A lighting strip comprises an elongated substantially U-shaped body 1 formed of a base strip 3 having a pair of sides 4a, 4b extending perpendicularly from opposing longitudinal edges so as to form, with the base strip 3, an elongated channel 5. The two sides 4a, 4b each have a respective one of a pair of aligned, longitudinally extending ribs 6 formed on their facing surfaces, proximate to the open side of the channel 5, which form a constriction in the cross-section of the channel 5. A plurality of LEDs 8 are mounted in and distributed along the channel 5 on the base strip 3 so as to emit light towards the open face of the channel 5, and an elongated lens 2 is mounted so as to extend from the open face of the channel 5. The lens 2 having a longitudinally extending groove 9 formed in each side thereof in which said pair of aligned ribs 6 engage so as to retain the lens 2 in the channel 5.
Description

[0001] The present invention relates to lighting strips for use with signage to provide feature lighting effects in a wide range of environments.

[0002] Lighting effects are commonly used in connection with signage in order to accentuate the effect of the sign, particularly in low light conditions, both in internal and external applications. This is achieved by using either fluorescent strip lights or spot lights, but both of these lighting types have the drawback of having relatively short operating lives, so that the bulbs need to be replaced relatively frequently - which can be expensive if the lighting is in a generally inaccessible location such as on the side of a building. Furthermore, the high voltage requirements of these types of lighting raise safety issues for external applications, requiring suitable waterproofing to be utilised which can prove to be expensive.

[0003] According to the present invention there is provided a lighting strip comprising an elongated substantially U-shaped body formed of a base strip having a pair of sides extending perpendicularly from opposing longitudinal edges so as to form, with the base strip, an elongated channel, the two sides each having a respective one of a pair of aligned, longitudinally extending ribs formed on their facing surfaces, proximate to the open side of the channel, which form a constriction in the cross-section of the channel, a plurality of LEDs being mounted in and distributed along the channel on the base strip so as to emit light towards the open face of the channel, and an elongated lens being mounted so as to extend from the open face of the channel, the lens having a longitudinally extending groove formed in each side thereof in which said pair of aligned ribs engage so as to retain the lens in the channel.

[0004] A lighting strip in accordance with the invention has the advantage that the securing arrangement between the body and the lens easily enables the lens to be replaced by sliding it out of the channel. Furthermore, the mounting of the LEDs in the base of the channel, and the mounting interface for the lens within the body enables LEDs easily to be isolated from the surrounding environment in a particularly effective manner whilst still providing desirable lighting effects through the focusing of the light from the LEDs through the linear lens or prism.

[0005] Preferably, the body is formed of a thermally conducting material such as aluminium, the LEDs being in thermal contact with the body so that it acts as a heat sink for the LEDs, effectively conducting heat from them and thereby extending their operating life. Furthermore, the facing sides of the body are preferably reflective so that all light emitted by the LEDs is directed to the lens/prism.

[0006] The lens or prism may be hollow or solid, and formed from a variety of materials such as acrylic. The shape of the projecting face can also be varied to provide different effects, lighting direction, and profile of illumination.

[0007] In a particularly preferred embodiment, end caps are provided which engage in the opposing ends of the light strip in order both to retain the lens in position in the body and to isolate the LEDs from the surrounding environment by ingress through the ends of the body. The end caps and/or the lens may further include seal means which engage between the end caps / lens and the body so as to provide a particularly effective water seal.

[0008] The opposing longitudinal sides of the body advantageous each include a respective one of a second pair of aligned, longitudinally extending ribs formed on their facing surfaces, between said respective one of the first pair of ribs and the base strip, preferably substantially half way therebetween, which second pair of longitudinally extending ribs form a constriction in the cross-section of the channel. An elongate strip of filter material may then be mounted in the body between the LEDs and the lens on the second constriction, enabling a wide range of lighting effects such as different colours to be achieved in a very simple and cheap manner.

[0009] In a further development of the invention, two lighting strips according to the invention are mounted with their base strips back to back so that their lenses are remote from each other, extending in opposite directions. This arrangement enables a double aspect lighting effect to be achieved in a particularly effective manner. Furthermore, this double aspect lighting assembly may be used to provide back lighting for a sign by mounting the sign on the front of the assembly. Lens configurations may then be used which direct the light towards a backing screen, for example by use of lenses have flat projecting faces which are inclined away from the sign and towards the backing screen. Furthermore, by use of different filters for the two lighting strips, different lighting effects such as different colour can be achieved behind different areas of the sign.

[0010] In a particularly advantageous development, the bodies of the two lighting strips are electrically conductive with a layer of insulating material being disposed between their base strips so as to electrically isolate them from each other. One of the bodies is then connected to a positive power supply and the other of the bodies is connect to negative or earth, the elongated bodies then acting as busbars for providing power to the sign, in particular for powering any internal illumination in the sign. This may be achieved in a particularly effective manner by providing at least one pair of mounting posts on which are mounted the sign, one of the mounting posts being electrically connected to one of the bodies and the other connected to the other of the bodies, each said post then performing the dual role of mounting post and power terminal.

