LIGHTING SYSTEM

Field of the Invention

This invention relates to a lighting system that may be installed to light an area. More particularly, this invention relates to the use of sets of tracks to affix lighting fixtures on a surface. Still more particularly, this invention relates to a system that allows lighting fixtures to be set at different intervals along the set of tracks while keeping a consistent illumination of the lighted area.

Prior Art

Society is constantly striving to reduce consumption of electricity. One of the most problematic areas for reducing the consumption of electricity is in lighting systems for public areas such as corridors, banquet halls, and the like to create a soft cosy atmosphere. Conventional lighting systems and bulbs are commonly used in these areas for this purpose because the conventional lighting systems have been designed to provide sufficient uniform illumination in these areas. However, conventional lighting bulbs in these systems typically consume vast quantities of electricity and have short life spans.

One alternative to conventional light bulbs are cold cathode fluorescent lights (CCFLs). CCFLs typically operate with lower power consumption and have very long life spans of 15,000 hours or more, light almost immediately, and are unaffected by the number of start ups. Thus, CCFLs are an ideal alternative for lighting corridors or other areas where lighting systems are either continuously in use or in use for long periods of time. One disadvantage of CCFLs is that CCFLs typically have a long tubular housing. This makes installation difficult in areas having irregular shapes and makes consistent illumination of an area difficult to achieve. Therefore, those skilled in the art are striving to find systems that will allow for easy installation of CCFL systems that provide consistent illumination of an area.

Summary of the Invention

The above and other problems are solved and an advance in the art is made by a lighting system in accordance with this invention. One advantage of a lighting system in accordance with

this invention is that the use of sets of tracks for affixing the lighting fixtures and electronics to a surface eases the installation and replacement of components of the system. A second advantage is that the use of tracks and provision of J-shaped lighting tube ends allows adjacent lighting fixtures to be placed at various distances apart while providing a consistent illumination of the lighted area. This allows the system to be fitted in irregularly sized areas and around obstacles. A third advantage is that a coupling that connects a lighting fixture to the track may allow the lighting fixture to be set at differing angles with respect to the track. This allows the lighting fixtures to be easily installed in areas and to maintain a consistent illumination of an area as topographic features of the surface change.

In accordance with this invention, a lighting system includes a base having a top surface and a bottom surface. The bottom surface of the base is affixed to a surface of a structure, such as wall or a ceiling. Multiple sets of tracks are placed along a top surface of the base. A lighting fixture is affixed to one of the sets of tracks at any position along any of the sets of tracks by a fixture coupling. An electronics coupling affixes lighting electronics at any position along any of the sets of tracks. Power supply lines and/or other control lines may be affixed to any of the sets of tracks at any position along the tracks by a line coupling.

Preferably, the fixture coupling affixes a lighting fixture to a first set of tracks, the electronics coupling affixes the electronics to a second set of tracks, and the line coupling affixes the power and or other control lines to a third set of tracks. Still more preferably, the first set of track is along a first side of the base and the third set of tracks is along the second side of the base and all of the sets of tracks are aligned parallel to a longitudinal axis of the base.

In accordance with some embodiments of this invention, each of the sets of tracks is configured in the following manner. A first side wall extends along a first side of a slot and a second side wall extends along a second side of the slot. Each side wall includes an overhang region which extends outward from the sidewall over the slot to allow a coupling to be snap fit into the slot. In accordance with some of these embodiments, the side walls are curved to form a cylindrical slot with an opening along a top side. Furthermore, the side walls are preferably made

of semi-rigid material to allow the couplings to be snap fit into the slot and to secure the couplings in the slot.

In accordance with some embodiments of this invention, the first and/or third sets of tracks may be configured to only allow the fixture coupling and/or the line coupling to be attached to the set of tracks. In these embodiments, these sets of tracks have a first side wall on one side of the base that is curved to define the overhang region and a second side wall on a second side of the slot that is substantially perpendicular to the surface of the base having a ledge that extends over the slot from a top inner side of the second side wall.

In accordance with embodiments of this invention, the fixture coupling includes a rail attachment and a lighting mount. The rail attachment snap fits into one of the plurality of sets of tracks and the lighting mount connects a lighting fixture to the coupling and allows a lighting fixture to move about the fixture coupling to be set at different angles with respect to the base.

