly right over rear sight 22. In this arrangement, the radioluminescent material 156 and 158 is arranged to be positioned at either side of the notch. It should be understood that this arrangement can also utilize a single bar 160 for being positioned below the notch. The housing 156 can be constructed either to be of a unitary structure with adhesive or other bonding material applied to both the front and rear surfaces of the sight 22, or can be constructed with a rear portion to be molded and bonded to the rear surface of sight 22 with the remainder being relatively flexible, such as the nature of a web of tape.

A preferred method of forming the various embodiments of encapsulations for both the front and rear sight arrangements, is by way of molding. As has been indicated above, a primary requisite is that the material used be as light transparent as possible in order that a minimum of radioluminescent material can be utilized. In order to avoid breakage as a result of impact that may occur from inserting guns in holsters or removing them from holsters, or that may result from accidentally dropping the gun, it is necessary and desirable to have a maximum strength material for forming the front and rear sight housings. A material that has been found particularly advantageous is commercially available and is identified as a plastic "lexan." Other suitable plastics can be utilized. It has also been found that due to the relatively small sizes that glass can also be utilized for forming the housings. It is also understood where it is not otherwise stated to be critical, that where squared edges are shown, rounded edges and surfaces may be used as desired.

In applying the housings to the front and rear sights, it is desirable to use an adhesive, such as epoxy resin, that is of very strong bonding and holding characteristics, while being impervious to the radioluminescent material, and being relatively resistant to such elements as water, oil, or the like. Various commercially available contact adhesives can also be utilized.

It is of course clear also that luminous material other than radioluminescent material can be utilized. Such alternative materials are well known and require some form of external energy, such as sunlight, artificial light, or the like, to provide energy to excite the luminous material to a glow. For purposes of sighting these materials work, but suffer from the disadvantage of periodically requiring the external application of excitation energy to cause continued glow. Since guns are normally carried in holsters, or the like, which are usually enclosed with relatively dark interiors, it would likely occur that the luminous material would be inactive when the gun is withdrawn for use. When inactive, the material does not glow, and would not be visible in darkened conditions. This situation does not arise, of course, with the radioluminescent materials.

In conclusion, then, it can be seen from a consideration of the foregoing detailed description of the preferred embodiments, when viewed in light of the drawings, that the various objectives of the invention have been achieved. It being understood that various modifications in configurations, dimensioning, selection of materials, positioning of components, and the like, will become readily apparent to those skilled in the art without departing from the spirit and scope of the invention, what is intended to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. For use in combination with a gun having a barrel supporting a front sight having predetermined thickness, height, and length dimensions and a rearwardly facing surface, and a rear portion supporting a rear sight having a generally upright rear surface and including a sighting notch adapted for cooperation with the front sight in sighting operations, an improved gun sight in combination including; first luminous means mounted on the rearwardly facing surface of the front sight, said first luminous means including first housing means having a first mounting surface, a rearwardly facing viewing face, and an enclosure, first radioluminescent means deposited in said enclosure for providing a source of light visible at said viewing face, bonding means for bonding said first mounting surface to said rearwardly facing surface on said front sight, and alignment means including at least a pair of parallelly arranged spaced-apart downwardly extending members integrally formed on said first mounting surface, said spaced apart positioning of said members being substantially the same as said predetermined thickness of said front sight and arranged for holding said housing means in alignment during bonding to said front sight and for strengthening said bond; and second luminous means mounted on the generally upright rear surface of the rear sight, said second luminous means including second housing means having at least one transparent viewing portion, an enclosure portion in visible cooperation with said viewing portion, said viewing portion arranged for positioning with relation to said notch in said rear sight and having a predetermined length extending across at least a part of said upright rear surface near the bottom of said notch, second mounting surface means for bonding said second housing means to said generally upright rear surface, second radioluminescent means enclosed in said enclosure for providing a source of light visible through said viewing portion as a bar of visible light, and leveling and alignment means including tab means forwardly extending from said second mounting surface means for resting on the bottom surface of said notch and holding said second housing means level and aligned during bonding to said rear sight, said first and second luminous means capable of being seen in darkened conditions an brought into a predetermined visual relationship for sighting said gun without interfering with normal use of said front sight and said rear sight during periods of sufficient light to render said front and rear sights visible;

2. The combination as in claim 1 wherein said enclosure in said housing means extends generally perpendicular to said viewing face and is generally circular in cross section, said first radioluminescent means enclosed in said enclosure thereby appearing as a generally circular spot of light when viewed at said viewing face.

3. The combination as in claim 2 wherein a closure of one end of said enclosure is formed by an integral thickness of material at said viewing face, and the opening end of said enclosure intersects said first mounting surface at a predetermined angle forming a filling opening thereat, and includes sealing means for sealing said filling opening for containing said first radioluminescent means.

4. The combination of claim 1 wherein said first radioluminescent means comprises a first tubular member having first and second closed ends for forming an enclosure therebetween, and a first predetermined radioluminescent material contained within said first tubular member.

5. The combination as in claim 1 wherein said second housing means includes a plurality of said transparent viewing portions, each of said viewing portions having an enclosure portion associated therewith for containing a portion of said second radioluminescent means, and arranged in a predetermined relation to the notch of said rear sight.

6. The combination as in claim 5 wherein one of said plurality of viewing portions is at a predetermined position at either side of said notch.

7. The combination as in claim 4 wherein said tubular member is made from transparent glass for at least partially shielding a user from predetermined types of radiation from said contained radioluminescent material.

8. The combination as in claim 1 wherein a closure of one end of said enclosure is formed by an integral thickness of material at said first mounting surface, and the opening of said enclosure intersects said viewing face at a predetermined angle forming a filling opening thereat.

9. The combination as in claim 1 wherein said second radioluminescent means comprises a second tubular member having first and second closed ends for forming an enclosure therebetween, and a second predetermined radioluminescent material contained within said second tubular member.

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