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### **SOLID-STATE CANOPY LIGHT FIXTURE WITH HINGED DIFFUSER LENS**

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#### **Abstract**

The invention is a solid-state canopy light fixture featuring a box-shaped housing with a base panel and four side panels that define an interior volume. The top opening allows access to this volume. A hinge member is on the first side panel, while a rib with a hole for a fastener is on the second side panel. The lens tray, with a base tray panel and a continuous side wall, includes a tray hinge member and a tray rib with a second hole. The tray hinge connects to the housing hinge, allowing the lens tray to rotate between two positions. A diffuser lens, secured within the side wall, and a board with solid-state lighting elements are included. A sealing element is adjacent to the lens edge. This design enables easy installation by eliminating the need to fully remove the diffuser lens.

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## Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION(S) [0001] The present disclosure is related to, and claims priority to, U.S. Provisional Patent Application Ser. No. 63/648,512, titled “SOLID-STATE CANOPY LIGHT FIXTURE WITH HINGED DIFFUSER LENS,” which was filed on May 16, 2024, the entirety of which is incorporated by reference into the present disclosure.

### BACKGROUND

[0002] Canopy light fixtures are well known in the prior art. Typically, canopy light fixtures are horizontally mounted, commonly ceiling mounted, to have downward light throw. As such, these light fixtures are well-suited for area lighting and safety lighting, for example, in parking structures, gas stations, buildings, walkways and entryways.

[0003] A typical canopy light fixture includes a box-shaped housing to which is mounted a diffuser lens. Installation of the fixture requires physical mounting of the housing with electrical wiring being pulled through one or more access openings in the housing, e.g., through one or more knockout holes. The diffuser lens is removed with standard designs to access the interior of the housing to make necessary electrical connections. Removal and re-mounting of the diffuser lens is time consuming, particularly in large installations where a large quantity of canopy light fixtures is required to be installed.

### SUMMARY

[0004] A solid-state canopy light fixture is provided herein including: a box-shaped housing having a base panel, a first side panel, a second side panel, a third side panel, and a fourth side panel, the first, second, third, and fourth side panels perimetrically bounding the base panel such that the base panel and the first, second, third, and fourth side panels collectively define an interior volume, the first, second, third, and fourth side panels defining a top opening, spaced from the base panel, through which the interior volume is accessible; at least one hinge member formed on an exterior surface of the first side panel opposite the interior volume; a rib projecting from an exterior surface of the second side panel opposite the interior volume, a first hole being formed in the rib for receiving a fastener; a lens tray having a base tray panel, with opposing first and second faces, and a continuous side wall bounding the base tray panel, the side wall protruding from the first face, at least one tray hinge member formed on an exterior surface of the side wall opposite the base tray panel, and a tray rib formed on an exterior surface of the side wall opposite the base tray panel, a second hole being formed in the tray rib, wherein the at least one tray hinge member is hingedly connected to the at least one hinge member so that the lens tray is rotatably displaceable between a first position, where the tray rib is adjacent the rib with the second hole being coaxially aligned with the first hole, and a second position, where the tray rib is spaced from the rib with the second hole not being coaxially aligned with the first hole; a diffuser lens having a generally planar outer edge bounding an inner portion, wherein the diffuser lens is secured to the lens tray so that the outer edge is located wholly within the side wall; at least one board containing a plurality of solid-state lighting elements located between the lens and the base tray panel of the lens tray; and, at least one sealing element adjacent the outer edge. Advantageously, the subject invention provides a hinged assembly, containing the diffuser lens and solid-state lighting elements, which avoids the need for full removal of the diffuser lens during installation of the light fixture.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is a top view schematic of the solid-state canopy light fixture illustrating the housing and lens tray assembly.

[0006] FIG. 2 is a side view schematic illustrating the assembly of the solid-state canopy light fixture with the hinged lens tray.

[0007] FIG. 3 is an exploded view diagram illustrating the assembly components of the solid-state canopy light fixture.

