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Matthews et al.

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(54) **LIGHT BEAM MODIFIER DEVICES**

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Related U.S. Application Data

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(51) **Int. Cl.**[7] **F21L 4/04**

(52) **U.S. Cl.** **362/202**; 362/208; 362/282; 362/396

(58) **Field of Search** 362/202, 208, 362/282, 322, 319, 396; 285/18, 33, 112, 365, 367; 292/247; 24/270

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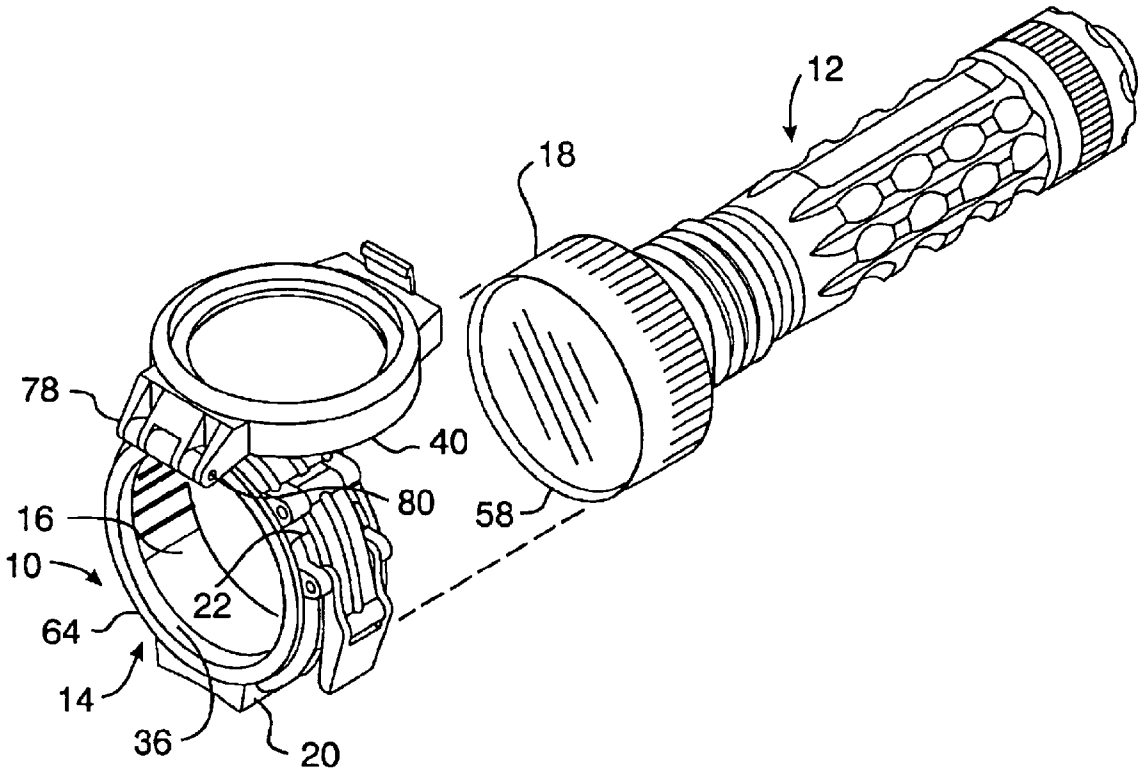
(57) **ABSTRACT**

A light beam modifier device for attachment to a light beam generator apparatus such as a flashlight or a weapon light. The light beam modifier includes an easily operable clamp for facilitating securement and removal of the light beam modifier device to and from the light generator. The device provides a positive locking closure between the flip-open door and the clamp, and further includes a spring hinge for permitting at least one and preferably two flip-open positions of the door out of the path of the light beam.

