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Patti

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[54] **MULTIPLE TRACK ADAPTER FOR TRACK LIGHTING SYSTEMS**

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[21] Appl. No.: **783,891**

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[51] **Int. Cl.**[6] **H01R 25/14**

[52] **U.S. Cl.** **439/121**

[58] **Field of Search** 439/121, 122, 439/94, 116–119

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Primary Examiner—Gary F. Paumen

Attorney, Agent, or Firm—Hill & Simpson

[57] **ABSTRACT**

An adapter is provided for making a mechanical and an electrical connection between a light fixture and a plurality of differently configured tracks of different track lighting systems. By utilizing the adapter of the present invention, a light fixture may be mechanically and electrically connected to differently configured tracks manufactured by different manufacturers.

27 Claims, 4 Drawing Sheets

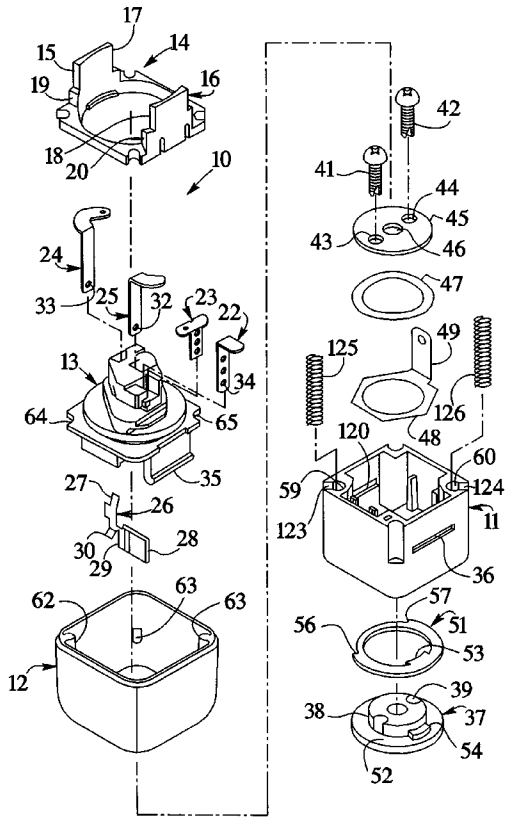
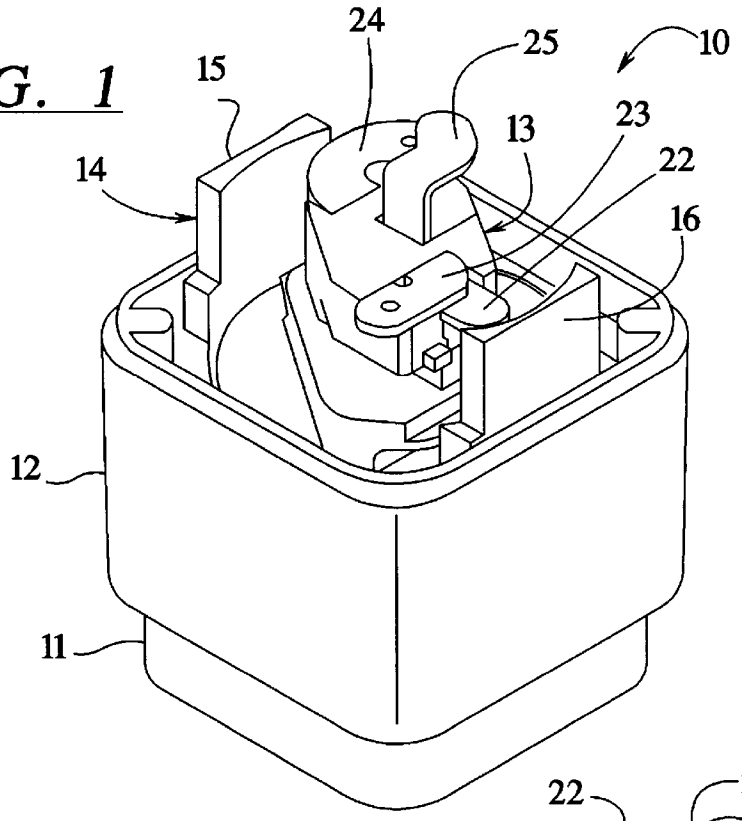


FIG. 1



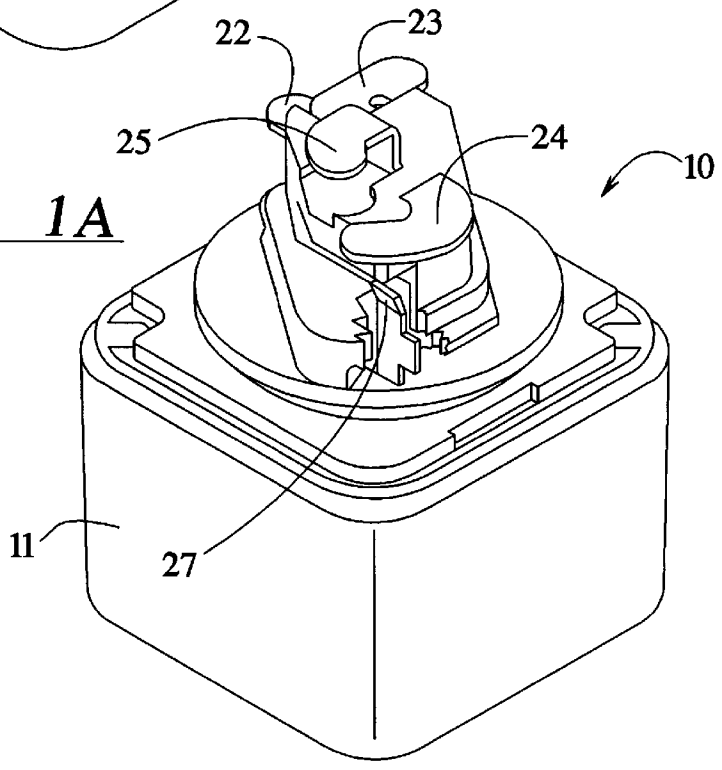


FIG. 1A

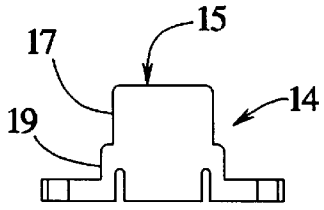
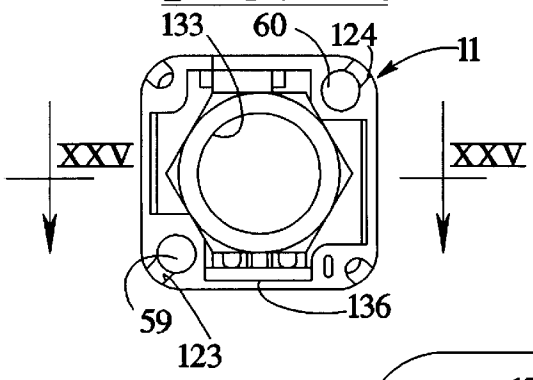