In accordance with some embodiments of this invention, the rail attachment includes a base. A first curved wall extends from a first end of the base and is mated to a curved side wall of the set of tracks. In some embodiments, a second curved side wall also extends from a second end of the base and is mated to a second curved side wall of the set of tracks. In other embodiments, a second end of the base has a bottom surface that slopes towards the top surface of the base and mates with a second side wall of the set of tracks. In some further embodiments, a wall fixture extends out of one side of the base to affix the fixture coupling to a surface in an absence of a set of tracks.

In accordance with some embodiments of the lighting fixture, the lighting mount is configured in the following manner. A receiver is connected to the rail attachment. A connector on the lighting fixture is connectable to the receiver. A sprocket and tooth arrangement between the receiver and the connector allows the angle of the lighting fixture with respect to the base of the system to be changed and securely holds the fixture in place at the desired angle.

In accordance with some embodiments of this invention, the line coupling includes a rail attachment and a line holder. The rail attachment snap fits into one of the plurality of sets of tracks and the line holder holds a power line and/or secondary line in place proximate the sets of tracks.

In accordance with some embodiments of this invention, the rail attachment includes a base. A first curved wall extends from a first end of the base and is mated to a curved side wall of the set of tracks. In some embodiments, a second curved side wall also extends from a second end of the base and is mated to a second curved side wall of the set of tracks. In other embodiments, a second end of the base has a bottom surface that slopes towards the top surface of the base and mates with a second side wall of the set of tracks. In some further embodiments, a wall fixture extends out of one side of the base to affix the line coupling to a surface in an absence of a set of tracks.

In accordance with some embodiments, the line holder is formed of a panel extending outwards from the top surface of the rail attachment with a primary depression defined into the panel configured to snap fit around the primary and/or power line. In some of these embodiments, a secondary depression is defined in the panel extending from the primary depression in the panel and is configured to snap fit around a secondary line.

In accordance with embodiments of this invention, the electronics coupling includes a rail attachment and an electronics mount. The rail attachment snap fits into one of the plurality of sets of tracks and the electronic connects an electronic component to the coupling.

In accordance with some embodiments of this invention, the rail attachment includes a base. A first curved wall extends from a first end of the base and is mated to a curved side wall of the set of tracks. In some embodiments, a second curved side wall also extends from a second end of the base and is mated to a second curved side wall of the set of tracks. In other embodiments, a second end of the base has a bottom surface that slopes towards a top surface of the base and mates with a second side wall of the set of tracks. In some further embodiments, a

wall fixture extends out of one side of the base to affix the electronics coupling to a surface in an absence of a set of tracks.

In accordance with some embodiments of this invention, the lighting fixture includes a housing enclosing a light tube. The light tube has J-shaped ends on opposing ends of the tube. This allows multiple of lighting fixtures to be connected to a set of tracks with varying distances between adjacent fixtures while providing consistent illumination to a lighted area.

Brief Description of the Drawings

The above and other features and advantages of a lighting system in accordance with this invention are described in the following detailed description and are shown in the following drawings:

Figure 1 illustrating a perspective view of a lighting system in accordance with an embodiment this invention;

Figure 2 illustrating a perspective view of a base component in accordance with an embodiment of this invention;

Figure 3 illustrating a perspective view of a first side of a fixture coupling in accordance with an embodiment of this invention;

Figure 4 illustrating a perspective view of a second side of the fixture coupling in accordance with the embodiment shown in Figure 3;

Figure 5 illustrating a perspective side view of a lighting fixture in accordance with an embodiment of this invention;

Figure 6 illustrating a side perspective view of an electronics coupling in accordance with an embodiment of this invention; and

Figure 7 illustrating a side perspective view of a line coupling in accordance with an embodiment of this invention.

Detailed Description

This invention relates to a lighting system that may be installed to light an area. More particularly, this invention relates to the use of sets of tracks to affix lighting fixtures on a surface.

Still more particularly, this invention relates to a system that allows lighting fixtures to be set at different intervals along the sets of tracks while keeping a consistent illumination of the lighted area. For purposes of understanding, components shown in multiple figures are given the same reference numeral throughout this description.