44 Claims, 4 Drawing Sheets



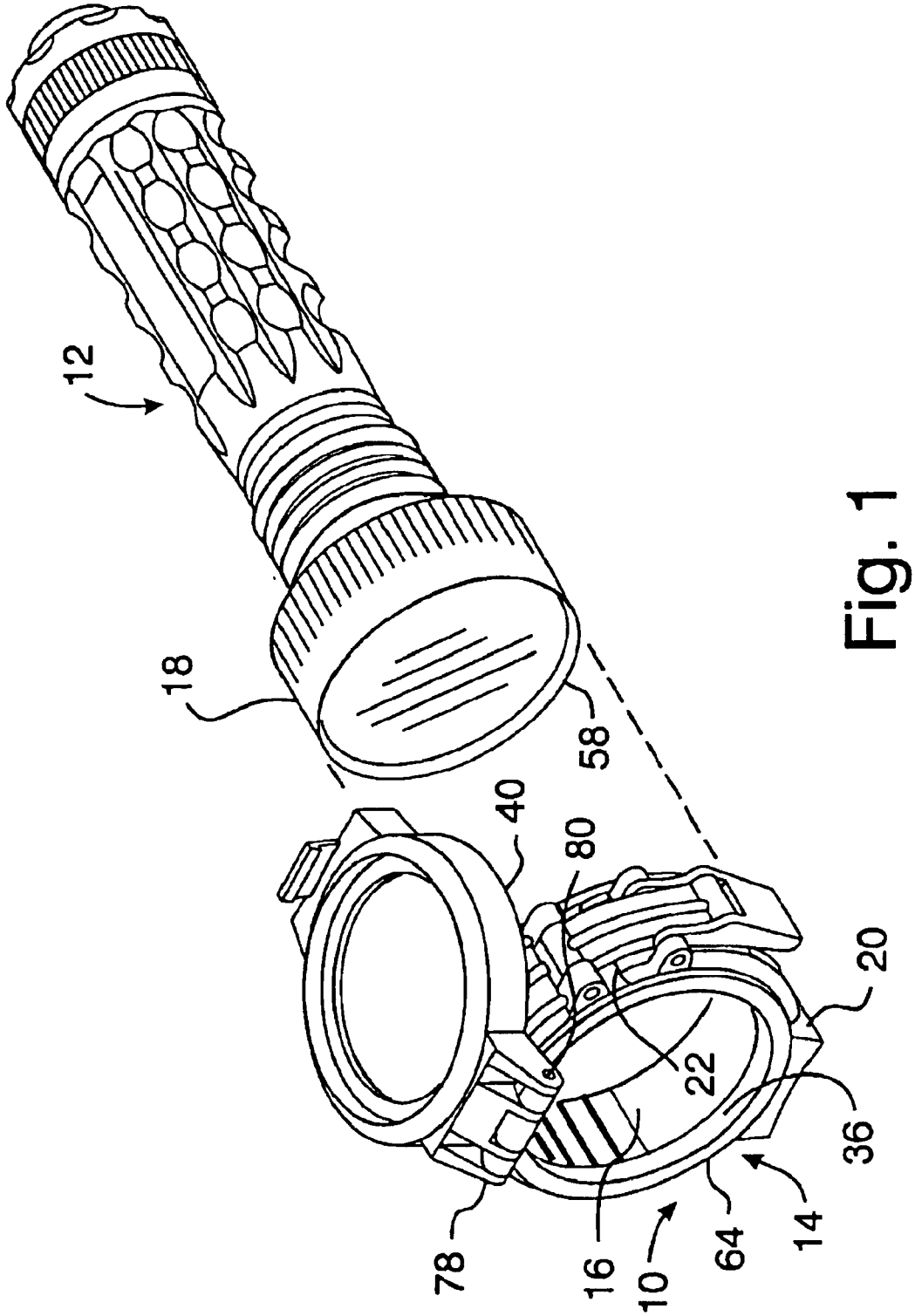


Fig. 1

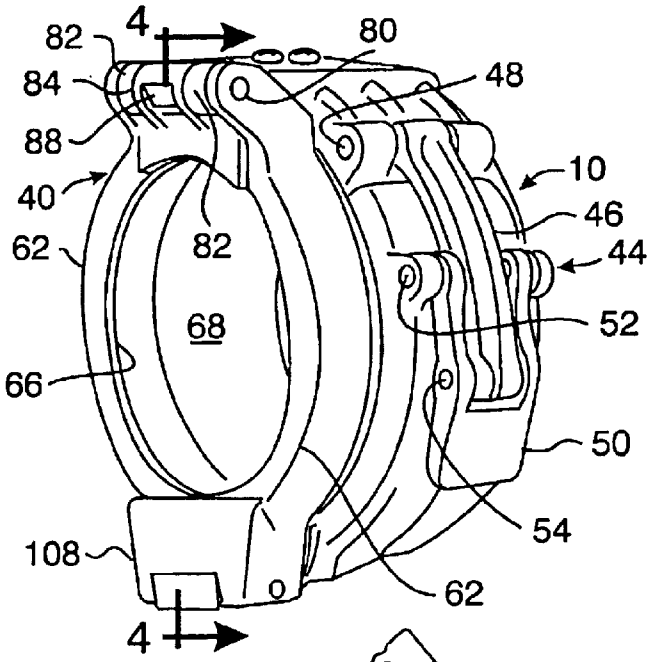


Fig. 2

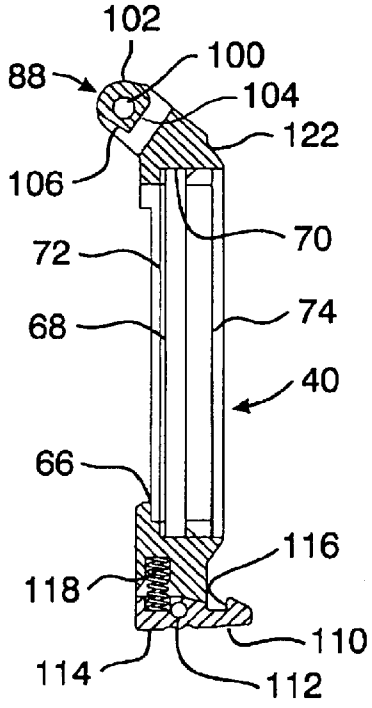


Fig. 4

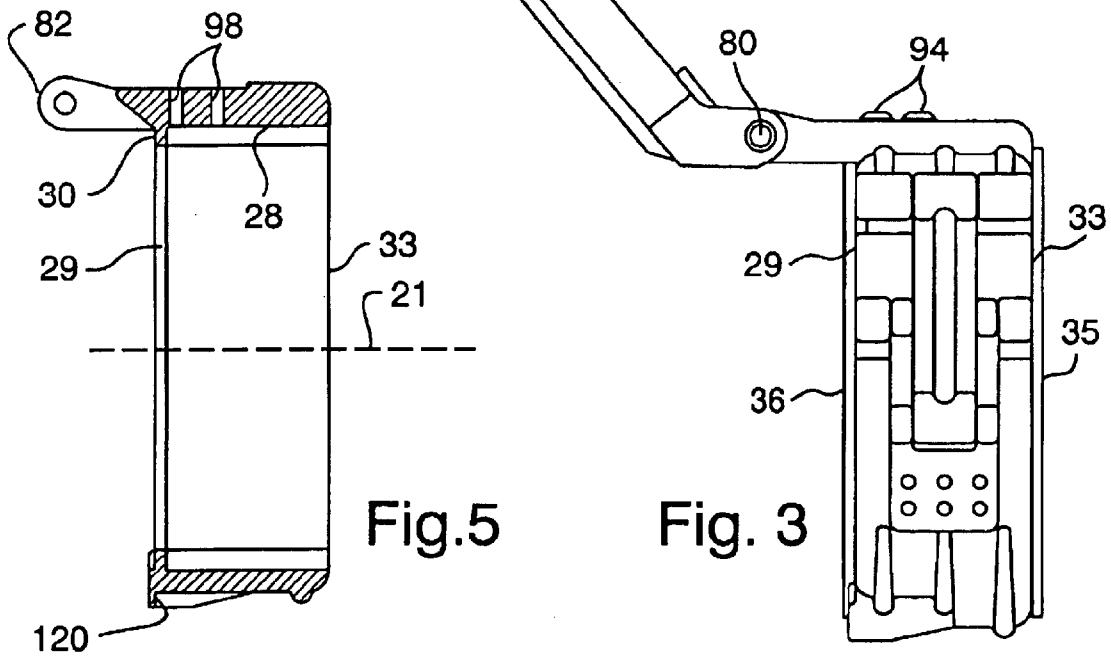


Fig.5

Fig. 3

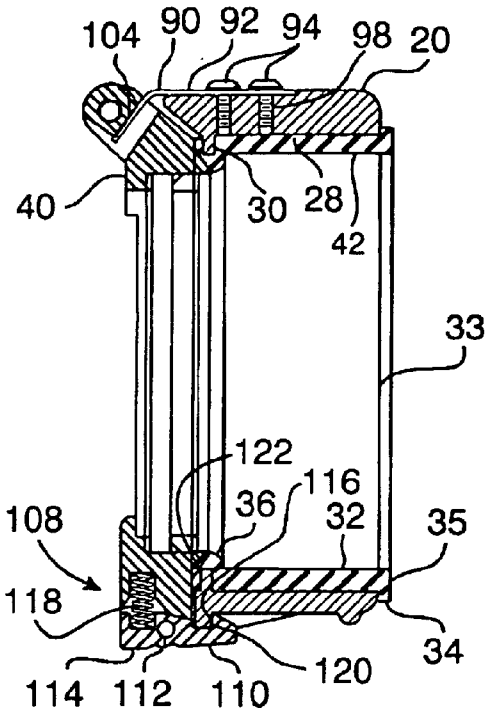


Fig. 6

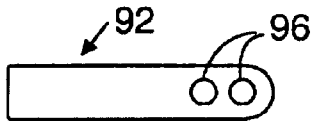


Fig. 7

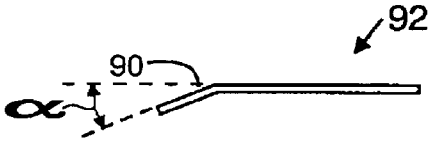


Fig. 8

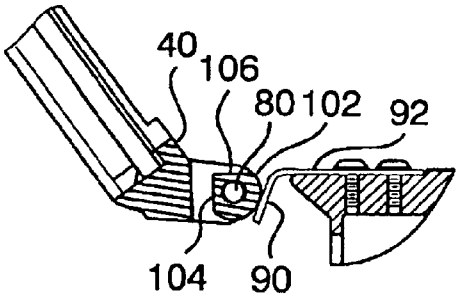


Fig. 10

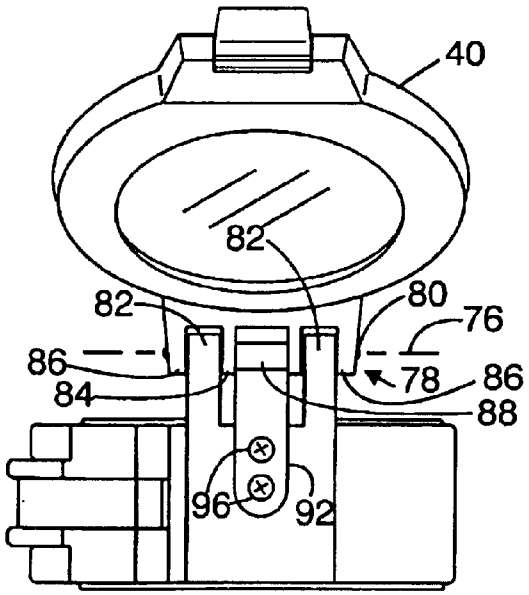


Fig. 9

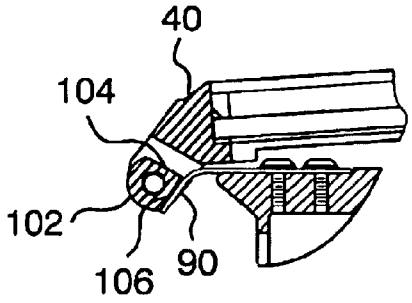


Fig. 11

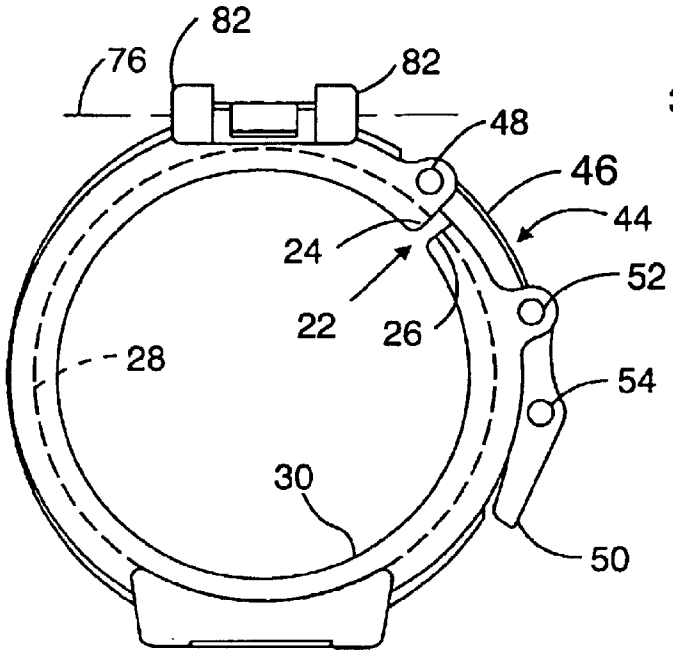


Fig. 12

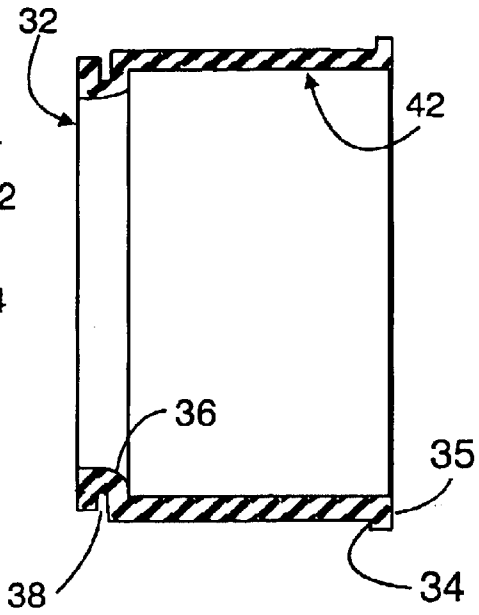


Fig. 13

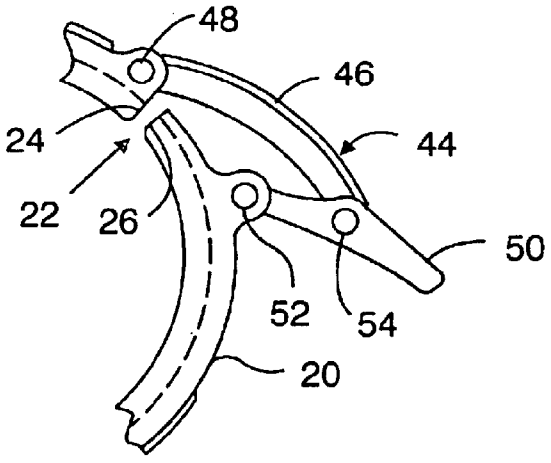


Fig. 14

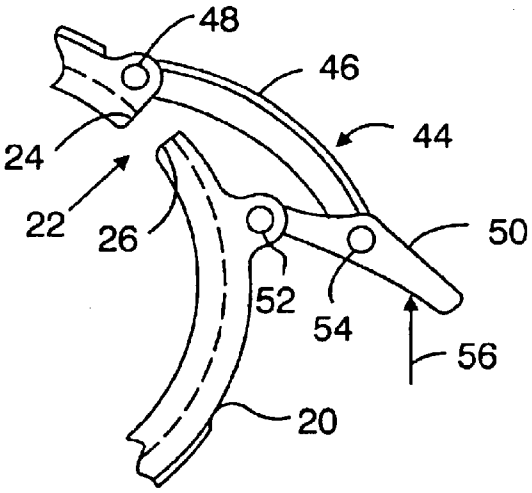


Fig. 15

LIGHT BEAM MODIFIER DEVICES

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Patent Application No. 60/308,168, filed Jul. 25, 2001, which provisional application is incorporated herein by reference.

BACKGROUND OF THE INVENTION

This invention relates to light beam modifier devices, and more particularly to light beam modifier devices for attachment to light beam generator apparatus such as flashlights as well as weapon lights including target illuminators and laser sights for firearms.

As used herein, the term "light beam modifier" embraces devices for modifying characteristics of a light beam, including devices for placing optical filters, lenses and diffusers in the path of the light beam for altering the light beam, as well as opaque covers for blocking the light beam. Such light beam modifier devices are generally provided as accessories for flashlights and weapon lights. The filter devices limit the color of white light to produce a blue, red, or infrared light, as examples, depending upon the tactical needs of the user of the flashlight or weapon light. Lenses or diffusers may be employed for producing a broader or more diffused light beam for close-up work or when an intense light focused beam is not desired. An opaque cover may be utilized for blocking the light beam. In any of these modifiers, the light beam may be returned to its unmodified or original condition by removing the filter, lens, diffuser or cover from the path of the light beam.