FIG. 23

FIG. 24



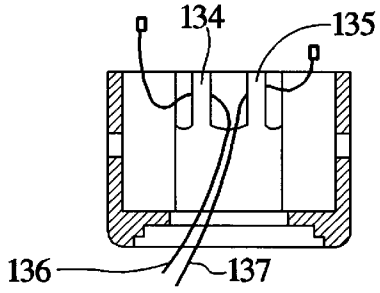


FIG. 25

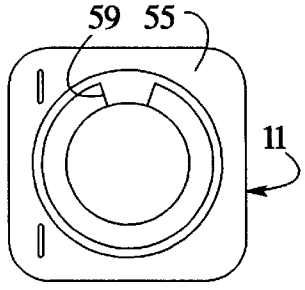


FIG. 26

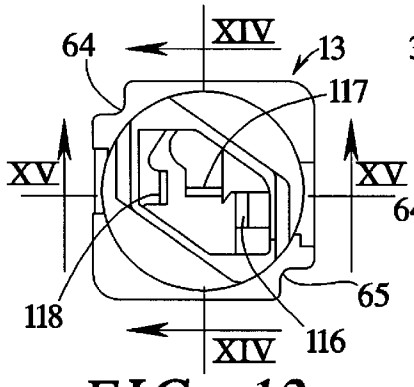


FIG. 12

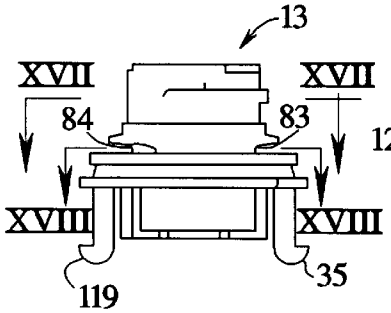
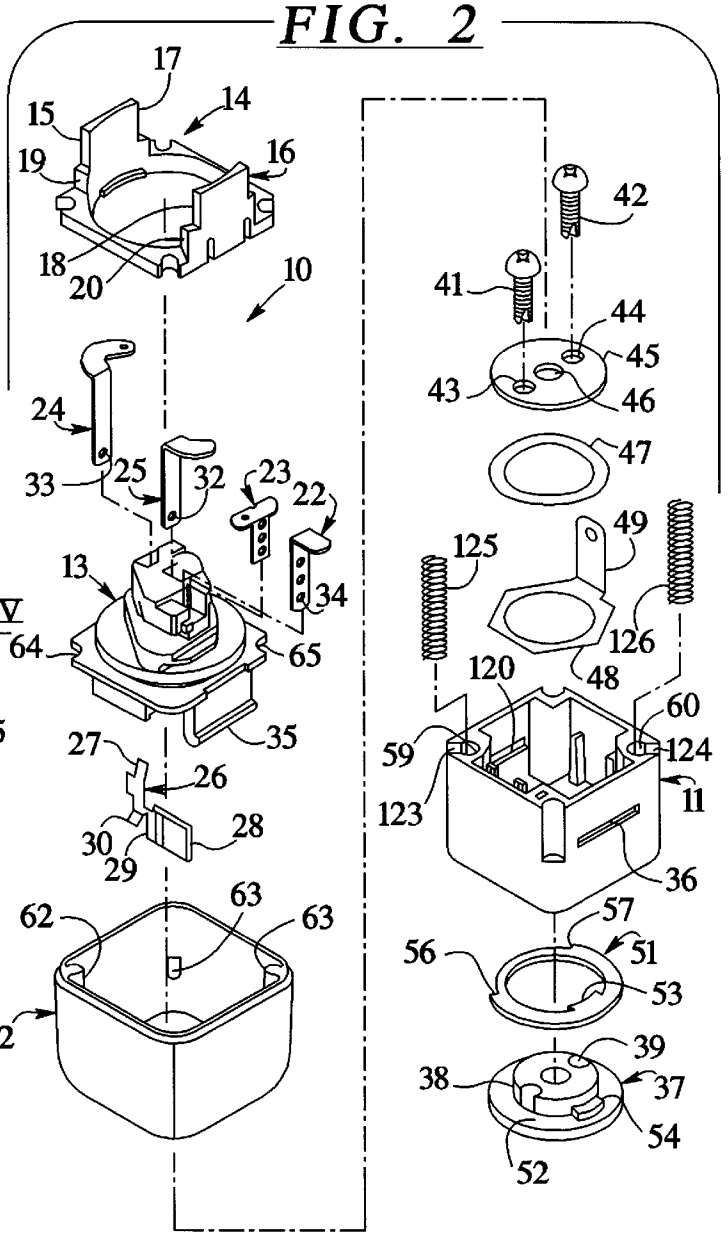


FIG. 13

FIG. 2



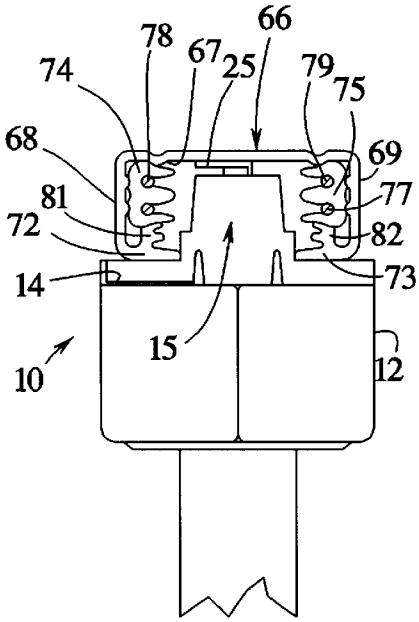
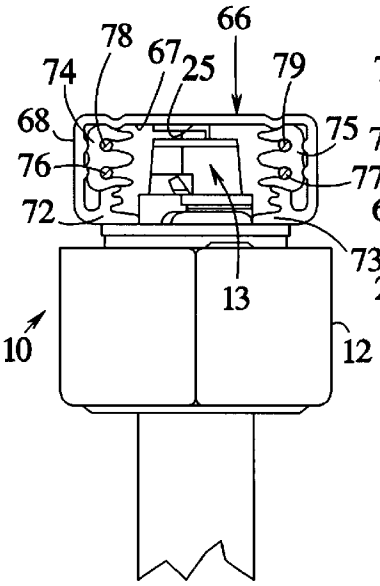


FIG. 3



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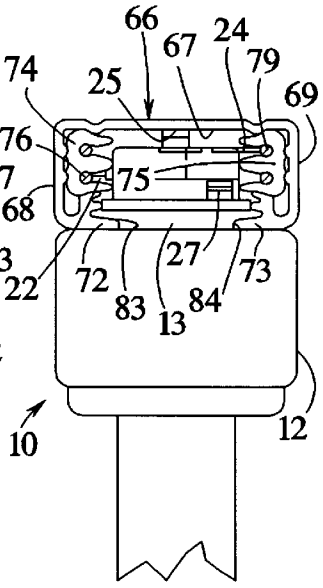

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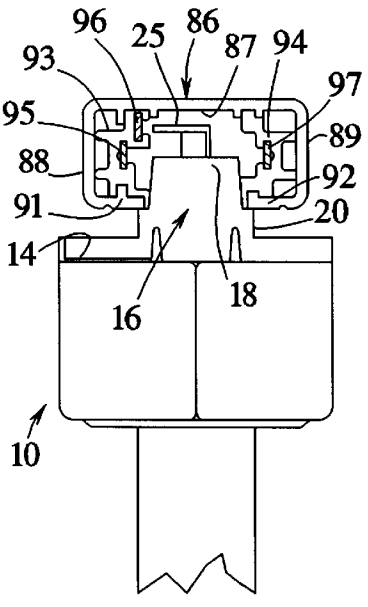

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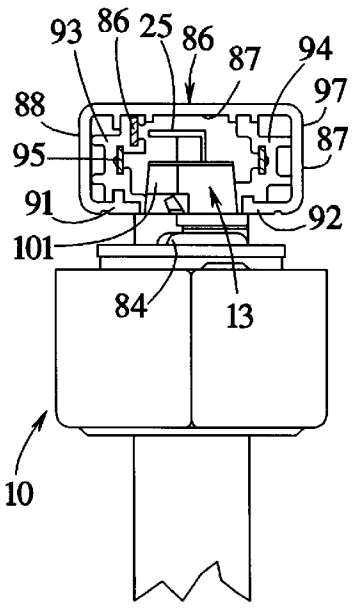
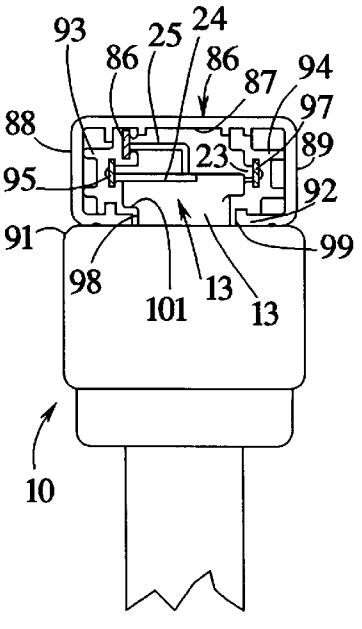