This invention relates to a lighting system for affixing lighting fixtures to a surface of a structure. In particular, this lighting system is for use with CCFLs. However, one skilled in the art will recognize that other types of lighting fixtures may be used without departing from this invention.

Figure 1 illustrates lighting system 100 in accordance with an embodiment of this invention. Lighting system 100 includes a base 120 that has a bottom surface that rests on a surface of a structure. Sets of tracks are on a top surface of base 120. In the shown embodiment, there are four sets of tracks. Preferably, base 120 is made of a metal, polyurethane, plastic, or other rigid material. The exact material being left to a designer to provide the strength and/or aesthetic features required. Further, one skilled in the art will recognize that any number of tracks may be provided without departing from this invention. A more complete description of the sets of tracks is provided with reference to Figure 2.

Lighting fixtures 105,106 are connected to a first set of tracks. Each of lighting fixtures 105, 106 is independently movable along the first set of tracks. Thus, the spacing between adjacent lighting fixtures 105,106 is variable. In this embodiment, lighting fixtures 105, 106 are shown connected to a first set of tracks on a first side of base 120. However, one skilled in the art will recognize that either or both of lighting fixtures 105, 106 could be connected to any of the shown sets of tracks without departing from this invention. Lighting fixtures 105,106 and a coupling for connecting lighting fixtures 105, 106 to a set of tracks are described below with reference to Figures 3-5.

Lighting electronics 110 and 111 are housings for electronic components for applying power to the lighting fixtures 105, 106. The electronic components housed in lighting electronics 110 and 111; and connections to power lines 115 and lighting fixtures 105,106 are omitted as an

understanding of these components and connections is not needed to make and/or use lighting system 100. In the shown embodiment, light electronics 110 and 111 are shown connected to a second set of tracks substantially in the middle of base 120. However, one skilled in the art will recognize that either one or both of light electronics 110 and 111 may be connected to any other set of tracks on base 120 without departing from this invention. A description of an electronics coupling that used to connect lighting electronics 110 and/or 111 to the tracks is provided below with respect to Figure 6.

Power line 115 is connected to a third set of tracks on base 120 in the shown embodiment. For purposes of this discussion, power line 115 may be a wire and/or wires providing current and/or control signals to lighting electronics 110 and 111 to operate lighting fixtures 105 and 106. As shown, power line 115 is connected to a third set of tracks on a second side of base 120 opposite from the set of tracks to which lighting fixtures 105,106 are connected. One skilled in the art will recognize all or a portion of power line 115 may be connected to different set of tracks without departing from this invention.

Figure 2 illustrates a perspective view of base 120 in accordance with an embodiment of this invention. Base 120 is made of a metal, polyurethane, plastic, or other rigid material. Sets of tracks 205, 235, and 245 are on a top surface of base 120. Preferably, sets of tracks 205, 235, and 245 are substantially aligned along a longitudinal axis of base 120. However, these sets of tracks may be aligned differently if needed without departing from this invention. In the shown embodiment, sets of tracks 205, 235 and 245 have different configurations to connect with different components. However, one skilled in the art will recognize that all or a portion of the sets of tracks may have the same configuration to allow rearrangement of components on different sets of tracks without departing from this invention.

As shown in Figure 2, first set of tracks 205 is configured in the following manner. First side wall 210 and second side wall 220 extend outward from the top surface of base 120 enclosing a slot. First side wall 210 and second side wall 220 are made of material that allows first and second sidewalls 210, 220 to slightly flex to allow couplings from components to snap fit into the

slot and then secure the couplings in the slot. First side wall 210 is along a first side base 120 and has a circular curvature to define an overhang over the slot. Second side wall 220 is along a side of the slot opposite of first side wall 210 on the interior of base 120. Second side wall 220 extends substantially perpendicular from the surface of base 120. A ledge 225 extends outward from a top, side surface of second side wall 220 to create an overhang over the slot.