Conventional light modifier devices generally include a friction fit sleeve of elastic material such as rubber that is twisted onto the front end bezel or head of the light generator, a spring hinged door containing the light modifying material (filter, lens, diffuser or cover), the door being friction held about the front edge of the resilient sleeve and may be flipped open to remove the door from the light path. Such prior art devices may be difficult to be placed onto and removed from the light generator under tactical conditions, and the door is generally subject to being sprung open by being inadvertently touched by the user or by vibration such as when used on a weapon light secured to a firearm.

SUMMARY OF THE INVENTION

Light beam modifier devices according to the present invention resolve the deficiencies of the prior art light beam modifier devices. According to one aspect of a preferred embodiment of the present invention, a light beam modifier device is provided which includes an easily operable clamp for facilitating securement of the light beam modifier device to the light generator and for facilitating removal of the light beam modifier device from the light generator when desired. A further aspect of the preferred embodiment provides a positive locking closure between the flip open door and the clamp, for assuring that the door is maintained in its closed position during tactical operations. According to another aspect of the preferred embodiment, the light modifier device includes a spring hinge that permits at least one and preferably two flip-open positions of the door out of the path of the light beam. The preferred embodiment is watertight when installed on the light generator, and leakage of light from the unmodified beam is precluded.

A preferred embodiment of the present invention provides a device for modifying a light beam emanating from the head of a light beam generator, the device comprising the combination of: a clamp assembly including a substantially tubular member having a front edge and a rear edge and a longitudinal opening defined by longitudinal ends extending between the front and rear edges, a latch on the tubular member across the longitudinal opening and manually operable to a latched position maintaining the width of the opening for clamping the tubular member about the light beam generator head, the latch being manually operable to an unlatched position permitting the width of the opening to be increased for unclamping the tubular member from the light beam generator head; and a door pivotally secured to the clamp assembly and including a light modifier element, the door being pivotable to a closed position placing the light modifier element in the path of a light beam generated by the light beam generator when the tubular member is clamped to the light beam generator head, the door being pivotable to an open position placing the light modifier element out of the path of the light beam when the tubular member is clamped to the light beam generator. The latch across the longitudinal opening is preferably manually operable past the unlatched position for further increasing the width of the longitudinal opening.

In the preferred embodiment, the latch includes a pivot arm having first and second ends, the first end pivotally secured to a first longitudinal pivot pin secured to the tubular member, a finger-actuable member pivotally secured to a second longitudinal pivot pin secured to the tubular member, the first and second longitudinal pivot pins respectively situated on opposite sides of the longitudinal opening, the second end of the pivot arm pivotally secured to a third longitudinal pivot pin carried by the finger-actuable member. The pivot arm preferably describes an arc, the arc radius of the inner surface of the pivot arm being equal to or slightly greater than the radius of the exterior surface of the tubular member.

An elastomeric seal is fitted to the interior surface of the tubular member, the elastomeric seal extending over the tubular member's front edge for sealingly contacting the door when the door is in its closed position.

The preferred light beam modifier device includes a door latch having a manually actuable latching member on the door in cooperative engagement with the clamp assembly for latching the door in its closed position to the clamp assembly. The door latch preferably includes a spring biasing the latching member for latching the door in the closed position, the latching member being manually operable against the bias of the spring for unlatching the latching member for permitting opening of the door. The clamp assembly includes a transverse ledge, and the latching member includes a hook end portion and a finger-actuable end portion, the latching member being pivotally secured between its end portions to the door; and the spring biases the finger-actuable end portion for urging the hook to engage the ledge for latching the door in its closed position.

The door may preferably be opened to a first open position and to a second open position, each of such open door positions placing the light modifier element out of the path of the light beam. A hinge, which pivotally secures the door to the clamp assembly, includes a transverse pivot pin secured to the clamp assembly forwardly of the front edge, an arm projecting from the door pivotally secured to the pin and including a cam surface, a spring secured to the clamp assembly and biasing the cam surface for maintaining the door in the first open position when the door is pivoted to that open position. The arm preferably includes a second cam surface, the spring biasing the second cam surface for

maintaining the door in the second further or fully open position when the door is pivoted to that second open position.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed to be characteristic of the invention, together with further advantages thereof, will be better understood from the following description considered in connection with the accompanying drawings in which a preferred embodiment of the present invention is illustrated by way of example. It is to be understood, however, that the drawings are for the purpose of illustration and description only and are not intended as a definition of the limits of the invention.

FIG. **1** is a front/side perspective view (in reduced scale as compared with FIGS. **2–15**) of a preferred embodiment of a light beam modifier device according to the present invention, in exploded combination with a flashlight, the light beam modifier door shown in a fully flipped-open position;

FIG. **2** is a front/side perspective view of the preferred embodiment of the light beam modifier device of FIG. **1**, its door shown in its closed position;

FIG. **3** is a side elevation view of the preferred embodiment of FIG. **2**, shown with its door in a partially flipped-open position;

FIG. **4** is a cross-sectional elevation view of the light modifier door of the preferred embodiment of FIG. **2**, taken along the line **4—4** of FIG. **2** in the direction of the appended arrows;

FIG. **5** is a cross-sectional elevation view of a clamping member of the light beam modifier preferred embodiment of FIG. **2**, taken along the line **44** of FIG. **2** in the direction of the appended arrows;

FIG. **6** is a cross-sectional elevation view (in enlarged scale) of the preferred embodiment of FIG. **2**, taken along the line **4—4** of FIG. **2** in the direction of the appended arrows;

FIG. **7** is a top plan view of a flat spring included in the preferred embodiment of FIG. **6**;

FIG. **8** is a side elevation view of the flat spring of FIG. **7**;

FIG. **9** is a top perspective view of the light modifier preferred embodiment with its door in a partially flipped-open position as in FIG. **3**;

FIG. **10** is a fragmentary cross-sectional elevation view of the light beam modifier preferred embodiment as in FIG. **6** but with its door in a partially flipped-open position as in FIGS. **3** and **9**;

FIG. **11** is a fragmentary cross-sectional elevation view of the light beam modifier preferred embodiment as in FIG. **6** but with its door in a fully flipped-open position as in FIG. **1**;

FIG. **12** is a front elevation view of the clamping member included in the light modifier preferred embodiment of FIG. **1**, showing the clamping member in its latched or clamping configuration;

FIG. **13** is a cross-sectional elevation view of a clamp seal included in the light beam modifier preferred embodiment of FIG. **1**;

FIG. **14** is a fragmentary view of the clamping member of FIG. **12**, shown unlatched; and

FIG. **15** is a fragmentary view of the clamping member of FIG. **12**, shown in its unclamping configuration.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning to FIG. **1**, there is shown a preferred embodiment of a light beam modifier **10** for being mounted to the front of a light beam generator such as a flashlight **12**. The light beam modifier **10** includes a clamp assembly **14** having a substantially cylindrical internal surface **16** for being clamped onto and about the front end bezel or head **18** of the flashlight **12** or of a weapon light. The clamp assembly **14** includes a generally cylindrical clamping member **20** (see also FIGS. **3**, **5**, **12**, **14** and **15**) constructed of a plastic material such as nylon or, for example, a resinous plastic material marketed by Du Pont de Nemours under the trademark ZYTEL®. The clamping member **20** is generally in the form of a tube having a longitudinal axis **21**, and includes a longitudinal opening **22** defined between longitudinal ends **24**, **26** of the substantially tubular clamping member **20**. The clamping member's internal surface **28** generally conforms to but is slightly radially greater than the flashlight head **18**; in the preferred embodiment where the internal surface **28** and the head **18** are generally cylindrical the diameter of the internal surface **28** is slightly larger than the outside diameter of the head **18**. The clamping member's front edge **29** includes a radially inwardly projecting ledge **30** defining a circular opening having a diameter preferably slightly smaller than the outside diameter of the flashlight head **18**.