FIG. 7



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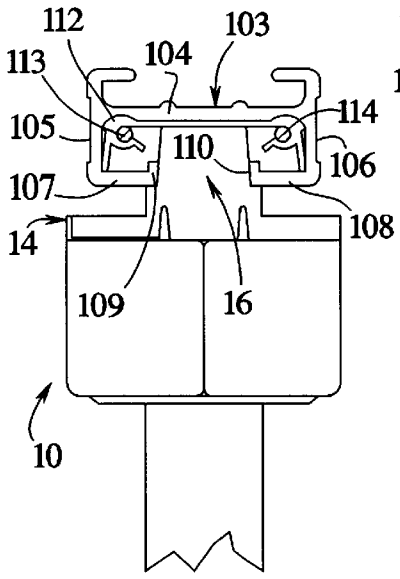
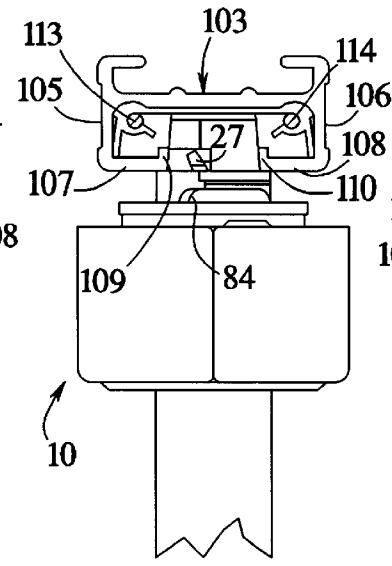


FIG. 9



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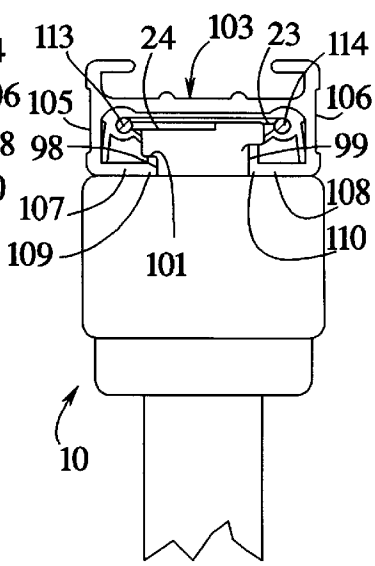

FIG. 11

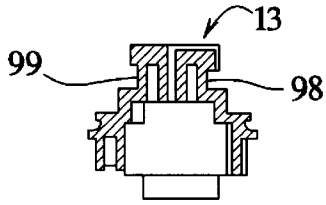

FIG. 14

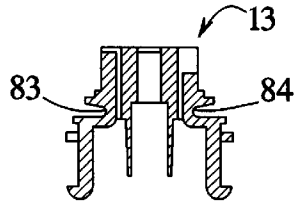

FIG. 15

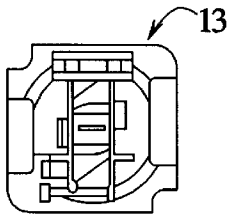

FIG. 16

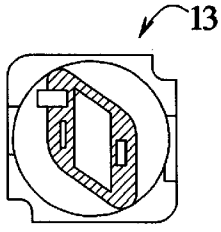

FIG. 17

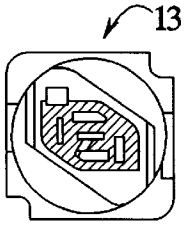

FIG. 18

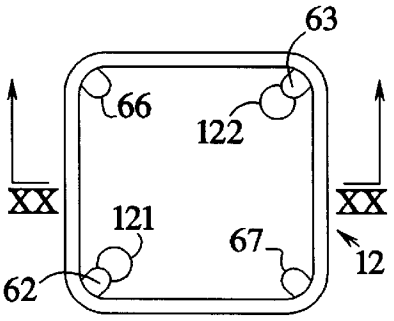

FIG. 19

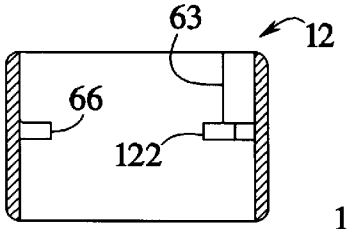

FIG. 20

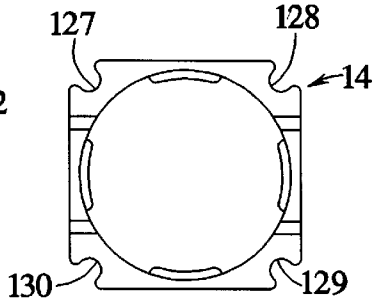

FIG. 21

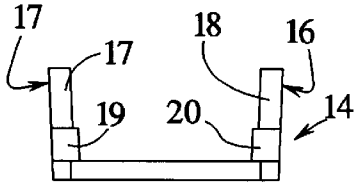

FIG. 22

MULTIPLE TRACK ADAPTER FOR TRACK LIGHTING SYSTEMS

FIELD OF THE INVENTION

The present invention relates generally to track lighting systems and more specifically, to an adapter for connecting a light fixture at any point along a track of a track lighting system. Still more specifically, the present invention relates to an adapter for connecting a light fixture to any one of differently configured tracks of different track lighting systems.

BACKGROUND OF THE INVENTION

Track lighting systems are known. A typical track lighting system includes two primary components. First, a track having a generally inverted C-shaped cross section is mounted to a ceiling or a wall. The track typically has a top wall disposed between two downwardly extending arms which terminate in two inwardly extended ledges to form a central channel. Inserts are typically disposed between each ledge and the top wall for the purpose of accommodating one or more conductors. The inserts are typically fabricated from a plastic material that insulates the conductors from each other and from the track if the track is fabricated from metal.

The track lighting fixture or light fixture is attached to the track by inserting the adapter mounted to the fixture through the central channel of the track. A typical adapter includes two or more tangs that extend outwardly which, when twisted, are frictionally secured above the ledges of the track. Conductor engaging tabs also extend outwardly from the top end of the adapters which engage the conductor when the adapter is locked into place above the ledges of the track.

Further, three types of grounding mechanisms are typically provided for track lighting systems. For metallic tracks which also serve as a ground conductor, a metallic tab may be provided that extends outward from the adapter to provide a scraping engagement between the grounding tab and the ledge of the conductor. Another configuration is to provide an upwardly extending grounding tab that engages a top wall of the track, assuming the top wall of the track is not lined with an insulating insert material. Other track lighting systems employ a separate conductor which is accommodated in an insert for grounding purposes. For these systems, a separate conductor engaging tab must be provided in the top end of the adapter head.

Three different tracks having three different structural configurations and that are used with three different track lighting systems are illustrated in FIGS. **3–8**. The three different lighting systems are sold under the CAPRI, HALO and JUNO trademarks. As can be seen from FIGS. **3–5** which illustrate the CAPRI track, FIGS. **6–8** which illustrate the HALO track and FIGS. **9–11** which illustrate the JUNO track, the CAPRI, HALO and JUNO tracks are dimensioned differently and, prior to the present invention required a specially designed adapter for each track.

Previously, an adapter attached to a CAPRI light fixture which is designed to fit a CAPRI track would not fit into either a HALO or a JUNO track. Similarly, an adapter attached to a HALO light fixture which is designed to fit a HALO track would not fit into either a CAPRI or a JUNO track. Finally, an adapter attached to a JUNO light fixture designed for a JUNO track would not fit into either a HALO track or a CAPRI track.

Thus, after a consumer has installed one of the currently available track lighting systems onto a ceiling, and the consumer later decides to change the decor of the room by changing light fixtures, the consumer is forced to choose a light fixture fabricated by the manufacturer of his or her original track lighting system or a light fixture that is designed specifically to fit that system. In essence, once a consumer chooses a CAPRI system, a HALO system or a JUNO system, and the consumer later decides to change the light fixtures, the consumer is limited to choosing fixtures equipped with adapters specifically designed to fit the original system. If the consumer chooses a light fixture that cannot fit the consumer's original track, the only alternative left to the consumer is to choose a different light fixture or replace the pre-existing track.

