preferably substantially vertical. Preferably, the base is a cylindrical section having an axis that defines the axis of insertion.

Preferably, the heat sink has a coupling element that defines an abutment surface for engaging the retaining element. More preferably, the heat sink defines a stop for restricting further entry of the body device through the fitting aperture. Alternatively, the base defines a stop for restricting further entry of the body device through the fitting aperture.

Preferably, the base has a coupling element that defines an abutment surface for engaging the retaining element. More preferably, the base defines a stop for restricting further entry of the body device through the fitting aperture. Alternatively, the heat sink defines a stop for restricting further entry of the body device through the fitting aperture.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

FIG. 1 is a schematic view of a lighting assembly according to the invention, shown installed in a handrail;

FIG. 2 is an inline assembly view of an embodiment lighting assembly according to the invention;

FIG. 3A is a cross sectional side view of the lighting assembly of FIG. 2, shown installed in a hand rail;

FIG. 3B is an enlarged sectional view of the lighting assembly of FIG. 3A, showing the retaining element retaining the body device within the hand rail;

FIG. 3C is a partial sectional front view of the lighting assembly of FIG. 2;

FIG. 3D is an enlarged sectional view of the lighting assembly of FIG. 3C;

FIGs 4A–4H show views of the base element of the lighting assembly of FIG. 2;

FIGs 5A-5F show views of the heat sink element of the lighting assembly of FIG. 2;

FIGs 6A-6K show views of the lens element of the lighting assembly of FIG. 2;

FIGs 7A-7B show views of the light emitting diode (LED) light source of the lighting assembly of FIG. 2;

5C shows a side elevation view of the heat sink element 234. A sectional side view is provided by FIG. 5E.

It will be appreciated that tapered portions 520 are provided on opposite sides for the heat sink element 234 for engaging the retaining element (not shown). The tapered portions 520 further define a flange 312 for abuttingly engaging an end portion of the retaining element. The width 521 defined by the tapered portions is greater than the width 522 shown in the front elevation, such that when the body device is rotated 90 degrees the retaining element disengages the coupling element 312.

Figs 6A through 6K show the lens element 236 of a lighting assembly. The lower portion 610 of the lens element is adapted to conform with the exterior of the hand rail, when the body device is installed. The lens element is shown to be asymmetric with respect to a vertical plane 300, as best shown in FIG. 6H.

FIG. 6C shows a plan view of the lens element, FIG. 6D shows a side elevation view of the lens element, FIG. 6E shows an view from below the lens element, and FIG. 6F shows a front view of the lens element. Sectional views are provided in FIG. 6F and FIG. 6H.

FIG 7A and FIG 7B show a plan and side elevation of the light emitting diode light source 328 respectively. The light source includes an LED component 710, electrical connections 720 and 722, and fitting apertures 730.

FIG 8A through FIG. 8C show an elongate band retaining element 210. The retaining element further defines opposite end portions 212 adapted to engage the body device.

FIG. 9 discloses an inline assembly view of an alternative embodiment lighting assembly 900. This lighting assembly is adapted for installation in a 40mm diameter hand rail 901. This embodiment lighting assembly 900 includes a body device 920 for providing a light source, and a retaining element 910 comprising opposite end portions 912 for abuttingly engaging and retaining the body device.

The body device 920 comprises: a base element 932, a heat sink element 934, a lens element 936 and a light emitting diode (LED) light source 938. Detailed disclosure of these elements are provided in FIG. 11 through FIG. 14. The light emitting diode (LED) light source 238 is electrically coupled to a power source (not shown).

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A lighting assembly for installing through a fitting aperture defined by a handrail, the lighting assembly including:

a retaining element that is removably insertable through the fitting aperture;

a body device for providing a light source, the body device comprising a coupling element releasablly engageable to the retaining element; and

wherein, with the retaining element inserted through the fitting aperture and located within the handrail, insertion of the body device through the fitting aperture enables the coupling element to engage the retaining element thereby releasablly retaining the body device.

2. The lighting assembly according to claim 1, wherein:

with the body device inserted through fitting aperture and retained by the retaining element, the light source provides an asymmetric illumination pattern.

3. A lighting assembly for installing through a fitting aperture defined by a handrail, the lighting assembly including:

a retaining element;

a body device for providing a light source;

wherein, with the body device inserted through fitting aperture and retained by the retaining element, the light source provides an asymmetric illumination pattern.

4. A lighting assembly for installing through a fitting aperture defined by a handrail, the lighting assembly including:

a retaining element that is removably insertable through the fitting aperture; and

a body device for providing an asymmetric light source, the body device comprising a coupling element releasablly engageable to the retaining element.

5. The lighting assembly according to claim 4, wherein: with the retaining element inserted through the fitting aperture and located within the handrail, insertion of the

body device through the fitting aperture enables the coupling element to engage the retaining element thereby releasablly retaining the body device.