The clamping member interior surface **28** is fitted with an elastomeric substantially tubular seal **32** (FIG. **13**, see also FIG. **6**), made for example of rubber or neoprene. The length of the seal **32** is preferably slightly greater than the length of the tubular clamping member **20** so as to slightly longitudinally extend from both the front edge **29** and the rear edge **33** of the clamping member **20**. At its rear, the seal **32** includes a radially outwardly projecting shoulder **34** contacting and overhanging the rear edge **33** of the clamping member **20** to form a rear rim seal **35** thereabout. The forward edge of the seal **32** defines a radially inward ridge **36** having a radially outward recess **38** for mating with the clamping member radially inward ledge **30**. In such manner, the fitted seal **32** is longitudinally held by the clamping member **20**, while the seal's ridge **36** provides a stop and seal (both water-tight and light-tight) for the forward edge of the flashlight head **18**, as well as providing a seal (both water-tight and light-tight) for the closed door **40** of the light beam modifier **10** as will be discussed later. The thickness of the elastomeric seal **32** is determined such that, when the clamping member **20** is installed on the flashlight head **18**, the inner surface **42** of the seal **32** contacts the head **18** and the seal **32** is compressed between the clamping member's interior surface **28** and the outer surface of the head **18**; i.e. the light beam modifier **10** is clamped about the front end portion of the flashlight **12**.

The clamping member **20** is provided with a latch **44** for relieving compression in the seal **32**, to facilitate installation and removal of the light beam modifier **10** onto and from the flashlight **12**. The latch **44** includes an arcuate pivot arm **46** pivotable about a first longitudinal pivot pin **48** secured to the clamping member **20** at one of its longitudinal ends **24** facing the opening **22**. A finger-actuable latch member **50** is pivotable about a second longitudinal pivot pin **52** secured to the clamping member **20** in the vicinity of the other one of the clamping member ends **26** and spaced from the first pivot pin **48**; in one example, the arcuate distance between the pins **48** and **52** was approximately 0.6 the arcuate length of the arm **46**. The other end of the arcuate arm **46** is pivotably attached to the finger-actuable latch member **50**

and is pivotable about a third longitudinal pivot pin **54** secured to the finger-actuable latch member **50**. A preferred spatial relationship of the three pivot pins **48**, **52**, **54** is such that the arcuate arm **46**, having an inner surface arc radius equal to or slightly greater than the radius of the outer surface of the tubular clamping member **20**, will lie against or adjacent the outer surface of the clamping member **20** when the finger-actuable latch member **50** is urged into its fully closed position against or adjacent the outer surface of the clamping member **20** as shown in FIG. **12**; in the example referred to above, the distance between the second pivot pin **52** and the third pivot pin **54** was approximately 0.4 the arcuate length of the arm **46**.

To install the light beam modifier device **10** on the flashlight **12**, the user unlatches the normally closed latch **44** (its latched or closed position being shown in FIG. **12**) by flipping open the finger-actuated latch member **50** to pivot about the pivot pin **52**. This action causes the longitudinal pivot pin **54** to rotate upwardly and outwardly about the longitudinal pivot pin **52**, in turn causing the arcuate lever arm **46** to pivot about pivot pin **48**, as shown in FIG. **14**. The user then inserts the flashlight bezel's front edge or rim **58** within the pliable rim seal **35** comprising the rear end of the clamp seal **32**. As the light beam modifier **10** is slid onto the flashlight head **18**, radial forces induced into the clamp seal **32** are transmitted to the clamping member **20** which, being resilient and unlatched, produces a greater separation between the clamping member's opposing longitudinal ends **24** and **26**, increasing the effective diameter of the clamping member **20**. The effective diameter of the resilient clamping member **20** may be further increased by upwardly urging the finger-actuable member **50** (indicated by the force arrow **56**, see FIG. **15**), which causes the arm **46** to urge the pivot pin **48** to move to the left as shown in FIG. **15**, resulting in the clamping member longitudinal end **24** moving away from the end **26** and further increasing the width of the longitudinal opening **22**. The user is thus permitted to easily slide the clamp assembly **14** onto the flashlight head **18**, until the front rim **58** of the head **18** abuts the rear of the clamp seal's inwardly projecting ridge **36**. At this point, the user urges the finger-actuatable latch **50** to pivot downwardly about the pivot pin **52** until the latch **44** is closed as shown in FIG. **12**, whereupon the clamp seal **32** is compressably trapped between the head **18** and the clamp member **20**, the clamping member **20** clamping the light beam modifier device **10** to the flashlight head **18**.

The light beam modifier **10** may be removed from the flashlight head **18** by the user outwardly flipping open the finger-actuable latch member **50** to unlatch the latch **44**, thereby substantially relieving compression in the clamp seal **32** and permitting the user to forwardly urge the light beam modifier **10** with respect to the head **18**. Removal may be further facilitated by upwardly urging the finger-actuable latch member **50** (FIG. **15**) to further increase the effective diameter of the clamping member **20**.

Turning to FIGS. **2**–**11** along with FIG. **1**, the light beam modifier **10** includes a door **40** pivotally secured to the clamping member **20** such that when the light beam modifier **10** is installed on the flashlight head **18** the door **40** may be placed in front of the head **18** in the path of the light beam and may be pivoted away from the front of the head **18** out of the path of the light beam. The door **40** comprises a substantially circular frame **62** of outside diameter or dimension sufficient to cover the front opening **64** of the clamping assembly **14**. The frame **62** includes a central opening or window **66** for being interposed in the light path when the door **40** is in its closed position as shown in FIG. **2**.

A light modifier element **68**, such as an optical filter, an optical lens, a diffuser or an opaque cover, is held within the window **66** by the frame **62** such that the light modifier element **68** is interposed in the light path when the door **40** is in its closed position as shown in FIG. **2**. In the preferred door embodiment **40** of FIG. **4**, the light modifier element **68** is held by the frame **62** radially within a recess **70** circumferentially of the opening **66** and longitudinally held between an annular gasket **72** and a retaining ring **74**, producing a watertight seal. Preferred examples of light modifying elements **68** include an optical filter for limiting the color of the light beam to produce a light beam of a particular color, such as blue, red, or infrared; an optical lens or lens system or translucent element for altering the light beam to produce a broader or more diffused light beam; and an opaque cover for completely blocking the light beam, as well as for permitting the flashlight **12** (or weapon light) to be stored without risk of damage to the front lens of the flashlight (or weapon light).