Second set of tracks 235 is the interior of base 120 and connects to lighting electronics in the shown embodiment. First side wall 230 and second side wall 240 are aligned substantially parallel to one another and a longitudinal axis of base 120. First side wall 230 and second side wall 240 are curved inwards towards one another to form a cylindrical slot with an opening on a top side. Preferably, first side wall 230 and 240 are made of a material that allows enough flexing for a coupling to be snap fit into the formed slot and then secure the coupling in the slot.

Third set of tracks 245 is configured in the following manner. First side wall 260 and second side wall 250 extend outward from the top surface of base 120 enclosing a slot. First side wall 260 and second side wall 250 are made of material that allows first and second sidewalls to slightly flex to allow couplings from components to snap fit into the slot and then secure the couplings in the slot. First side wall 260 is along a second side base 120 and has a circular curvature to define an overhang over the slot. Second side wall 250 is along a side of the slot opposite of first side wall 260 on the interior of base 120. Second side wall 260 extends substantially perpendicular from the surface of base 120. A ledge 255 extends outward from a top, side surface of second side wall 250 to create an overhang over the slot. One skilled in the art will recognize that any additional number of tracks may be added or removed without departing from this invention.

Figure 3 and 4 illustrate side views of fixture coupling 300 in accordance with an embodiment of this invention. Fixture coupling 300 affixes a lighting fixture to a set of tracks. In the shown embodiment, fixture coupling 300 affixes one side of a lighting fixture to a set of tracks. Thus, one skilled in the art will recognize any number of fixture couplings 300 may connect a light fixture to a set of tracks without departing from the invention. Furthermore, it may be possible to

configure fixture couplings 300 in a manner in which one fixture coupling 300 connects a lighting fixture to a first set of tracks and a second coupling 300 connects the lighting fixture to a second set of tracks without departing from this invention.

In the shown embodiment, fixture coupling 300 is made of plastic, polyurethane, or other material. Fixture coupling 300 includes a rail attachment and a lighting mount. The rail attachment snap fits into one of the plurality of sets of tracks and the lighting mount connects a lighting fixture to the coupling and allows a lighting fixture to move about the fixture coupling to be set at different angles with respect to the base.

In accordance with some embodiments of this invention, the rail attachment includes a base 305. A first curved wall 310 extends from a first end of the base 305 and is mated to a curved side wall of the set of tracks. In some embodiments, a second curved side wall also extends from a second end of the base and is mated to a second curved side wall of the set of tracks. In the embodiment, a second end 315 of the base 305 has a bottom surface that slopes towards a top surface of base 305 and mates with a second side wall of the set of tracks. In some further embodiments, a wall fixture 330 extends out of one side of the base to affix fixture coupling 300 to a surface in an absence of a set of tracks. An opening in wall fixture 330 is configured to receive a screw, nail or other fastening device.

Receiver 320 extends out of base 305. Connector 515 of lighting fixture 500 (Shown in Figure 5) is connectable to receiver 320. In this embodiment, connector 515 snap fits into a cavity in receiver 320. Tooth 325 on one side of base 305 opposite wall fixture 330 cooperates with sprocket 316 of connector 515 to allow the angle of the lighting fixture with respect to the base of the system to be changed and securely holds the fixture in place at the desired angle by fitting securely between adjacent cogs of sprocket 316. One skilled in the art will recognize that tooth 325 may be on connector 515 and sprocket 316 on fixture coupling 300 without departing from this invention.

Figure 5 illustrates lighting fixture 500 in accordance with an embodiment of this invention. Lighting fixture 500 has a housing 510 made of transparent material. A lighting tube or bulb (Not Shown) having J-shaped ends (Not Shown) which bend inwards, towards one another is housed inside housing 510. Housing 510 includes transparent housing ends 505. The use of transparent housing ends 505 and J-shaped lighting tube ends allows the illumination from adjacent lighting fixtures in the system to remain consistent even if the distance between adjacent fixtures is varied. As described above, connector 515 cooperates with receiver 320 and includes a sprocket 316 that cooperates with tooth 325.

Figure 6 illustrates electronics coupling 600 used to affix lighting electronics to a set of tracks. One skilled in the art will recognize that one or more electronics couplings 600 may be used to connect an electronics housing to one or more sets of tracks without departing from this invention. Electronics coupling 600 includes rail attachment 610 and an electronics mount 620. In this embodiment, rail attachment 610 is configured to snap fit into one of the sets of tracks and electronic mount 620 connects lighting electronics 110, 111 to coupling 600.