6. The lighting assembly according to any one of the preceding claims, wherein:

the lighting assembly directs light asymmetrically about an axis of insertion, such that with the body device installed in a handrail in a substantially downward orientation, the light source is asymmetrically directed toward a thoroughfare and away from a wall adjoining the handrail.

7. The lighting assembly according to any one of the preceding claims, wherein the body device comprises: a base element; a heat sink element; an light emitting diode light source; and a lens element.

8. The lighting assembly according to claim 7, wherein:

the body device is formed by fixing the heat sink element to the base element;

the lens element being adapted to be located with the base; and

the light source being adapted to be located with the heat sink element.

9. The lighting assembly according to any one of claims 7 to 8, wherein:

the lens element is asymmetric with respect to an axis of insertion, and

directs light asymmetrically about the axis;

such that with the body device is installed in a handrail in a substantially downward orientation, the lens directs light asymmetrically toward a thoroughfare and away from a wall adjoining the handrail.

10. The lighting assembly according to any one of claims 7 to 9, wherein the light source is mounted at an angle offset to an axis of insertion.

11. The lighting assembly according to any one of claims 7 to 10, wherein an axis of insertion is defined through a centre of both the base and the heat sink when viewed as a side profile.

12. The lighting assembly according to any one of the preceding claims, wherein the retaining element is biased into a retaining configuration.

13. The lighting assembly according to any one of the preceding claims, wherein the retaining element is elongate and sized to circumferentially abut a portion of an interior of the handrail.

14. The lighting assembly according to any one of the preceding claims, wherein:

opposite end portions of the retaining element each abuttingly engage an abutment surface defined by the coupling element for retaining the body device; and

the opposite end portions each abuttingly engage a stop for restricting further entry of the body device through the fitting aperture.

15. The lighting assembly according to any one of the preceding claims, wherein:

the coupling element is defined by a pair of groves on opposite sides of the body device for providing an abutment surface for engaging the retaining element and thereby retaining the body device.

16. The lighting assembly according to any one of claims 1 to 14, wherein:

the coupling element is defined by a pair of flange protrusions on opposite sides of the body device, and the body device has an expanding taper for directing the retaining element into an expanded configuration for receiving the body device, and enabling a retaining configuration upon engagement with the coupling element.

17. The lighting assembly according to any one of the preceding claims, wherein:

the body device includes a stop for restricting further entry of the body device through the fitting aperture;

the stop is adapted to abuttingly engage opposite end portion of the retaining element; and

the stop being further adapted to restrict movement of the body device, when the body device is substantially flush with the exterior of the handrail.

18. The lighting assembly according to any one of the preceding claims, wherein:

the body device is disengaged from the retaining element by relative rotation of the body device with respect to the retaining element and/or handrail, thereby enabling removal of the body device from the handrail.

19. The lighting assembly according to claim 18, wherein:

with the body device disengaged from the retaining element, a stop restricts further entry of the body device through the fitting aperture.

20. The lighting assembly according to any one of the preceding claims, wherein:

with the body device installed in the handrail, the axis of insertion is preferably substantially vertical.

21. A lighting assembly for installing through a fitting aperture defined by a handrail, substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.

preferably substantially vertical. Preferably, the base is a cylindrical section having an axis that defines the axis of insertion.

Preferably, the heat sink has a coupling element that defines an abutment surface for engaging the retaining element. More preferably, the heat sink defines a stop for restricting further entry of the body device through the fitting aperture. Alternatively, the base defines a stop for restricting further entry of the body device through the fitting aperture.

Preferably, the base has a coupling element that defines an abutment surface for engaging the retaining element. More preferably, the base defines a stop for restricting further entry of the body device through the fitting aperture. Alternatively, the heat sink defines a stop for restricting further entry of the body device through the fitting aperture.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

FIG. 1 is a schematic view of a lighting assembly according to the invention, shown installed in a handrail;

FIG. 2 is an inline assembly view of an embodiment lighting assembly according to the invention;

FIG. 3A is a cross sectional side view of the lighting assembly of FIG. 2, shown installed in a hand rail;

FIG. 3B is an enlarged sectional view of the lighting assembly of FIG. 3A, showing the retaining element retaining the body device within the hand rail;

FIG. 3C is a partial sectional front view of the lighting assembly of FIG. 2;

FIG. 3D is an enlarged sectional view of the lighting assembly of FIG. 3C;

FIGs 4A–4H show views of the base element of the lighting assembly of FIG. 2;

FIGs 5A-5F show views of the heat sink element of the lighting assembly of FIG. 2;

FIGs 6A-6L show views of the lens element of the lighting assembly of FIG. 2;

FIGs 7A-7B show views of the light emitting diode (LED) light source of the lighting assembly of FIG. 2;

5C shows a side elevation view of the heat sink element 234. A sectional side view is provided by FIG. 5E.

It will be appreciated that tapered portions 520 are provided on opposite sides for the heat sink element 234 for engaging the retaining element (not shown). The tapered portions 520 further define a flange 312 for abuttingly engaging an end portion of the retaining element. The width 521 defined by the tapered portions is greater than the width 522 shown in the front elevation, such that when the body device is rotated 90 degrees the retaining element disengages the coupling element 312.