Alternative configurations for securing the light modifier element **68** to the frame **62** may be utilized; for example, the frame **62** may include threads about the circular window **66** for threadably mating with circumferential threads of the light modifier elements, permitting convenient interchangeability among different filters, lenses and covers. Where interchangeability is not desired, a particular light modifier element **68** may be permanently secured to the frame **62**, such as by thermoplastic welding or adhesive techniques well known in the art.

The door **40** is pivotally secured to the clamping member **20**, pivotable about a transverse axis **76** (see FIGS. **9** and **12**) by hinge **78** which includes a transverse pivot pin **80** (see also FIGS. **1** and **2**) held by two spaced forwardly projecting laterally spaced arms **82** of the clamping member **20**. The hinge **78** further includes an arm **84** projecting from the door frame **62**, preferably along a radius of the door **40**, situated between the clamping member arms **82** and pivotally secured to the pivot pin **80**. The door frame **62** may further include two additional arms **86**, laterally outwardly of the respective clamping member arms **82**, pivotally secured to and retaining the ends of the pivot pin **80**.

The door radial arm **84** includes a transverse cam surface **88** in contact with a bent end portion **90** of a flat spring **92** (FIGS. **7** and **8**), the angle a of the bend in one example being approximately 22°. The flat spring **92** is secured to the clamping member **20**, for example by two screws **94** through respective apertures **96** in the spring **92** and cooperating with mating threads in respective apertures **98** in the clamping member **20**. The cam surface **88** of the radial arm **84** surrounds the transverse aperture **100** (FIG. **4**) through which the hinge pivot pin **80** extends, and the cam surface **88** includes a substantially cylindrical surface **102** extending through an arc of approximately 180° between two substantially flat cam surfaces **104** and **106** having an included angle of approximately 90°. When the door is in its closed position as shown in FIG. **6**, the cam first flat surface **104**—which is at an angle of approximately 23° from the face of the door—is contacted by the flat spring end portion **90**. When the user causes the door **40** to flip open, the door frame's radial arm **84** will rotate about the hinge pin **80** until the cylindrical cam surface **102** is contacted by the flat spring end portion **90** when the door **40** pivots to a first open position out of the path of the light beam, as represented in FIGS. **3**, **9** and **10**. The door may be maintained in this first position by the bias of the flat spring end portion **90** against the cylindrical cam surface **102**, or the door may be further flipped rearwardly such that the cam cylindrical surface **102**

travels along the spring end portion **90** until the second flat surface **106** of the cam portion **88** contacts the flat spring end portion **90**, urging the door **40** to a second or further position out of the light beam path, in which second position the door **40** is preferably fully open as shown in FIGS. **1** and **11**. The door is maintained in this fully open and "out of the way" position by the bias of the flat spring end **90** against the second flat cam surface **106**. The user reverses the above procedure to cause the door **40** to assume its closed position as shown in FIGS. **2** and **6**.

The preferred embodiment of the light beam modifier **10** is equipped with a door latch **108** (see FIGS. **4** and **6**) including a hook member **110** pivotally secured to the door frame **62** diametrically opposite the door frame's radial arm **84**. The latch hook member **110** is pivotable about transverse pivot pin **112** between a finger-actuable portion **114** of the hook member **110** and the hook portion **116** of the hook member **110**. The finger-actuable portion **114** is radially outwardly (i.e. downwardly as shown in the drawing of FIG. **6**) biased by compression spring **118**, for pivotally urging the hook portion **116** into latching engagement with transverse latching ledge **120** (see FIGS. **5** and **6**) of the clamping member **20**, the latching ledge **120** situated diametrically opposite the clamping member arms **82**, positively latching the door **40** to the clamp assembly **14** when the door **40** is closed and the latch hook member **110** is urged longitudinally rearwardly by the user. When the door **40** is closed and latched, the door frame's inner circular rim **122** (see FIGS. **3**, **4** and **6**) is urged against the front of the elastomeric seal ridge **36**, producing a water-tight and light-tight seal between the door frame **62** and the clamp assembly **14**.

To release the latch **108**, the user presses the finger-actuable hook portion **114** radially (upwardly as shown in the drawing of FIG. **6**) against the bias of the compression spring **118**, causing the hook member **110** to pivot clockwise about the hook pivot pin **112**. Such action results in the hook portion **116** being disengaged from the latching ledge **120**, whereupon the door **40** is caused to be unlatched and opened by action of the flat spring end portion **90** upon the first flat surface **104** of the door frame radial arm **84**. The door **40** may simultaneously be flipped open by the user, as previously described.

Thus, there has been described preferred a embodiment of a light beam modifier device for attachment to a light beam generator apparatus such as a flashlight or a weapon light. The light beam modifier includes an easily operable clamp for facilitating securement and removal of the light beam modifier device to and from the light generator. The device provides a positive locking closure between the flip-open door and the clamp, and further includes a spring hinge for permitting at least one and preferably two flip-open positions of the door out of the path of the light beam. Other embodiments of the present invention, and variations of the embodiment described herein, may be developed without departing from the essential characteristics thereof. Accordingly, the invention should be limited only by the scope of the claims listed below.

We claim:

1. A device for modifying a light beam emanating from the head of a light beam generator, the device comprising the combination of;

a clamp assembly including a substantially tubular member having a front edge and a rear edge and a longitudinal opening defined by longitudinal ends extending between said front and rear edges, a latch pivotally secured to said tubular member on opposing sides of said longitudinal opening and manually operable to a latched position maintaining the width of said opening for clamping said tubular member about the light beam generator head, said latch manually operable to an unlatched position permitting the width of said opening to be increased for unclamping said tubular member from the light beam generator head;

a door pivotally secured to said clamp assembly and including a light modifier element, said door being pivotable to a closed position placing said light modifier element in the path of a light beam generated by the light beam generator when said tubular member is clamped to the light beam generator head, said door being pivotable for maintaining said door in an open position with said light modifier element out of the path of the light beam; and

a door latch including a manually actuable latching member on said door in cooperative latching relation with said clamp assembly for latching said door in said closed position to said clamp assembly, said door latch including a spring biasing said latching member for latching said door in said closed position, said latching member being manually actuable against the bias of said spring for unlatching said latching member for permitting opening of said door.

2. The device according to claim **1**, wherein:

said latch of said clamp assembly is manually operable past said unlatched position for further increasing said width of said longitudinal opening.

3. The device according to claim **1**, wherein:

said latch of said alarm assembly includes a pivot arm having first and second ends, said first end pivotally secured to a first longitudinal pivot pin secured to said tubular member, a finger-actuable member pivotally secured to a second longitudinal pivot pin secured to said tubular member, said first and second longitudinal pivot pins respectively situated on opposing sides of said longitudinal opening, said second end of said pivot arm pivotally secured to a third longitudinal pivot pin carried by said finger-actuable member.