As shown, rail attachment 610 includes a base. A first curved wall 615 extends out of a first side of the base and is mated to a curved side wall of the set of tracks. Second curved side wall 605 extends from a second side of the base and is mated to a second curved side wall of the set of tracks. As shown, side walls 605 and 615 form a cylindrical member that snap fits into the set of tracks. In some further embodiments, a wall fixture (Not Shown) may extend out of one side of the base to affix the electronics coupling to a surface in an absence of a set of tracks.

As shown in this embodiment, electronic mount 620 is a nib that is press fit into a connector in the housing of the lighting electronics. However, it is envisioned that other mounts may be used without departing from this invention.

Figure 7 illustrates line coupling 700 that connects a line to a set of tracks in accordance to an embodiment of this invention. Line coupling 700 includes rail attachment and a line holder.

The rail attachment snap fits into one of the plurality of sets of tracks and the line holder holds a power line and/or secondary line in place proximate the set of tracks.

As shown, the rail attachment includes base 705. First curved wall 710 extends from a first end of base 705 and is mated to a curved side wall of the set of tracks. In some embodiments, a second curved side wall also extends from a second end of the base and is mated to a second curved side wall of the set of tracks. However, a second end 715 of base 705, as shown in this embodiment, has a bottom surface that slopes inwards towards a top surface and mates with a second side wall of the set of tracks. In some further embodiment, a wall fixture (Not Shown) extends out of one side of base 705 to affix line coupling 700 to a surface in an absence of a set of tracks. The wall fixture, preferably, has an opening that is mated to receive a screw, nail or other kind of fastener.

As shown, the line holder is formed from panel 730 extending outward from the top surface of base 705 with a primary depression 720 defined into the panel configured to snap fit around the primary and/or power line. The line holder may also have, as shown, secondary depression 725 defined in the panel extending from the primary depression in the panel that is configured to snap fit around a secondary line or to provide additional flexibility.

The above describes a lighting system in accordance with an embodiment of this invention. It is envisioned that based upon this description those skilled in the art can and will design alternative embodiments that infringe this invention as set forth in the following claims.

What is claimed is:

1. A lighting system comprising:

a base having a top surface and a bottom surface wherein said bottom surface of said base is affixed to a surface;

a plurality of sets of tracks along said top surface of said base;

a fixture coupling that affixes a lighting fixture at any position along one of said plurality of sets of tracks; and

a line coupling that affixes a power line to any position along one of said plurality of tracks.

2. The lighting system of claim 1 wherein said plurality of sets of tracks are substantially aligned with a longitudinal axis of said base.

3. The lighting system of claim 1 wherein each of said plurality of sets of tracks comprises:

a first side wall along a first side;

a second side wall along a second side;

a first overhanging region on said first side wall overhanging a slot defined between said first side wall and said second side wall; and

a second overhanging region on said second side wall overhanging said slot wherein said first side wall, said second side wall, said first overhanging region, and said second overhanging region are configured to allow a base of a coupling to be snap fit into said slot.

4. The lighting system of claim 3 wherein said first side wall and said second side wall are curved to form a cylindrical slot with an opening along a top side.

5. The lighting system of claim 4 wherein said first and second side wall are made of semi-rigid material to allow said coupling to be snap fit into said slot and secure said coupling in said slot.

6. The lighting system of claim 3 wherein said first side wall of a first one of said plurality of sets of tracks along a first side of said base is curved to define said overhanging region and said

second side wall of said first one of said plurality of sets of tracks is substantially perpendicular to said surface of said base with a ledge extending from a top inner side of said second side wall over said slot.

7. The lighting system of claim 6 wherein said first side wall of a second one of said plurality of sets of tracks along a second side of said base is curved to define said overhanging region and said second side wall of said second one of said plurality of sets of tracks is substantially perpendicular to said surface of said base with a ledge extending from a top inner side of said second side wall over said slot.

8. The lighting system of claim 1 wherein said fixture coupling comprises:

a rail attachment that snap fits into one of said plurality of sets of tracks; and

a lighting mount that allows a lighting fixture to move about said fixture coupling.