[0008] FIG. 4 is a perspective view illustrating the solid-state canopy light fixture's housing and lens tray assembly.

[0009] FIG. 5 is a perspective view illustrating the solid-state canopy light fixture's housing and lens tray assembly.

[0010] FIG. 6 is a schematic diagram illustrating the rotational connection between the lens tray and housing in the solid-state canopy light fixture.

[0011] FIG. 7 illustrates a schematic diagram of the hinged connection between the housing and lens tray in the solid-state canopy light fixture.

[0012] FIG. 8 is a perspective view illustrating the lens tray assembly of the solid-state canopy light fixture.

[0013] FIG. 9 is a perspective view illustrating the hinge mechanism of the solid-state canopy light fixture.

#### DETAILED DESCRIPTION

[0014] In the field of lighting, particularly in environments such as parking structures, gas stations, and walkways, canopy light fixtures are commonly used due to their ability to provide broad area illumination. These fixtures are typically mounted horizontally, often on ceilings, to direct light downward. However, the installation and maintenance of traditional canopy light fixtures present several challenges.

[0015] One significant issue with conventional canopy light fixtures is the time-consuming process required for installation and maintenance. Typically, these fixtures include a box-shaped housing with a diffuser lens that needs to be removed to access the interior for electrical connections. This removal and reattachment of the diffuser lens can be particularly cumbersome in large installations where numerous fixtures are involved. Additionally, the requirement to fully detach the lens increases the risk of damage to the lens and other components during handling.

[0016] Furthermore, traditional designs often lack efficient sealing mechanisms, which can lead to moisture ingress, especially in outdoor or non-climate-controlled environments. This can result in damage to the internal components, reducing the lifespan and reliability of the fixture. The absence of a streamlined method for accessing the interior of the fixture without complete disassembly also complicates routine maintenance and repairs.

[0017] The present solution addresses these issues by introducing a solid-state canopy light fixture with a hinged diffuser lens assembly. This design allows for easy access to the interior of the fixture without the need for full removal of the diffuser lens, significantly reducing installation and maintenance time. The fixture comprises a box-shaped housing with a lens tray that is rotatably connected via a hinge mechanism, enabling the lens tray to be moved between open and closed positions. This configuration not only facilitates quick access for electrical connections but also minimizes the risk of damage to the lens and other components. Additionally, the solution incorporates effective sealing elements to prevent moisture ingress, enhancing the durability and reliability of the fixture in various environmental conditions.

[0018] With reference to the figures, a solid-state light fixture is shown and generally designated with reference number **10**. The light fixture **10** generally includes a housing **12**, a lens tray **14**, a diffuser lens **16**, and at least one board **18** containing a plurality of solid-state lighting elements **20**.

[0019] The housing **12** is preferably box-shaped with a base panel **22**, a first side panel **24**, a second side panel **26**, a third side panel **28**, and a fourth side panel **30**. The first, second, third, and fourth side panels, **24**, **26**, **28**, **30** perimetrically bound the base panel **22** such that the base panel **22** and the first, second, third, and fourth side panels, **24**, **26**, **28**, **30** collectively define an interior volume **32**. In addition, the first, second, third, and fourth side panels, **24**, **26**, **28**, **30** define a top

opening **34**, spaced from the base panel **22**, through which the interior volume **32** is accessible.

[0020] The housing **12** may be formed of polymeric material, such as plastic, and be formed by molding, such by injection molding. Alternatively, the housing **12** may be formed partially or wholly of metallic material, e.g., aluminum, and may be die cast. The first, second, third, and fourth side panels, **24**, **26**, **28**, **30** may be joined to form a continuous wall about the base panel **22**.

[0021] One or more access openings **36** may be formed in the base panel **22** and/or in one or more of the first, second, third, and fourth side panels, **24**, **26**, **28**, **30**. The access openings **36** may be of any form known in the art allowing for the passage of wiring, mounting of sensors (e.g., motion sensors, daylight sensors), and connections with auxiliary components, such as back-up batteries. For example, the access openings **36** may be knockout holes and/or threaded openings. Caps (e.g., threaded caps) or removable tabs **38** may be provided to seal the access openings **36** not in use.