4. The device according to claim **3**, wherein:

said pivot arm describes an arc, the arc radius of the inner surface of said pivot arm being equal to or slightly greater than the radius of the exterior surface of said tubular member.

5. The device according to claim **1**, further including:

an elastomeric seal fitted to the interior surface of said tubular member.

6. The device according to claim **5**, wherein:

said elastomeric seal extends over said front edge of said tubular member for sealingly contacting said door when said door is in said closed position.

7. The device according to claim **1**, wherein:

said clamp assembly includes a transverse ledge;

said latching member includes a hook end portion and a finger-actuable end portion, said latching member being pivotally secured between said end portions to said door; and

said spring biases said finger-actuable end portion for urging said hook to engage said ledge for latching said door in said closed position.

8. The device according to claim **1**, wherein:

said latch of said clamp assembly includes a pivot arm having first and second ends, said first end pivotally secured to said tubular member on one side of said longitudinal opening, a finger-actuable member pivot-

ally secured to said tubular member on the other side of said longitudinal opening, said second end of said pivot arm pivotally secured to said finger-actuable member.

9. The device according to claim **8**, wherein:

said latch of said clamp assembly across said longitudinal opening is manually operable past said unlatched position for further increasing said width of said longitudinal opening.

10. A device for modifying a light beam emanating from the head of a light beam generator, the device comprising the combination of:

a clamp assembly including a substantially tubular member having a front edge and a rear edge and a longitudinal opening defined by longitudinal ends extending between said front and rear edges, a latch pivotally secured to said tubular member on opposing sides of said longitudinal opening and manually operable to a latched position maintaining the width of said opening for clamping said tubular member about the light beam generator head, said latch manually operable to an unlatched position permitting the width of said opening to be increased for unclamping said tubular member from the light beam generator head; and

a door pivotally secured to said clamp assembly and including a light modifier element, said door being pivotable to a closed position placing said light modifier element in the path of a light beam generated by the light beam generator when said tubular member is clamped to the light beam generator head, said door being pivotable for maintaining said door in a first open position with said light modifier element out of the path of the light beam, and said door is pivotable further for being maintained in a second open position past said first open position.

11. A device for modifying a light beam emanating from the head of a light beam generator, the device comprising the combination of:

a clamp assembly including a substantially tubular member having a front edge and a rear edge and a longitudinal opening defined by longitudinal ends extending between said front and rear edges, a latch on said tubular member across said longitudinal opening and manually operable to a latched position maintaining the width of said opening for clamping said tubular member about the light beam generator head, said latch manually operable to an unlatched position permitting the width of said opening to be increased for unclamping said tubular member from the light beam generator head;

a door including a light modifier element; and

a hinge pivotally securing said door to said clamp assembly, said door being pivotable to a closed position placing said light modifier element in the path of a light beam generated by the light beam generator when said tubular member is clamped to the light beam generator head, said door being pivotable to an open position placing said light modifier element out of the path of the light beam, said hinge including

a transverse pivot pin secured to said clamp assembly forwardly of said front edge, an arm projecting from said door pivotally secured to said pin and including a cam surface, a spring secured to said clamp assembly and biasing said cam surface for maintaining said door in said open position when said door is pivoted to said open position.

12. The device according to claim **11**, wherein:

said arm includes a second cam surface, said spring biasing said second cam surface for maintaining said door in a further open position when said door is pivoted to said further open position.

13. The device according to claim **12**, wherein:

said cam surface is substantially cylindrical; and

said second cam surface is substantially flat.

14. The device according to claim **11**, further including:

a door latch including a manually actuable latching member on said door in cooperative latching relation with said clamp assembly for latching said door in said closed position to said clamp assembly.

15. The device according to claim **14**, wherein:

said door latch includes a spring biasing said latching member for latching said door in said closed position, said latching member being manually actuable against the bias of said spring for unlatching said latching member for permitting opening of said door.

16. The device according to claim **15**, wherein:

said clamp assembly includes a transverse ledge;

said latching member includes a hook end portion and a finger-actuable end portion, said latching member being pivotally secured between said end portions to said door; and

said spring biases said finger-actuable end portion for urging said hook to engage said ledge for latching said door in said closed position.

17. Light beam generator and modifier apparatus, comprising in combination:

a light beam generator having a head, for generating a light beam emanating from said head;

a clamp assembly including a substantially tubular member clamped about said head and having a front edge and a rear edge and a longitudinal opening defined by longitudinal ends extending between said front and rear edges, a latch pivotably secured to said tubular member on opposing sides of said longitudinal opening and manually operable to a latched position maintaining the width of said opening, said latch manually operable to an unlatched position permitting the width of said opening to be increased for unclamping said tubular member from said head;

a door pivotally secured to said clamp assembly and including a light modifier element, said door being pivotable to a closed position placing said light modifier element in the path of the light beam, said door being pivotable for maintaining said door in an open position with said light modifier element out of the path of the light beam; and

a door latch including a latching member on said door in cooperative latching relation with said clamp assembly for latching said door in said closed position to said clamp assembly.

18. The apparatus according to claim **17**, wherein:

said latch of said damn assembly is manually operable past said unlatched position for further increasing said width of said longitudinal opening.

19. The apparatus according to claim **17**, wherein:

said latch of said clamp assembly includes a pivot arm having first and second ends, said first end pivotally secured to a first longitudinal pivot pin secured to said tubular member, a finger-actuable member pivotally secured to a second longitudinal pivot pin secured to said tubular member, said first and second longitudinal

pivot pins situated on opposing sides of said longitudinal opening, said second end of said pivot arm pivotally secured to a third longitudinal pivot pin carried by said finger-actable member.

20. The apparatus according to claim **19**, wherein:

said pivot arm describes an arc, the arc radius of the inner surface of said pivot arm being equal to or slightly greater than the radius of the exterior surface of said tubular member.

21. The apparatus according to claim **17**, further including:

an elastomeric seal fitted to the interior surface of said tubular member.

22. The apparatus according to claim **21**, wherein:

said elastomeric seal extends over said front edge of said tubular member and sealingly contacting said door when said door is in said closed position.

23. The apparatus according to claim **17**, wherein:

said door latch includes a spring biasing said latching member for latching said door in said closed position, said latching member being manually actable against the bias of said spring for unlatching said latching member for permitting opening of said door.

24. The apparatus according to claim **23**, wherein:

said clamp assembly includes a transverse ledge;

said latching member includes a hook end portion and a finger-actuable end portion, said latching member being pivotally secured between said end portions to said door; and

said spring biases said finger-actuable end portion for urging said hook to engage said ledge for latching said door in said closed position.

25. Light beam generator and modifier apparatus, comprising in combination:

a light beam generator having a head, for generating a light beam emanating from said head;

a clamp assembly including a substantially tubular member clamped about said head and having a front edge and a rear edge and a longitudinal opening defined by longitudinal ends extending between said front and rear edges, a latch pivotably secured to said tubular member on opposing sides of said longitudinal opening and manually operable to a latched position maintaining the width of said opening, said latch manually operable to an unlatched position permitting the width of said opening to be increased for unclamping said tubular member from said head; and

a door pivotally secured to said damn assembly and including a light modifier element, said door being pivotable to a closed position placing said light modifier element in the path of the light beam, said door being pivotable for maintaining said door in a first open position with said light modifier element out of the path of the light beam, and said door is pivotable further for being maintained in a second open position past said first open position.