Therefore, by incorporating different design features in their tracks, competing manufacturers have prevented consumers from installing the light fixtures of their competitors onto their tracks and have effectively limited the consumer's choices of replacement light fixtures to light fixtures made by the manufacturers of the consumer's existing track lighting system. If the consumer is not satisfied with the variety of styles of replacement light fixtures offered by a particular manufacturer and the consumer's already installed track is made by that particular manufacturer, the consumer's only alternative is to install new track. This is an expensive and labor intensive prospect.

Therefore, there is a need on the part of consumers for an adapter that enables the attachment of light fixtures to a plurality of differently configured tracks made by different manufacturers. When such an adapter is attached to a light fixture, owners of track lighting systems made by any one of the three or more primary manufacturers would be able to install the light fixtures on their pre-existing track as a replacement light fixture. Consumers would no longer have to be forced or limited to choosing replacement light fixtures from the manufacturer of their currently installed track. Such an adapter would greatly expand the selection of replacement light fixtures currently available to consumers. Such an adapter would also enable manufacturers to expand the market for their current replacement light fixtures because the light fixtures would be able to be attached to all of the major track lighting systems instead of a specific track lighting system manufactured by a single manufacturer.

SUMMARY OF THE INVENTION

The above-mentioned needs are satisfied by the present invention which provides a track lighting adapter for mechanically and electrically connecting a track light fixture to a plurality of differently dimensioned or configured tracks. In essence, the track lighting adapter of the present invention, when attached to a light fixture, enables that light fixture to be attached to at least any one of the three differently configured tracks manufactured by the three primary manufacturers of track lighting systems.

A track lighting adapter made in accordance with the present invention mechanically and electrically connects a light fixture to any one of a plurality of differently configured tracks of the type having a top wall disposed between a first and second downwardly extending arm in a generally inverted U-shaped configuration. Each arm is connected to an inwardly extending ledge. Two ledges define a central channel or a central slot which accommodates the adapter. Each side of the track also includes an insert, typically made of plastic, that accommodates at least one conductor. The spacing of the conductors between the ledge and the top wall varies from manufacturer to manufacturer as well as the thickness of the ledges. Each track also includes a ground

conductor which may be a separate conductor wire or the metallic track itself.

The adapter of the present invention includes a contact head having a top end for insertion through the central channel of the track and a bottom end that is connected to a main housing which, in turn, is connected to the light fixture. The top end of the contact head includes two separate ground contact tabs, a first tab that is spring biased upward for engaging the top wall of at least one of the currently available tracks, a ground conductor of at least one of the currently-available tracks and a second scraping type ground contact tab that engages one of the ledges of the other currently available tracks. The top end of the contact head further includes two line (or positive) conductor contact tabs for engaging the line (or positive) conductors of the tracks and at least one neutral conductor contact tab for engaging the neutral conductors of the tracks. The line conductor contact tabs are disposed on the same side of the contact head and are vertically displaced from one another to accommodate the differences in the spacing of the line conductor amongst the tracks of the various manufacturers.

In an embodiment, the line conductor contact tabs are disposed on an opposing side of the top end of the contact head from the neutral conductor contact tab.

In an embodiment, the top end of the contact head further comprises a fist lower pair of opposing slots for engaging the first and second ledges of at least one of the currently-available tracks and a second upper pair of opposing slots for engaging the first and second ledges of at least one of the currently available tracks. The first lower pair of opposing slots and the second upper pair of opposing slots being vertically displaced from one another.

In an embodiment, one of the upper opposing slots is wider or thicker than the other upper opposing slot.

In an embodiment, the first lower pair of opposing slots accommodate the first and second ledges of the CAPRI track.

In an embodiment, the second upper pair of opposing slots engage the first and second ledges of the HALO and JUNO tracks.

In an embodiment, the adapter of the present invention includes a lock ring mounted over the top end of the contact head. The lock ring includes an annular base for accommodating the top head of the contact head and two upwardly extending and opposing tabs. The tabs are accommodated in the central channel of the track.

In an embodiment, the tabs of the lock ring of the present invention each include a narrow top portion and a wider bottom portion. The narrow top portion is sufficiently narrow to be inserted through the central channel of the currently available tracks. In contrast, the wider bottom portion is accommodated in the central channel of at least one of the currently available tracks and is wider than the central channels of at least two of the currently available tracks. Accordingly, the wider bottom portion of the tabs of the lock ring control the depth in which the lock ring, and consequently the contact head, can be inserted into the central channels of the tracks that are narrower than the bottom portions of the tabs of the lock ring.

In an embodiment, the adapter of the present invention provides an automatic polarity matching mechanism by way of at least one stop barrier disposed on the contact head which prevents rotation of the contact head in such a way as to align one or more of the line conductor contact tabs with a neutral conductor of one of the currently available tracks.

In an embodiment, the present invention includes an automatic polarity matching system which includes at least one stop barrier disposed on the top end of the contact head which prevents rotation of the contact head so as to align or contact the neutral conductor contact tab with a line conductor of one of the currently available tracks.

In an embodiment, the adapter of the present invention includes a contact head having two ground contact tabs, two line conductor contact tabs and one neutral conductor contact tab.

In an embodiment, one of the ground contact tabs of the adapter of the present invention is spring biased upward and the other ground contact tab extends outward from a side of the contact head.

In an embodiment, at least one of the line conductor contact tabs of the present invention is vertically disposed above the other line conductor contact tab.

In an embodiment, in addition to being vertically displaced from one another, the line conductor contact tab is directed outward or from the contact head body at approximately right angles with respect to each other.

In an embodiment, the contact head of the present invention includes two pairs of vertically displaced slots. A lower pair of opposing slots are intended to accommodate the first and second ledges of at least one of the currently-available tracks. The upper pair of opposing slots are intended to accommodate the first and second ledges of at least two of the currently-available tracks.

In an embodiment, the second upper pair of opposing slots have different thicknesses for engaging first and second ledges of tracks that have different thicknesses. More specifically, in an embodiment, the second upper pair of opposing slots include one wider slot and one narrower slot because at least two of the currently available tracks have one thick ledge and one thin ledge. The thick ledge being accommodated in the thick upper slot and the thin ledge being accommodated in the thin upper slot. Further, the employment of two upper slots of different thicknesses provide for an automatic polarity matching mechanism because the contact head cannot be rotated the wrong way because a thick ledge cannot be accommodated in a thin upper slot.

The present invention also provides an improved ground contact mechanism for track light fixture adapters. The ground contact mechanism of the present invention includes a spring lever which has an upper end biased in an upward direction and a lower end connected to a clip for attaching the mechanism to an adapter, the clip is also connected to a grounding post which includes an upwardly extending scraper end.

In an embodiment, the spring lever of the ground contact mechanism of the present invention is employed to bias a ground contact tab upward against a top wall of a currently-available track.

In an embodiment, the ground contact tab engages a separate neutral conductor of at least one currently available track.

In an embodiment, the scraper end of the grounding post of the ground contact mechanism of the present invention provides a ground contact with a ledge of at least one currently available track.

The present invention also provides an improved combination lock ring and shock preventor for a track light fixture adapter. The lock ring comprises an annular base ring which includes two upwardly extending and opposing tabs. The tabs of the lock ring are accommodated in the central channels of at least three currently available tracks and

prevent a finger from engaging a conductor tab of the adapter when the conductor tab is in place and in engagement with a conductor wire of the track.

In an embodiment, the upwardly extending tabs of the lock ring include a narrow top portion and a wide bottom portion. The narrow top portion being sufficiently narrow so as to be accommodated in the openings of at least three currently available track configurations, the wide bottom portion being selectively wider than the central openings of at least two of the currently-available track configurations.

The present invention also provides an improved housing for an adapter used to connect a track light fixture to different track configurations. The housing includes a shell with a bottom having an opening through which two wires pass that electrically connect the light fixture to the contact head of the adapter. The shell further comprises a vertical wall with two upwardly extending posts spaced apart from each other and spaced apart from the wall. One of the wires extends upward and around one of said posts before being connected to the contact head, the other wire extending upward and around the other of said posts before being connected to the contact head. The engagement between the wires and the posts provides a cord lock and strain relief in the event stress is applied to the wires after they are connected to the contact head.