[0011] A shroud may be located between the lightings strips and the sign so as to block, in particular reflect back, any light from the lighting strips which might be projected towards the back of the sign rather than towards the backing screen. The shroud can advanta-
gously be mounted on the mounting posts between the sign and the bodies of the lighting strip although if formed of electrically conducting material, suitable isolating means will need to be provided between the posts and the shroud to prevent the shroud shorting between the posts.

[0012] In order that the invention may be well understood, there will now be described some embodiments thereof, given by way of example, reference being made to the accompanying drawings, in which:

Figures 1a to 1d are sectional end views of a lighting strip according to the invention with four different lenses mounted thereon; Figure 2a is a sectional end view of a sign and lighting strip assembly according to a second embodiment of the invention having back-to-back bodies for double aspect light; Figure 2b is an enlarged sectional end view of the lighting strip of Figure 2a; and Figure 3 is an end view of a lens which forms part of the lighting strip of Figure 2b.

[0013] Referring first to Figure 1a, there is shown an end view of a lighting strip according to the invention composed of a U shaped body 1 formed of thermally conductive material such as aluminium and a profiled lens 2 mounted in mouth of the U shaped body. The body 1 is elongated and has a base member 3 with opposing spaced apart side walls 4a, 4b extending substantially perpendicularly therefrom so as to define a longitudinal channel 5. Mounted in the channel 5 on the base member 3 are a plurality of LEDs 8 which are distributed along the length of the strip with appropriate power supply wires leading into the channel and in electrical contact with said LEDs. More particularly, the LEDs are mounted on a strip which is position in the channel so that the light from the LEDs is directed through the open side of the channel - either directly or through reflection from the sides 4a, 4b of the body, the strip being fastened in position on the base member 3 using thermally conductive fastening means such as thermally conductive adhesives so that the LEDs are thermally coupled to the body 1, enabling the body 1 to act as a heat sink for the LEDs, thereby increasing their operating life.

[0014] Each of the side walls 4a, 4b has a first longitudinally extending rib 6 projecting from its inner surface into the channel 5 substantially half way between the base member 3 and the top of the U shaped body, the ribs on the two side walls 4a, 4b being aligned so as to form a constriction in the width of the channel 5 on which is engageable an elongated lighting screen, such as a coloured filter for varying the colour of the light emitted by the lighting strip.

[0015] Each side wall 4a, 4b further includes a second longitudinally extending rib 7 which projections from its inner surface into the channel 5 proximate to the open end of the U shaped body 1, said second ribs 7 engaging in channels 9 formed by undercuts in the sides of the lens so as to secure said lens 2 in the body 1. The lens and lighting screen are each easily inserted into the body 1 by sliding in from one end thereof, and then securely retained in position my use of suitable end caps on the body 1 (not shown).

[0016] As shown in Figures 1a to 1d, the standard body may be fitted with a wide range of different shaped lenses or prisms 12, 13, 14 to meet different requirements for lighting direction, level and effect of illumination, the retaining ribs on the sides 4a, 4b of the body enabling easy slide fitting and removal of the lenses in the body through on end thereof. The side channels 9 of the lens can also be provided with suitable sealing means to prevent the ingress of moisture into the channel where it could short the power supply to the LEDs when installed externally. Furthermore, a light filter can easily be slide into place seating on the first ribs 6 so as easily to enable the illuminating colour to be changed.

[0017] Referring next to Figures 2a and 2b, there is shown a development of the lighting strip of Figure 1 in which a pair of strips 21, 22 are mounted with their bodies 1, 1' mounted base 3 to base 3' so as to provide double aspect lighting - that is lighting projected in two different directions. More particularly, the bases 3, 3' are connect- ed back to back with a piece of insulating material 23 disposed therebetween so that the two bodies 4, 1' are electrically isolated from each other. In all other respects, each of the lighting stripes are identical with the arrangement shown in Figures 1a to 1b except that, in the illustrated embodiment in Figures 2a and 2b, each of the lenses 2, 2' has an illuminating face 18, 18' which is inclined to the plane of the base members 3, 3', as shown in Figure 3, so that the light is projected against a backing screen 24 for the sign 25. The whole assembly is then mounted on the backing screen 24 by means of a bracket 26 which holds the lighting strips 21, 22 away from the backing screen so as to ensure that the a broad light spread is produced on the backing screen 24.

[0018] The sign 25 for which the lighting strips 21, 22 are providing back illumination are mounted in front of the lighting strips 21, 22 by means of mounting posts 27, 28 which are in electrical contact with a respective one of the bodies 1, 1' of the lighting strips. The bodies 1, 1' are electrically isolated from each other by the insulating material, and the upper body 1 is electrically connected to a positive power feed, whereas the lower body 1' is electrically connected to negative or earth. The mounting posts 27, 28 are therefore likewise respectively positively and negatively charged and therefore operate not only as mounting posts for the sign 25 but also as power feeds for the LEDs 29 located inside the sign 29 for internal illumination thereof.