Figs 6A through 6L show the lens element 236 of a lighting assembly. The lower portion 610 of the lens element is adapted to conform with the exterior of the hand rail, when the body device is installed. The lens element is shown to be asymmetric with respect to a vertical plane 300, as best shown in FIG. 6H.

FIG. 6C shows a plan view of the lens element, FIG. 6D shows a side elevation view of the lens element, FIG. 6E shows an view from below the lens element, and FIG. 6F shows a front view of the lens element. Sectional views are provided in FIG. 6F and FIG. 6H.

FIG 7A and FIG 7B show a plan and side elevation of the light emitting diode light source 328 respectively. The light source includes an LED component 710, electrical connections 720 and 722, and fitting apertures 730.

FIG 8A through FIG. 8C show an elongate band retaining element 210. The retaining element further defines opposite end portions 212 adapted to engage the body device.

FIG. 9 discloses an inline assembly view of an alternative embodiment lighting assembly 900. This lighting assembly is adapted for installation in a 40mm diameter hand rail 901. This embodiment lighting assembly 900 includes a body device 920 for providing a light source, and a retaining element 910 comprising opposite end portions 912 for abuttingly engaging and retaining the body device.

The body device 920 comprises: a base element 932, a heat sink element 934, a lens element 936 and a light emitting diode (LED) light source 938. Detailed disclosure of these elements are provided in FIG. 11 through FIG. 14. The light emitting diode (LED) light source 238 is electrically coupled to a power source (not shown).

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A lighting assembly for installing through a fitting aperture defined by a handrail, the lighting assembly including:

a retaining element that is removably insertable through the fitting aperture;

a body device for providing a light source, the body device comprising a coupling element releasably engageable to the retaining element; and

wherein, with the retaining element inserted through the fitting aperture and located within the handrail, insertion of the body device through the fitting aperture enables the coupling element to engage the retaining element thereby releasably retaining the body device; and wherein

the body device is disengageable from the retaining element by relative rotation of the body device with respect to the retaining element and/or handrail, thereby enabling removal of the body device from the handrail, and with the body device disengaged from the retaining element, a stop restricts further entry of the body device through the fitting aperture.

2. The lighting assembly according to claim 1, wherein:

with the body device inserted through fitting aperture and retained by the retaining element, the light source provides an asymmetric illumination pattern.

3. The lighting assembly according to claim 1 or 2, wherein:

the lighting assembly directs light asymmetrically about an axis of insertion, such that with the body device installed in a handrail in a substantially downward orientation, the light source is asymmetrically directed toward a thoroughfare and away from a wall adjoining the handrail.

4. The lighting assembly according to any one of the preceding claims, wherein the body device comprises: a base element; a heat sink element; a light emitting diode light source; and a lens element.

5. The lighting assembly according to claim 4, wherein:

the body device is formed by fixing the heat sink element to the base element;

the lens element being adapted to be located with the base; and

the light source being adapted to be located with the heat sink element.

6. The lighting assembly according to claim 4 or 5, wherein:

the lens element is asymmetric with respect to an axis of insertion, and

directs light asymmetrically about the axis;

such that with the body device is installed in a handrail in a substantially downward orientation, the lens directs light asymmetrically toward a thoroughfare and away from a wall adjoining the handrail.

7. The lighting assembly according to any one of claims 4 to 6, wherein the light source is mounted at an angle offset to an axis of insertion.

8. The lighting assembly according to any one of claims 4 to 7, wherein an axis of insertion is defined through a centre of both the base and the heat sink when viewed as a side profile.

9. The lighting assembly according to any one of the preceding claims, wherein the retaining element is biased into a retaining configuration.

10. The lighting assembly according to any one of the preceding claims, wherein the retaining element is elongate and sized to circumferentially abut a portion of an interior of the handrail.

11. The lighting assembly according to any one of the preceding claims, wherein:

opposite end portions of the retaining element each abuttingly engage an abutment surface defined by the coupling element for retaining the body device; and

the opposite end portions each abuttingly engage the stop for restricting further entry of the body device through the fitting aperture.

12. The lighting assembly according to any one of the preceding claims, wherein:

the coupling element is defined by a pair of groves on opposite sides of the body device for providing an abutment surface for engaging the retaining element and thereby retaining the body device.

13. The lighting assembly according to any one of claims 1 to 11, wherein:

the coupling element is defined by a pair of flange protrusions on opposite sides of the body device, and the body device has an expanding taper for directing the retaining element into an expanded configuration for receiving the body device, and enabling a retaining configuration upon engagement with the coupling element.

14. The lighting assembly according to any one of the preceding claims, wherein:

the stop is adapted to abuttingly engage opposite end portion of the retaining element; and

the stop is further adapted to restrict movement of the body device, when the body device is substantially flush with the exterior of the handrail.

15. The lighting assembly according to any one of the preceding claims, wherein:

with the body device installed in the handrail, an axis of insertion is substantially vertical.