An advantage of the present invention is that it provides an adapter for a track light fixture that enables the light fixture to be connected to any one of three currently-available track configurations.

Another advantage of the present invention is that it provides an adapter for a track light fixture with improved shock prevention.

Another advantage of the present invention is that it provides an adapter for a track light fixture with automatic polarity matching between the light fixture and the track.

Still another advantage of the present invention is that it provides an adapter for a track lighting fixture that enables the fixtures to be utilized in a plurality of different track configurations.

Yet another advantage of the present invention is that it makes track light fixtures equipped with an adapter made in accordance with the present invention interchangeable between at least three currently-available track configurations.

Another advantage of the present invention is that it provides an improved grounding mechanism for different track configurations.

Another advantage of the present invention is that it provides an improved housing for an adapter for a track light fixture which provides improved strain relief for the wires connecting the track light fixture to the contact head of the adapter.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and appended claims, and upon reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of this invention, reference should now be made to the embodiment illustrated in greater detail in the accompanying drawings and described below by way of an example of the invention.

FIG. **1** is a perspective view of an adapter made in accordance with the present invention.

FIG. **1A** is another partial perspective view of the adapter of FIG. **1**.

FIG. **2** is an exploded perspective view of the adapter shown in FIG. **1**.

FIG. **3** is an end view of a currently-available track with the adapter of FIG. **1** of the present invention inserted into the central channel of the track.

FIG. **4** is another end view of the track and adapter shown in FIG. **3**.

FIG. **5** is another end view of the track and adapter shown in FIG. **3**.

FIG. **6** is an end view of a second currently available track with the adapter of FIG. **1** inserted into the central channel of the track.

FIG. **7** is another end view of the track and adapter of FIG. **6**.

FIG. **8** is another end view of the track and adapter of FIG. **6**.

FIG. **9** is an end view of a third currently-available track with the adapter of FIG. **1** inserted into the central channel of the track.

FIG. **10** is another end view of the track and adapter of FIG. **9**.

FIG. **11** is another end view of the track and adapter of FIG. **9**.

FIG. **12** is a plan view of the contact head of the adapter of the present invention.

FIG. **13** is an elevational view of the contact head of FIG. **9**.

FIG. **14** is a sectional view taken along line **14—14** of FIG. **12**.

FIG. **15** is a sectional view taken along line **15—15** of FIG. **12**.

FIG. **16** is a bottom plan view of the contact head of FIG. **12**.

FIG. **17** is a sectional view taken along line **17—17** of FIG. **13**.

FIG. **18** is a sectional view taken along line **18—18** of FIG. **13**.

FIG. **19** is a top plan view of the slide lock collar of the adapter of the present invention.

FIG. **20** is a front sectional view of the slide lock collar of FIG. **19**.

FIG. **21** is a top plan view of the lock ring of the adapter of the present invention.

FIG. **22** is a front elevational view of the lock ring of FIG. **21**.

FIG. **23** is a side elevational view of the lock ring of FIG. **21**.

FIG. **24** is a top plan view of the main housing of the adapter of the present invention.

FIG. **25** is a sectional view taken along line **25—25** of FIG. **24**.

FIG. **26** is a bottom plan view of the main housing of FIG. **24**.

It should be understood that the drawings are not necessarily to scale and that the embodiments are sometimes illustrated by graphic symbols, phantom lines, diagrammatic representations and fragmentary views. In certain instances, details which are not necessary for an understanding of the present invention or which render other details difficult to perceive may have been omitted. It should be understood, of course, that the invention is not necessarily limited to the particular embodiments illustrated herein.

DETAILED DESCRIPTION OF THE DRAWINGS

Turning first to FIG. **1**, the perspective view of an adapter **10** made in accordance with the present invention is illustrated. The adapter **10** includes a main housing **11** which passes through a sliding lock collar **12**. The main housing also accommodates and is connected to a contact head **13**, a top end of which is accommodated within a lock ring **14**. These main parts are further illustrated in more detail in the exploded view shown in FIG. **2**. FIG. **1A** provides a partial perspective of the adapter **10** view from an opposing angle to that of FIG. **1** and particularly illustrates the ground scraper contact **27** which is discussed in detail below.

Turning to FIG. **2**, the lock ring **14** includes two upwardly protruding tabs **15**, **16**. The tabs **15**, **16** each include a narrower upper portion **17**, **18** respectively which extend upward from wider bottom portions **18**, **19** respectively. The tabs **15**, **16**, with the narrower portions **17**, **18** and wider portions **19**, **20** permit the slide lock collar to selectively fit within any one of the three currently-available track configurations illustrated below in FIGS. **3–11**.

Returning to FIG. **2**, the adapter **10** also includes three contact tabs **22**, **23**, **24**. The contact tabs **22**, **23** are tabs for engaging the line conductors of the tracks, as further illustrated in FIGS. **3–11** while the contact tab **24** engages the neutral conductor of all three tracks illustrated in FIGS. **3–11**. Returning to FIG. **2**, the adapter **10** as illustrated also includes a first ground contact tab **25** which, as illustrated in FIGS. **3–5**, engages a top wall of a track to ground the light fixture or, as illustrated in FIGS. **6–8**, engages a separate ground conductor. The adapter **10** also includes a second ground contact in the form of a separate upwardly extending ground post **26** which features an upper scraping end **27** for engaging a ledge or side rail of a track as illustrated in FIGS. **7–8** and **10–11**. The grounding post **26** is connected to a U-shaped clip **28** which is also connected to a spring arm shown at **29**. The spring arm **29** includes an upper distal end **30** which, when assembled, is accommodated in the slot **32** disposed at a lower end of the ground contact tab **25**. The spring arm **29** biases the ground contact tab **25** upward so that it may engage the top wall of the track as illustrated in FIGS. **3–5**.

The neutral conductor contact tab **24** includes a hole **33** disposed at a lower end thereof and the line conductor contact tab **22** also includes a hole **34** disposed at a lower end thereof for attachment to the neutral end line leads (not shown) coming from the light fixture (not shown). As shown in FIG. **1**, the line conductor contact tabs **22**, **23** are arranged in a stacked relationship within the contact head body **13**. In an alternative embodiment, the contact tabs **22**, **23** may be fabricated from a single piece of metal or be pre-attached to one another.

Still referring to FIG. **2**, contact head **13** includes a downwardly extending tongue **35** which is accommodated in a slot **36** disposed in the housing **11** for ease of assembly. In addition to the necessary slots for accommodating the line conductor contact tabs **22**, **23**, neutral conductor contact tab **24**, ground contact tab **25** and ground scraper element **27**, the contact head body **13** also includes a plurality of slots and stop barriers that are described below in connection with FIGS. **12–15**.

Still referring primarily to FIG. **2**, the main housing **11** provides the connection between the contact head **13** and the light fixture (not shown). Specifically, a bushing **37** is provided with two holes **38**, **39** which accommodate the screws **41**, **42** which attach the bushing to the fixture. The screws **41**, **42** pass through the holes **43**, **44** of the washer **45** which also includes a center hole **46** for accommodating the lead wires of the light fixture (not shown). The washer is disposed on top of a wavy or undulating washer **47** which provides some resistance to the pivotal connection between the washer **45** and the bushing **37** so that the fixture maintains its position and is not rotated or shifted by normal household or environmental vibrations. An additional washer **48** with a ground connecting tab **49** is disposed between the wavy washer **47** and the over-center ring **51**. The over-center ring **51** rides on top of the flange **52** of the bushing **37** and provides less than 360° of rotation due to the engagement of the tab **53** on the over-center ring **51** with the step **54** disposed on the bushing **37**. However, more than 360° of rotation is provided because the over-center ring **51** is free to rotate with respect to the bottom **55** of the housing **11** until one of the steps on the over-center ring **51** shown at **56**, **57** in FIG. **2** engaged the step shown at **58** in FIG. **26**. The springs **125**, **126** are disposed in the vertical passages **59**, **60** which have a bottom (see FIGS. **24** and **26**) and engage the keys **121**, **122** disposed at a lower end of the ribs **62**, **63** which are disposed in the corners of the sliding collar **12**. As a result, the collar **12** is biased in the upward direction and removal and/or installation of the adapter **10** requires an initial pulling down of the collar **12**. The ribs **62**, **63** slidably engage the indents **64**, **65** disposed in the diagonally opposed corners of the contact head body **13**.