[0019] In order to ensure that the light from the lighting strips 21, 22 is effectively projected onto the backing screen 24, and not directly onto the back of the sign 25, a metal shroud 26 is mounted on the posts 27, 28 between the lightings strips 21, 22 and the sign 27, the
shroud 26 reflecting any extraneous light back towards the backing screen 24. Suitable insulating fixings are provided between the shroud 26 and the mounting posts 27, 28 so as to prevent the shroud shorting the posts.

[0020] It will, of course, be understood that other lens shapes and configurations can be utilised in conjunction with the present invention, other than those illustrated, the appropriate shape and characteristics being dependent upon the particular illumination pattern and intensity required.

Claims

1. A lighting strip comprising an elongated substantially U-shaped body (1) formed of a base strip (3) having a pair of sides (4a, 4b) extending perpendicularly from opposing longitudinal edges so as to form, with the base strip (3), an elongated channel (5), the two sides (4a, 4b) each having a respective one of a pair of aligned, longitudinally extending ribs (6) formed on their facing surfaces, proximate to the open side of the channel (5), which form a constriction in the cross-section of the channel (5), a plurality of LEDs (8) being mounted in and distributed along the channel (5) on the base strip (3) so as to emit light towards the open face of the channel (5), and an elongated lens (2) being mounted so as to extend from the open face of the channel (5), the lens (2) having a longitudinally extending groove (9) formed in each side thereof in which said pair of aligned ribs (6) engage so as to retain the lens (2) in the channel (5).

2. A lighting strip according to claim 1, wherein the body (1) is formed of a thermally conducting material such as aluminium, the LEDs (8) being in thermal contact with the body (1) so that it acts as a heat sink for the LEDs (8).

3. A lighting strip according to claim 1 or claim 2, wherein the facing sides (4a, 4b) of the body (1) are reflective so that all light emitted by the LEDs (8) is directed to the lens/prism (2).

4. A lighting strip according to any of the preceding claims, wherein end caps are provided which engage in the opposing ends of the light strip in order both to retain the lens (2) in position in the body (1) and to isolate the LEDs (8) from the surrounding environment by ingress through the ends of the body, preferably the end caps and/or the lens including seal means which engage between the end caps / lens and the body so as to provide a particularly effective water seal.

5. A lighting strip according to any of the preceding claims, wherein the opposing longitudinal sides (4a, 4b) of the body (1) each include a respective one of a second pair of aligned, longitudinally extending ribs (7) formed on their facing surfaces, between said respective one of the first pair of ribs (6) and the base strip (3), preferably substantially half way therebetween, which second pair of longitudinally extending ribs (7) form a constriction in the cross-section of the channel (5).

6. A lighting strip according to claim 5, wherein an elongate strip of filter material is mounted in the body between the LEDs (8) and the lens (2) on the second constriction.

7. A lighting strip assembly comprising a pair of lighting strips (21, 22) each according to any of the preceding claims mounted with their base strips (3, 3') back to back so that their lenses (12; 13; 14) are remote from each other, extending in opposite directions, and further including mounting means (27, 28) for mounting a sign (25) on the front of the assembly, said assembly providing back lighting for said sign (25).

8. A lighting strip assembly according to claim 7 or claim 8, wherein each lighting strip (21, 22) has a filter associated with it, a different filter being used for each lighting strip (21, 22) so as to achieve different lighting effects.

9. A lighting strip assembly according to claim 7 or claim 8, wherein the bodies (1, 1') of the two lighting strips (21, 22) are electrically conductive with a layer of insulating material (23) being disposed between their base strips (3, 3') so as to electrically isolate them from each other, one of the bodies (1; 1') being connected to a positive power supply and the other (1'; 1) being connect to negative or earth, whereby the elongated bodies (1, 1') act as busbars for providing power to the sign (25), in particular for powering any internal illumination in the sign.

10. A lighting strip assembly according to any of claims 7 to 9, wherein the bodies (1, 1') of the two lighting strips (21, 22) are electrically conductive with a layer of insulating material (23) being disposed between their base strips (3, 3') so as to electrically isolate them from each other, one of the bodies (1; 1') being connected to a positive power supply and the other (1'; 1) being connect to negative or earth, whereby the elongated bodies (1, 1') act as busbars for providing power to the sign (25), in particular for powering any internal illumination in the sign.

11. A lighting strip assembly according to claim 10, wherein the mounting means comprises at least a pair of mounting posts (27, 28) on which are mounted the sign (25), one of the mounting posts (27) being electrically connected to one of the bodies (1) and the other (28) connected to the other of the bodies (1'), each post (27, 28) performing the dual role of mounting post and power terminal.

12. A lighting strip assembly according to any of claims 7 to 11, wherein a shroud (26) is located between the lightings strips (21, 22) and the sign (25) so as to block, in particular reflect back, any light from the lighting strips (21, 22) which might be projected towards the back of the sign rather than towards a backing screen.
13. A lighting strip assembly according to claim 12 when dependent upon claim 11, wherein the shroud (26) is mounted on the mounting posts (27, 28) between the sign (25) and the bodies (1, 1') of the lighting strip.
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The present search report has been drawn up for all claims

Place of search: Munich
Date of completion of the search: 27 November 2006
Examiner: Meacher, David

### CATEGORY OF CITED DOCUMENTS

- **X**: particularly relevant if taken alone
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