[0022] The housing **12** may also include one or mounting holes formed, e.g., formed in the base panel **22**, to allow the passage therethrough of mounting elements **39**, such as screws, brackets, hooks, hangers, and so forth. In addition, or alternatively, the housing **12** may include one or more mounting formations, such as ribs, channels, depressions, and so forth, formed to mountingly engage one or more external mounting elements **39**, such as brackets, hooks, hangers, mounting plates, and the like.

[0023] At least one hinge member **40** is formed on an exterior surface **42** of the first side panel **24** opposite the interior volume **32**. Preferably, two of the hinge members **40** are provided spaced apart on the exterior surface **42**.

[0024] A rib **44** projects from an exterior surface **46** of the second side panel **26**. A first hole **48** is formed in the rib **44** for receiving a fastener. Preferably, the second side panel **26** is located opposite the first side panel **24** across the base panel **22**. With the second side panel **26** opposite the first side panel **24**, the rib **44** is located opposite the at least one hinge member **40** across the base panel **22**. As will be appreciated by those skilled in the art, alternatively, the second side panel **26** may be located adjacent to the first side panel **24**, so as not to be opposite the first side panel **24**.

[0025] The lens tray **14** includes a base tray panel **50**, with opposing first and second faces **52**, **54**, and a continuous side wall **56** bounding the base tray panel **50**. The side wall **56** protrudes from the first face **52**. Preferably, the side wall **56** protrudes from the first face **52** more than the thickness of the outer edge of the diffuser lens **16** so that the outer edge of the diffuser lens **16** is wholly recessed within the side wall **56** with the diffuser lens **16** secured to the lens tray **14**.

[0026] At least one tray hinge member **58** is formed on an exterior surface **60** of the side wall **56** opposite the base tray panel **50**. Preferably, the same quantity of tray hinge members **58** is provided to correspond to the hinge members **40**. In addition, a tray rib **62** is formed on the exterior surface **60** of the side wall **56** opposite the base tray panel **50**, with a second hole **64** being formed in the tray rib **62**.

[0027] The at least one tray hinge member **58** is hingedly connected to the at least one hinge member **40** so that the lens tray **14** is rotatably displaceable, relative to the housing **12**, between a first position, where the tray rib **62** is adjacent the rib **44** with the second hole **64** being coaxially aligned with the first hole **48** (FIGS. **4** and **6**), and a second position, where the tray rib **62** is spaced from the rib **44** with the second hole **64** not being coaxially aligned with the first hole **48** (FIGS. **5** and **7**). With the lens tray **14** in the first position, a fastener **F** may be inserted through the second hole **64** and into the first hole **48** to releasably lock the lens tray **14** in a closed position on the housing **12**. In the second position, the lens tray **14** is in an open position allowing access to the interior volume **32**.

[0028] The first hole **48** may be a through-hole formed to extend through the rib **44** or a blind hole not extending through the rib **44**. In addition, the first hole **48** and/or the second hole **64** may be internally threaded. As a through-hole, the fastener **F** may extend through both the first hole **48** and the second hole **64**, with a nut or similar structure being secured to the fastener **F** below the first hole **48** to resist removal of the fastener **F**. The head of the fastener **F** may be brought into tight

engagement with the tray rib **62** with tightening of a nut on the fastener **F** below the first hole **48**. Alternatively, as a blind hole, the first hole **48** may be internally threaded to threadedly receive the fastener **F**. The length of the fastener **F** may be selected such that the fastener **F** may threadedly engage the first hole **48** and be tightened into engagement with the tray rib **62**. Further, alternatively, the first hole **48** may be a through hole and internally threaded allowing the fastener **F** to extend through the first hole **48** and be threadedly received by the first hole **48** without the need for the use of a nut (as shown in FIG. 2).