As noted above, the problem addressed by the present invention is the inability of currently available track light fixtures to be fitted or attached to tracks other than the track made by the manufacturer of the fixture because manufacturers have intentionally modified the designs of their tracks so that light fixtures manufactured by other manufacturers and light fixtures not specifically designed for their tracks cannot be used as replacement light fixtures. Specifically, FIGS. **3–9** illustrate three different tracks. FIGS. **3–5** provide and end view of a track sold under the CAPRI trademark. FIGS. **6–8** provide an end view of a track sold under the HALO trademark. FIGS. **9–11** provide an end view of a track sold under the JUNO trademark. As described below, each track is configured differently and imposes individual requirements on the adapter **10**.

Specifically referring to FIGS. **3–5**, the CAPRI track **66** includes a center or top wall **67** with first and second downwardly extending arms **68**, **69**. Each arm **68**, **69** includes inwardly extending ledges **72**, **73** which define a central channel through which the adapter **10** of the present invention has been inserted. The track **66** further includes W-shaped inserts **74**, **75** which accommodate line conductor elements **76**, **77** and neutral conductor elements **78**, **79**. The inserts **74**, **75** are supported above the ledges **72**, **73** by the upwardly protruding extensions **81**, **82**. Thus, the track **66** as shown in FIGS. **3–5** include two line conductors **76**, **77** and two negative conductors **78**, **79**. The track **66** is also grounded and, as illustrated in FIGS. **3–5**, serves as a ground for the light fixture when the upwardly protruding ground tab **25** makes contact with the top wall **67**.

To insert the adapter **10** into the track **66** illustrated in FIGS. **3–6**, the slide lock collar **12** is pulled downward as illustrated in FIGS. **3–4**. The contact head **13** and both tabs **15**, **16** of the lock ring **14** have been inserted through the central channel of the track **66**. Only the tab **15** is shown in FIG. **3**; the tab **15** has been removed from FIGS. **4** and **5** for clarity. After the properly aligned contact head **13** has been inserted through the central channel as shown in FIGS. **3** and **4**, the adapter **10** is twisted to the right or in a clockwise direction from the perspective of a consumer reaching upward towards a ceiling to install the light fixture. This

rotational movement causes the line conductor contact tab **22** to engage the conductor **76** and further causes the neutral conductor contact tab **24** to engage the neutral conductor **79**.

Thus, as seen in FIG. **5**, with the lowerly disposed line conductor contact tab **22** engaging the line conductor **76** and with the neutral conductor contact tab **24** engaging the neutral conductor **79** and further with the ground contact tab **25** engaging the top wall **67**, an appropriate electrical connection is made between the fixture (not shown) and the track **66**. Still referring to FIG. **5**, it can be seen that the contact head **13** further includes two lower opposing slots shown at **83** and **84** in FIG. **5** and in FIG. **15**. These lower opposed slots are designed to accommodate the relatively thin ledges **72, 73** that are incorporated into the design of the track **66**. It will also be noted from FIG. **5** that the ground scraper element **27** that is attached to the clip **28** (see FIG. **2**) is not utilized for the track **66**. Instead, the spring arm **29** (see FIG. **2**) biases the ground contact tab **25** upward so that it engages the top wall **67** of the track **66**. Further, once the connection is made as illustrated in FIG. **5**, the slide lock collar **12** is biased upward into the position shown in FIG. **5**.

In contrast, as shown in FIGS. **6–8**, the HALO track **86** includes a different configuration than that of the track **66** shown in FIGS. **3–5**. While the track **86** also includes a top wall **87** and downwardly extending first and second arms **88, 89** that terminate in inwardly extending ledges **91, 92**, the similarities end there. Specifically, the track **86** includes two differently configured inserts **93, 94**. The insert **93** accommodates a line conductor **95** and a separate ground conductor **96**. In contrast, the insert **94** accommodates a line conductor **97**. Further, the thickness of the ledges **91, 92** is not uniform like the ledges **72, 73** of the track **66**. In contrast, as shown in FIGS. **6–8**, the ledge **92** is thicker than the ledge **91** and, consequently, the thickness of the portion of the insert **94** that covers the ledge **92** is greater than the thickness of the portion of the insert **93** that covers the ledge **91**.

To accommodate this design feature, the contact head **13**, as shown in FIG. **8**, includes a pair of upper opposing slots **98, 99** as illustrated in FIGS. **8** and **14**. The slot **99** is accommodated over the ledge **92** and the slot **98** is accommodated over the thinner ledge **91**. The orientation of these slots **98, 99** also prevent the adapter **10** from being installed in the wrong way or with the wrong polarity. Specifically, because the ledge **92** and the portion of the insert **94** covering the ledge **92** are too thick to be accommodated in the slot **98**, any attempt to insert the adapter **10** in the wrong way, or rotated 180° with respect to the appropriate alignment, will result in the thinner slot **98** being aligned with the thicker ledge **92**. Because the thicker ledge **92** cannot be accommodated in the thinner slot **98**, the portion of the contact head body **13** shown at **101** serves as a stop barrier and prevents the rotation of the adapter **10** when it is inserted through the central channel of the track **86** in the wrong way, or 180° out of phase with respect to the correct alignment.

As illustrated in FIGS. **7** and **8**, with the upwardly protruding tab **16** and the contact ring **14** removed for clarity, the contact head **13** (and the tabs **15, 16** of the contact ring **14**) are inserted through the central channel of the track **86**. The adapter **10** or light fixture is then rotated counterclockwise from the bottom view or the view from the consumer standing on the floor below the track **86** which is normally mounted on the ceiling (not shown). This rotation causes the ground conductor tab **25** to engage the ground conductor **96** and the neutral conductor contact tab **24** to engage the neutral conductor **95**. Further, although only partially shown in FIG. **8**, the line conductor contact tab **23** has swung around to engage the line conductor **97**. It will be noted that the slot **84** which is used in conjunction with the slot **83** to connect the adapter **10** to the track **66** is not utilized to connect the adapter **10** to the track **86** because the lower slots **83, 84** are disposed below the ledges **91, 92** of the track **86**.

An additional feature illustrated in FIGS. **6–8** is the use of the upper narrower portion **18** of the tab **16** and the lower wider portion **20** of the tab **16**. It will be noted that the central channel of the track **86** is narrower than the central channel of the track **66**. As a result, the lower wider portion **20** of the tab **16** cannot fit through the central channel but, instead, is blocked by the ledges **91, 92** and the portion of the inserts **93, 94** that cover the ledges **91, 92** respectively. However, the lower wider portion **20** of the tab **16** (and the lower wider portion **19** of the tab **15**—not shown in FIG. **6**) serves as an alignment guide and insures that the ground conductor contact tab **25** is appropriately aligned with the ground conductor **96** and that the neutral conductor contact tab **24** and the line conductor contact tab **23** are appropriately aligned with the neutral conductor **95** and line conductor **97** respectively. Hence, the construction of the tabs **15, 16** insures the appropriate depth of insertion of the adapter **10** into the track **86** and the configuration of the channels **98, 99** insures that the adapter **10** can only be connected with the correct polarity.

Turning to FIGS. **9–11**, the cross section of a track **103** is illustrated which is sold under the JUNO trademark. While the track **103** has a general H-shaped cross section, the lower half of the track **103** also includes a central wall **104** and downwardly extending first and second walls **105, 106** that terminate in inwardly extending ledges **107, 108** similar to the tracks **66** and **86** illustrated in FIGS. **3–5** and **6–8** respectively. However, again, the similarities end there. Specifically, each ledge **107, 108** terminates in an upwardly protruding lip **109, 110** respectively. The lip **109** is shorter or thinner than the lip **110**. No insulation material covers the ledges **107, 108** or the lips **109, 110**. A single insert **112** is employed which accommodates the neutral conductor **113** and line conductor **114**. While the width of the central channel of the track **103** is generally the same as the central channel of the track **86**, the depth of the channel of the track **103** is substantially shallower than that of both the tracks **86** and **66**. However, notwithstanding these differences, the adapter **10** provides a mechanical and electrical connection between a light fixture and the track **103** as it does between a light fixture and the tracks **86** and **66**.