9. The lighting system of claim 8 wherein said rail attachment comprises:

a base;

a first curved wall extending from a first end of said base mated to a curved side wall of said one of said plurality of sets of tracks;

10. The lighting system of claim 9 wherein said rail attachment further comprises:

a second curved wall extending from a second end of said base mated to a second curved side wall of said one of said plurality of sets of tracks.

11. The lighting system of claim 9 wherein said rail attachment further comprises:

a second end of said base having a second end with a bottom surface that slopes inwards and mates with a second side wall of said one of said plurality of sets of tracks.

12. The lighting system of claim 9 wherein said rail attachment further comprises:

a wall fixture extending out of one side of said base for affixing said fixture coupling to a surface in an absence of said plurality of sets of tracks.

13. The lighting system of claim 8 wherein said lighting mount comprises:

a receiver connected to said rail attachment;

a connector connected to said lighting fixture; and

a sprocket and tooth arrangement between said receiver and said connector wherein said tooth mates with a gap between adjacent cogs of said sprocket to hold said sprocket in place wherein said tooth may be placed between different cogs of said sprocket to change an angle of said lighting fixtures with respect to said base.

14. The lighting system of claim 1 wherein said line coupling comprises:

a rail attachment that snap fits into one of said plurality of sets of tracks; and

a line holder that attaches to a primary line to hold said primary line in place.

15. The lighting system of claim 14 wherein said rail attachment comprises:

a base;

a first curved wall extending from a first end of the base mated to a curved side wall of said one of said plurality of sets of tracks;

16. The lighting system of claim 15 wherein said rail attachment further comprises:

a second curved wall extending from a second end of said base mated to a second curved side wall of said one of said plurality of sets of tracks.

17. The lighting system of claim 15 wherein said rail attachment further comprises:

a second end of said base having a second end with a bottom surface that slopes inwards and mates with a second side wall of said one of said plurality of sets of tracks.

18. The lighting system of claim 15 wherein said rail attachment further comprises:

a wall fixture extending out of one side of said base for affixing said line coupling to a surface in an absence of said plurality of sets of tracks.

19. The lighting system of claim 14 wherein said line holder comprises:

a panel extending outwards from said rail attachment with a primary depression defined into said panel configured to snap fit around said primary line.

20. The lighting system of claim 19 wherein said line holder further comprises:

a secondary depression extending from said primary depression defined in said panel that is configured to snap fit around a secondary line.

21. The lighting system of claim 1 further comprising:

an electronics coupling that affixes lighting electronics at any position along one of said plurality of sets of tracks.

22. The lighting system of claim 21 wherein said fixture coupling affixes to a first one of said plurality of sets of tracks, said electronics coupling affixes to a second one of said plurality of sets of tracks, and said line coupling affixes to a third one of said plurality of sets of tracks.

23. The lighting system of claim 22 wherein said first one of said plurality of tracks is along a first side of said top surface of said base and said third one of said plurality of sets of tracks is along a second side of said top surface of said base.

24. The lighting system of claim 21 wherein said electronics coupling comprises:

a rail attachment that snap fits into one of said plurality of sets of tracks; and

an electronics mount that attaches to said lighting electronics.

25. The lighting system of claim 24 wherein said rail attachment comprises:

a base;

a first curved wall extending from a first end of the base mated to a curved side wall of said one of said plurality of sets of tracks;

26. The lighting system of claim 25 wherein said rail attachment further comprises:

a second curved wall extending from a second end of said base mated to a second curved side wall of said one of said plurality of sets of tracks.

27. The lighting system of claim 25 wherein said rail attachment further comprises:

a second end of said base having a second end with a bottom surface that slopes inwards and mates with a second side wall of said one of said plurality of sets of tracks.

28. The lighting system of claim 1 further comprising:

a lighting fixture having a housing enclosing a light bulb; and

J-shaped ends on opposing ends of said light bulb.

29. The lighting system of claim 28 wherein a plurality of said fixture couplings may be used to vary distances between adjacent ones of a plurality of lighting fixtures.

30. The lighting system of claim 29 wherein illumination of said plurality of lighting fixtures is consistent.