[0029] The hinge connection between the at least one hinge member **40** and the at least one tray hinge member **58** may be formed in any known manner. By way of non-limiting example, each hinge member **40** corresponds to a tray hinge member **58** with a pin **66**, being provided on one of the members, and a matching pin opening **68**, being provided on the other of the members, formed to receive the pin **66** so that the pin **66** is rotatable relative to the pin opening **68**. The pin defines an axis of rotation about which the lens tray **14** rotates relative to the housing **12**. A locking detent **70** may be formed on the pin **66** configured to by-pass the pin opening **68** with sufficient insertion of the pin **66** into the pin opening **68** thereby resisting withdrawal of the pin **66** from the pin opening **68**. The locking detent **70** may be ramped to increase in diameter in the direction of insertion of the pin **66** into the pin opening **68**. The pin **66** is mounted at a terminal end **72** secured to the respective member. Preferably, a flange **74** radiates outwardly from the pin **66** to act as a stop against excessive insertion of the pin **66** into the pin opening **68** and to act as a guide surface about the pin opening **68** during rotation of the lens tray **14** between the first and second positions.

[0030] As will be appreciated by those skilled in the art, with two or more pairs of the hinge members **40** and tray hinge members **58**, the pins **66** of the respective pairs are preferably coaxially aligned to lie along, and collectively define, the axis of rotation about which the lens tray **14** rotates relative to the housing **12**.

[0031] The diffuser lens **16** may be of any form known in the art, preferably being translucent. The diffuser lens **16** includes a planar outer edge **76** bounding an inner portion **78**. The diffuser lens **16** is secured to the lens tray **14** so that the outer edge **76** is located wholly within the side wall **56** of the lens tray **14**. Preferably, the diffuser lens **16** is secured to the lens tray **14** by fasteners extending through the outer edge **76** of the diffuser lens **16** into engagement with the base tray panel **50** of the lens tray **14**.

[0032] The at least one board **18** may be one or more circuit boards of any known type, including printed circuit boards (PCB's). The solid-state lighting elements **20** are mounted to the at least one board **18** in any known manner so as to be ready for activation by application of electrical power to inputs on the at least one board **18**. Any related wiring may be contained within the board **18** as is known in the art.

[0033] The solid-state lighting elements **20** may be any type of solid-state lighting elements, such as light emitting diodes (LED's), organic light emitting diodes (OLED's), and polymer light emitting diodes (PLED's).

[0034] The at least one board **18** is located between the diffuser lens **16** and the lens tray **14**, particularly between the diffuser lens **16** and the base tray panel **50**. The at least one board **18** is situated to direct light generated by the solid-state lighting elements **20** at the diffuser lens **16**.

[0035] The diffuser lens **16** is secured to the lens tray **14** preferably by fasteners extending through the outer edge **76** and into engagement with the lens tray **14**, particularly the base tray panel **50**. It is preferred that the at least one board **18** be located wholly within the outer edge **76** (i.e., located wholly in alignment with the inner portion **78** of the diffuser lens **16**).

[0036] With the light fixture **10** being useable in outdoor or non-climate-controlled environments, sealing may be necessary to inhibit the ingress of moisture into internal spaces. It is preferred that at least one sealing element **80** be provided adjacent the outer edge **76**, particularly with the diffuser lens **16** secured to the lens tray **14**. The sealing element **80** may be located about the perimeter of the outer edge **76** and/or between the outer edge **76** and the base tray panel **50**. The

sealing element **80** acts to inhibit the ingress of moisture into the space between the diffuser lens **16** and the base tray panel **50**. The sealing element may be a continuous gasket formed to extend along the full length of the outer edge **76** of the diffuser lens **16**.

[0037] In addition, at least one sealing element **82** may be provided to bound the top opening **34** configured to be in sealing contact with the lens tray **14** with the lens tray **14** in the first position. The sealing element **82** inhibits the ingress of moisture into the interior volume **32** with the lens tray **14** being in a closed state.