Specifically, referring to FIG. **9**, the contact head body **13** along with the tabs **15, 16** of the lock ring **14** are inserted upward through the central channel of the track **103**. Once inserted, if the correct configuration is obtained, the fixture or adapter **10** is rotated in a counterclockwise direction from the user's point of view standing on the floor to the position illustrated in FIG. **11**. In the position illustrated in FIG. **11**, the ground scraping element **27** disposed at the end of the post **26** (see FIG. **2**) has scrapingly engaged the lip **109** of the ledge **107** to provide a ground contact. The neutral conductor contact tab **24** is aligned with and is engaging the neutral conductor **113**. While only partially shown in FIG. **11**, the line conductor contact tab **23** has swung around and is aligned with and is engaging the line conductor **114**. Hence, with the ground scraper **27** engaging the lip **109** of the ledge **107** and with the neutral conductor contact tab **24** engaging the neutral conductor **113** and finally with the line conductor contact tab **23** engaging the line conductor **114**,

the adapter **10** has provided electrical connection between a light fixture (not shown) and the track **103**.

Because the lower notch or channel **99** must accommodate the wider lip **110**, there is only one way to connect the adapter **10** to the track **103**. Any attempt to connect the adapter **10** out of orientation by 180° would result in the narrower channel **98** being aligned with the lip **110** which would result in the stop barrier **101** engaging the lip **110** and preventing rotation of the adapter **10** as discussed above with respect to FIG. **8** and the track **86**.

FIGS. **12–18** further illustrate the contact head **13**. Specifically, the indents shown at **64, 65** accommodate the ribs **62, 63** of the slide lock collar **12**. The slot shown at **116** accommodates the line conductor contact tab **23** as well as the line conductor contact tab **22**. The narrower slot **117** slidably accommodates the ground conductor contact tab **25** and the slot **118** accommodates the neutral conductor contact tab **24**. Referring to FIG. **13**, the tongue **119** is accommodated in the slot **120** disposed in the main housing **11** (see FIG. **2**). Additional design details of the contact head **13** are illustrated in FIGS. **14–18**.

The slide lock collar **12** is further illustrated in FIGS. **19** and **20**. The keys shown at **121, 122** are accommodated within the passages **59, 60** of the main housing **11** (see also FIGS. **2** and **24**). The ribs shown at **62, 63** are accommodated in the openings **123, 124** disposed in the main housing **11** (see also FIGS. **2** and **24**). The keys **121, 122** support the lower end of the springs shown at **125, 126** in FIG. **2** which provide the spring bias to the collar **12**. The lock ring **14** is further illustrated in FIGS. **21–23**. The slots **127–130** accommodate the ribs **66, 63, 67, 62** respectively of the lock collar **12**.

Details of the main housing **11** are further illustrated in FIGS. **24–25**. The housing **11** includes a bottom opening **133** which accommodates the top portion of the bushing **37** (see FIG. **2**) and the wires that connect the light fixtures to the contact head **13**. The interior of the housing **11** also includes two upwardly extending posts **134, 135** around which lead wires **136, 137** from the light fixture are looped prior to connection to the holes **33, 34** of the conductor contact tabs **24, 22** at the contact head. This looping of the wires **136, 137** around the posts **134, 135** provide excellent pull-out protection and strain relief for the wires **134, 135** and insures that the connection between the light fixture and the contact head **13** will be long-lasting and durable.

Accordingly, a single adapter **10** has been provided which will provide an electrical and mechanical connection between a light fixture and three differently configured tracks **66, 86** and **103**. While only three tracks **66, 86** and **103** are illustrated and described, it is anticipated that the adapter **10** will also provide electrical and mechanical connection to other tracks and track systems that are either currently available or will become available in the future. Accordingly, it is not anticipated that use of the adapter **10** be limited to the tracks **66, 86** and **103** as illustrated in FIGS. **3–11**.

From the above description, it is apparent that the objects of the present invention have been achieved. While only a single embodiment has been set forth, alternative embodiments and various modifications will be apparent from the above description to those skilled in the art. These and other alternatives are considered equivalents and within the spirit and scope of the present invention.

What is claimed is:

1. A track lighting adapter for mechanically and electrically connecting a track light fixture to a plurality of differently configured tracks, each of said tracks having at least two conductors and one ground,

the adapter comprising three conductor contact tabs and two ground contact tabs, only two of the three conductor contact tabs engaging a conductor and the other of the three conductor contact tabs not engaging any conductor when the adapter is mechanically and electrically connected to one of the tracks, and only one of the two ground contact tabs engaging a ground and the other of the two ground contact tabs not engaging any ground when the adapter is mechanically and electrically connected to one of the tracks.

2. A track lighting adapter for mechanically and electrically connecting a track light fixture to any one of a plurality of differently configured tracks of the type having

a top wall disposed between a first and a second downwardly extending arms, the first arm being connected an inwardly extending first ledge, the second arm being connected an inwardly extending second ledge, the first and second inwardly extending ledges defining central channel, a line conductor being accommodated between the first ledge and the top wall a first predetermined distance above said first ledge, a neutral conductor being accommodated between the second ledge and the top wall a second predetermined distance above said second ledge, the first ledge having a first thickness, the second ledge having a second thickness, and a ground conductor,

wherein at least one of the first predetermined distance, the second predetermined distance, the first thickness and the second thickness of each of the plurality of differently configured tracks differs from one another,

the adapter comprising:

a contact head comprising a top end for insertion through the central channels said tracks and a bottom end for connection to a main housing,

the top end of the contact head comprising a first ground contact tab that is spring biased upward for engaging the top wall of at least one of said tracks, the top end further comprising a second ground contact tab for engaging one of the ledges of at least one of said tracks,

the top end of the contact head further comprises two line conductor contact tabs for engaging the line conductors of said tracks and at least one neutral conductor contact tab for engaging the neutral conductors of said tracks, one of said line conductor contact tabs being vertically displaced from the other of said line conductor contact tabs.

3. The adapter of claim **2** wherein the line conductor contact tabs are disposed on an opposing side of the top end of the contact head from the neutral conductor contact tab.

4. The adapter of claim **2** wherein the top end of the contact head further comprises a first lower pair of opposing slots for engaging the first and second ledges of at least one of said tracks and a second upper pair of opposing slots for engaging the first and second ledges of at least one of said tracks the one of the second upper pair of opposing slots being wider than the other of the second upper pair of opposing slots for accommodating at least two different track configurations.

5. The adapter of claim **2** wherein the top end of the contact head further comprises a first lower pair of opposing slots for engaging the first and second ledges of at least one of said tracks and a second upper pair of opposing slots for engaging the first and second ledges of at least two of said tracks, the second upper pair of opposing slots being dis-

posed above the first lower pair of opposing slots, the one of the second upper pair of opposing slots being wider than the other of the second upper pair of opposing slots for accommodating at least two different track configurations.

6. The adapter of claim **2** further comprising a lock ring mounted over the top end of the contact head, the lock ring comprising an annular base for accommodating the top end of the contact head and two upwardly extending and opposing tabs, the tabs being accommodated in the central channels of the tracks.

7. The adapter of claim **6** wherein each of said tabs of said lock ring further comprises a narrow top portion and a wide bottom portion, the narrow top portion being accommodated in the central channels of all of said tracks, the wide bottom portion being accommodated in at least one central channel of said tracks and being selectively wider than the central channels of at least two of said tracks.

8. The adapter of claim **2** wherein the contact head further comprises at least one stop barrier for precluding the line conductor contact tabs from engaging the neutral conductor of a track.

9. The adapter of claim **2** wherein the contact head further comprises at least one stop barrier for precluding the neutral conductor contact tab from engaging the line conductor of a track.