26. Light beam generator and modifier apparatus, comprising in combination:

a light beam generator having a head, for generating a light beam emanating from said head;

a clamp assembly including a substantially tubular member clamped about said head and having a front edge and a rear edge and a longitudinal opening defined by longitudinal ends extending between said front and rear edges, a latch on said tubular member across said longitudinal opening and manually operable to a latched position maintaining the width of said opening, said latch manually operable to an unlatched position permitting the width of said opening to be increased for unclamping said tubular member from said head;

a door including a light modifier element; and

a hinge pivotally securing said door to said clamp assembly, said door being pivotable to a closed position placing said light modifier element in the path of the light beam, said door being pivotable to an open position placing said light modifier element out of the path of the light beam, said hinge including

a transverse pivot pin secured to said clamp assembly forwardly of said front edge, an arm projecting from said door pivotally secured to said pin and including a cam surface, a spring secured to said clamp assembly and biasing said cam surface for maintaining said door in said open position when said door is pivoted to said open position.

27. The apparatus according to claim **26**, wherein:

said arm includes a second cam surface, said spring biasing said second cam surface for maintaining said door in a further open position when said door is pivoted to said further open position.

28. The apparatus according to claim **27**, wherein:

said cam surface is substantially cylindrical; and

said second cam surface is substantially flat.

29. A device for modifying a light beam emanating from the head of a light beam generator, the device comprising the combination of:

a substantially tubular member adapted to be secured about the light beam generator head;

a door pivotally secured to said tubular member and including a light modifier element, said door being pivotable to a closed position placing said light modifier element in the path of a light beam generated by the light beam generator when said tubular member is secured to the light beam generator head, said door being pivotable for maintaining said door in an open position with said light modifier element out of the path of the light beam; and

a door latch including a latching member on said door in cooperative latching relation with said tubular member and a spring biasing said latching member for latching said door in said closed position, said latching member being manually actuable against the bias of said spring for unlatching said latching member for permitting opening of said door.

30. The device according to claim **29**, wherein:

said tubular member includes a transverse ledge;

said latching member includes a hook end portion and a finger-actuable end portion, said latching member being pivotally secured between said end portions to said door; and

said spring biases said finger-actuable end portion for urging said hook to engage said ledge for latching said door in said closed position.

31. A device for modifying a light beam emanating from the head of a light beam generator, the device comprising the combination of:

a substantially tubular member adapted to be secured about the light beam generator head;

a door including a light modifier element; and

a hinge pivotally securing said door to said tubular member, said door being pivotable to a closed position

placing said light modifier element in the path of a light beam generated by the light beam generator when said tubular member is secured to the light beam generator head, said door being pivotable to a first open position placing said light modifier element out of the path of the light beam, said door being pivotable to a second open position placing said light modifier out of the path of the light beam, said hinge including

a transverse pivot pin secured to said tubular member, an arm projecting from said door pivotally secured to said pin and including a first cam surface and a second cam surface, a spring secured to said tubular member and biasing said first cam surface for maintaining said door in said first open position when said door is pivoted to said first open position, said spring biasing said second cam surface for maintaining said door in a said second open position when said door is pivoted to said second open position.

32. The device according to claim **31**, wherein:

said first cam surface is substantially cylindrical; and

said second cam surface is substantially flat.

33. A device for modifying a light beam emanating from the head of a light beam generator, the device comprising the combination of:

a clamp assembly including a substantially tubular member having a front edge and a rear edge and a longitudinal opening defined by longitudinal ends extending between said front and rear edges, a latch on said tubular member across said longitudinal opening and manually operable to a latched position maintaining the width of said opening for clamping said tubular member about the light beam generator head, said latch manually operable to an unlatched position permitting the width of said opening to be increased for unclamping said tubular member from the light beam generator head;

a door including a light modifier element; and

a hinge pivotally securing said door to said clamp assembly, said door being pivotable to a closed position placing said light modifier element in the path of a light beam generated by the light beam generator when said tubular member is clamped to the light beam generator head, said door being pivotable to an open position placing said light modifier element out of the path of the light beam when said tubular member is clamped to the light beam generator, said hinge including

an arm projecting from said door pivotally secured to said clamp assembly forwardly of said front edge, said arm including a cam surface, a spring secured to said clamp assembly and biasing said cam surface for maintaining said door in said open position when said door is pivoted to said open position.

34. The device according to claim **33**, wherein:

said arm includes a second cam surface, said spring biasing said second cam surface for maintaining said door in a further open position when said door is pivoted to said further open position.

35. The device according to claim **34**, wherein:

said cam surface is substantially cylindrical; and

said second cam surface is substantially flat.

36. The device according to claim **33**, further including:

a door latch including a manually actuable latching member on said door in cooperative latching relation with said clamp assembly for latching said door in said closed position to said clamp assembly.

37. The device according to claim **36**, wherein:

said door latch includes a spring biasing said latching member for latching said door in said closed position, said latching member being manually actuable against the bias of said spring for unlatching said latching member for permitting opening of said door.

38. The device according to claim **37**, wherein:

said clamp assembly includes a transverse ledge;

said latching member includes a hook end portion and a finger-actuable end portion, said latching member being pivotally secured between said end portions to said door; and

said spring biases said finger-actuable end portion for urging said hook to engage said ledge for latching said door in said closed position.

39. A device for modifying a light beam emanating from the head of a light beam generator, the device comprising the combination of:

a substantially tubular member adapted to be secured about the light beam generator head;

a door including a light modifier element; and

a hinge pivotally securing said door to said tubular member, said door being pivotable to a closed position placing said light modifier element in the path of the light beam, said door being pivotable to an open position placing said light modifier element out of the path of the light beam, said hinge including

an arm projecting from said door pivotally secured to said tubular member forwardly thereof, said arm including a cam surface, a spring secured to said tubular member and biasing said cam surface for maintaining said door in a first open position when said door is pivoted to said open position.

40. The device according to claim **39**, wherein:

said hinge includes a transverse pivot pin secured to said tubular member, and said arm is pivotably secured to said pivot pin.

41. The apparatus according to claim **39**, wherein:

said arm includes a second cam surface, said spring biasing said second cam surface for maintaining said door in a further open position when said door is pivoted to said further open position.

42. The device according to claim **39**, further including:

a door latch including a manually actuable latching member on said door in cooperative latching relation with said tubular member for latching said door in said closed position to said tubular member.

43. The device according to claim **42**, wherein:

said door latch includes a spring biasing said latching member for latching

said door in said closed position, said latching member being manually actuable against the bias of said spring for unlatching said latching member for permitting opening of said door.

44. The device according to claim **43**, wherein:

said tubular member includes a transverse ledge;

said latching member includes a hook end portion and a finger-actuable end portion, said latching member being pivotally secured between said end portions to said door; and

said spring biases said finger-actuable end portion for urging said hook to engage said ledge for latching said door in said closed position.

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