10. A track lighting adapter for mechanically and electrically connecting a track light fixture to any one of a plurality of differently configured tracks of the type having

a top wall disposed between a first and a second downwardly extending arms, the first arm being connected an inwardly extending first ledge, the second arm being connected an inwardly extending second ledge, the first and second inwardly extending ledges defining central channel, a line conductor being accommodated between the first ledge and the top wall a first predetermined distance above said first ledge, a neutral conductor being accommodated between the second ledge and the top wall a second predetermined distance above said second ledge, the first ledge having a first thickness, the second ledge having a second thickness, and a ground conductor,

wherein at least one of the first predetermined distance, the second predetermined distance, the first thickness and the second thickness of each of the plurality of differently configured tracks differs from one another,

the adapter comprising:

a contact head comprising a top end for insertion through the central channels said tracks and a bottom end for connection to a main housing,

the top end of the contact head comprises two line conductor contact tabs for engaging one of the line conductors of said tracks and at least one neutral conductor contact tab for engaging one of the neutral conductors of said tracks, one of said line conductor contact tabs being vertically displaced from the other of said line conductor contact tabs, the top end of the contact head further comprises a first ground contact tab that is spring biased upward for engaging the top wall of at least one of said tracks, the top end further comprising a second ground contact tab for engaging one of the ledges of at least one of said tracks.

11. The adapter of claim **10** wherein the line conductor contact tabs are disposed on an opposing side of the top end of the contact head from the neutral conductor contact tab.

12. The adapter of claim **10** wherein the top end of the contact head further comprises a first lower pair of opposing slots for engaging the first and second ledges of at least one of said tracks and a second upper pair of opposing slots for engaging the first and second ledges of at least one of said tracks.

13. The adapter of claim **10** wherein the top end of the contact head further comprises a first lower pair of opposing slots for engaging the first and second ledges of at least one of said tracks and a second upper pair of opposing slots for engaging the first and second ledges of at least two of said tracks, the second upper pair of opposing slots being disposed above the first lower pair of opposing slots.

14. The adapter of claim **10** further comprising a lock ring mounted over the top end of the contact head, the lock ring comprising an annular base for accommodating the top end of the contact head and two upwardly extending and opposing tabs, the tabs being accommodated in the central channels of the tracks.

15. The adapter of claim **14** wherein each of said tabs of said lock ring further comprises a narrow top portion and a wide bottom portion, the narrow top portion being accommodated in the central channels of all of said tracks, the wide bottom portion being accommodated in at least one central channel of said tracks and being selectively wider than the central channels of at least two of said tracks.

16. The adapter of claim **10** wherein the contact head further comprises at least one stop barrier for precluding the line conductor contact tabs from engaging the neutral conductor of a track.

17. The adapter of claim **10** wherein the contact head further comprises at least one stop barrier for precluding the neutral conductor contact tab from engaging the line conductor of a track.

18. A track lighting adapter for providing electrical power to a track lighting fixture at any given point along a track having one of three configurations, each track having a line conductor, a neutral conductor and a ground, the connecting apparatus comprising:

a contact head comprising two ground contact tabs, two line conductor contact tabs and one neutral conductor contact tabs,

one of said ground contact tabs is spring biased upward and the other of said ground contact tabs the extends outward from a side of the contact head,

at least one of said line conductor contact tabs is vertically displaced from the other of said line conductor contact tabs, only one of the ground contact tabs engaging the ground of the track and the other of the ground contact tabs not engaging the track when the adapter is mechanically and electrically connected to the track, and only one of the line conductor contact tabs engaging the line conductor of the track and the other of the line conductor contact tabs not engaging any line conductor of the track when the adapter is mechanically and electrically connected to the track.

19. The adapter of claim **18** wherein the contact head further comprises top end and a bottom end, the top end of the contact head further comprises a first lower pair of opposing slots for engaging the first and second ledges of at least one of said tracks and a second upper pair of opposing slots for engaging the first and second ledges of at least one of said tracks.

20. The adapter of claim **19** wherein the second upper pair of opposing slots having different thicknesses for engaging ledges of different thicknesses.

21. The adapter of claim **18** wherein the contact head further comprises at least one stop barrier for precluding the line conductor contact tabs from engaging the neutral conductor of a track.

22. The adapter of claim **18** where in the contact head further comprises at least one stop barrier for precluding the neutral conductor contact tab from engaging the line conductor of a track.

23. The adapter of claim **18** further comprising a lock ring mounted over the contact head, the lock ring comprising an annular base for accommodating a top end of the contact head and two upwardly extending and opposing tabs, the tabs being accommodated in the central channels of the tracks.

24. The adapter of claim **23** wherein each of said tabs of said lock ring further comprises a narrow top portion and a wide bottom portion, the narrow top portion being accommodated in the of the central channels of all of said tracks, the wide bottom portion being accommodated in at least one central channel of said tracks and being selectively wider than the central channels of at least two of said tracks.

25. A ground contact mechanism for an adapter used to connect track lighting fixtures to any one of a plurality of different track configurations, the ground contact mechanism comprising:

a spring lever comprising an upper end biased in an upward direction and a lower end connected to a clip for attaching the mechanism to the adapter,

the clip also being connected to a grounding post, the grounding post comprising an upwardly extending scraper end.

26. A combination lock ring and shock preventor for an adapter used to connect track lighting fixtures to any one of a plurality of different track configurations having central channels with conductors disposed inside the central channels, the adapters including at least two contact tabs for making electrical contact with said conductors, the combination lock ring and shock prevention comprising:

a spring-biased annular base ring comprising two upwardly extending and opposing tabs, each tab comprising a wide bottom portion connected to the base ring and a narrow top portion connected to the wide bottom portion opposite the base ring, the narrow top portion being accommodated in the central channels of all of said tracks, the wide bottom portion being accommodated in at least one central channel of said tracks and being selectively wider than the central channels of at least two of said tracks and preventing the at least two contact tabs of the adapter from being engaged by a user's finger.

27. A track lighting adapter for mechanically and electrically connecting a track light fixture to any one of a first, second and third differently configured tracks of the type having

a top wall disposed between a first and a second downwardly extending arms, the first arm being connected an inwardly extending first ledge, the second arm being connected an inwardly extending second ledge, the first and second inwardly extending ledges defining central channel, a line conductor being accommodated between the first ledge and the top wall a first predetermined distance above said first ledge, a neutral conductor being accommodated between the second ledge and the top wall a second predetermined distance above said second ledge, the first ledge having a first thickness, the second ledge having a second thickness, and a ground conductor,

wherein the first predetermined distance of the first track is different from first predetermined distance of the second and third tracks, the first predetermined distances of the second and third tracks are about the same, the second predetermined distances of the first, second and third tracks are about the same, the first thickness and the second thickness of the first track are different than the first thickness and second thickness of the second and third tracks, the first thicknesses of the second and third tracks are about the same, and the second thicknesses of the second and third tracks are about the same,

the adapter comprising:

a contact head comprising a top end for insertion through the central channels said tracks and a bottom end for connection to a main housing,

the top end of the contact head comprising a first ground contact tab that is spring biased upward for engaging the top wall of at least one of said tracks, the top end further comprising a second ground contact tab for engaging one of the ledges of at least one of said tracks, only one of the ground contact tabs engaging the track when the adapter is mechanically and electrically connected to the track,

the top end of the contact head further comprises two line conductor contact tabs for engaging the line conductors of said tracks and at least one neutral conductor contact tab for engaging the neutral conductors of said tracks, one of said line conductor contact tabs being vertically displaced from the other of said line conductor contact tabs so that only one of the line conductor contact tabs engages the line conductor of the track when the adapter is mechanically and electrically connected to the track, the line conductor contact tabs are disposed on an opposing side of the top end of the contact head from the neutral conductor contact tabs,

the top end of the contact head further comprises a first lower pair of opposing slots for engaging the first and second ledges of at least one of said tracks and a second upper pair of opposing slots for engaging the first and second ledges of at least one of said tracks, the one of the second upper pair of opposing slots being wider than the other of the second upper pair of opposing slots for accommodating at least two different track configurations.

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