[0038] One or more access openings **84** may be formed in the lens tray **14**. Preferably, an access opening **84** is formed in the base tray panel **50**, which is spaced from the side wall **56**. The access opening **84** allows for wiring to be extended from the interior volume **32** and into electrical connection with the at least one board **18**. Slack may be provided in this wiring to allow the lens tray **14** to be rotated to an open state (the second position).

[0039] FIG. **1** shows a top view schematic of the solid-state canopy light fixture **10**, illustrating the housing **12** and lens tray assembly. The light fixture **10** comprises a lens tray **14**, a diffuser lens **16**, a first side panel (FSP) **24**, a second side panel (SSP) **26**, a third side panel (TSP) **28**, a fourth side panel (FSP) **30**, a hinge member **40**, a rib **44**, an exterior surface **46**, a tray hinge member (THM) **58**, and a fastener F.

[0040] The lens tray **14** serves as a foundation for the diffuser lens **16**. The design of the lens tray **14** ensures that the diffuser lens **16** is held securely, promoting even distribution of light emitted from the solid-state lighting elements. The lens tray **14** is attached to the housing **12**, enabling rotational movement through the hinge member **40** and the tray hinge member **58**. The diffuser lens **16** is positioned in the center of the lens tray **14** and is designed to spread the light emitted from the solid-state lighting elements housed within the light fixture **10**. The diffuser lens **16** is held in place within the lens tray **14**, ensuring that the outer edge is recessed within the side wall of the lens tray **14**, providing protection and enhancing the aesthetic appeal of the fixture.

[0041] The first side panel **24**, second side panel **26**, third side panel **28**, and fourth side panel **30** collectively form the perimeter of the housing **12**, enclosing the interior volume of the light fixture **10**. These panels contribute to the structural integrity of the fixture, providing a robust enclosure for the internal components. The hinge member **40** is located on the exterior surface of the first side panel **24** and allows the lens tray **14** to rotate. This hinge mechanism, in conjunction with the tray hinge member **58**, enables the lens tray **14** to move between open and closed positions, facilitating convenient access to the interior of the fixture for maintenance and installation purposes.

[0042] The rib **44** projects from the exterior surface **46** of the second side panel **26** and is designed to receive the fastener F. The fastener F is used to secure the lens tray **14** in a closed position, ensuring that the fixture remains sealed and protected from environmental elements. The rib **44** and fastener F work together to provide a secure locking mechanism for the lens tray **14**. The tray hinge member **58** is located on the exterior surface of the lens tray **14** and works in conjunction with the hinge member **40** to allow for the rotational movement of the lens tray **14**. This hinge system is designed to provide smooth and reliable operation, ensuring that the lens tray **14** can be easily opened and closed as needed.

[0043] FIG. **2** shows a side view schematic of the solid-state canopy light fixture **10**, illustrating the housing **12** and lens tray **14** assembly. The light fixture **10** comprises a lens tray **14**, a diffuser lens **16**, a base panel **22**, a first side panel (FSP) **24**, a second side panel (SSP) **26**, a fourth side panel (FSP) **30**, an interior volume **32**, a hinge member **40**, a rib **44**, a tray hinge member (THM) **58**, a second hole **64**, and a fastener F. The housing **12** forms the structural foundation of the light fixture **10**, providing a robust enclosure for the internal components. The housing **12** includes the base panel **22**, which serves as the bottom surface, and the first side panel **24**, second side panel **26**, and fourth side panel **30**, which collectively define the perimeter of the housing **12**. These panels enclose the interior volume **32**, offering protection and support for the components housed within. The base panel **22** is integral to the housing **12**, ensuring stability and facilitating mounting of the

fixture.

[0044] The lens tray **14** is mounted to the housing **12**, allowing rotational movement through the hinge member **40** and tray hinge member **58**. This hinge mechanism enables the lens tray **14** to move between open and closed positions, facilitating convenient access to the interior volume **32** for maintenance and installation purposes. The diffuser lens **16** is secured within the lens tray **14**, ensuring that the outer edge is recessed within the side wall of the lens tray **14**, providing protection and enhancing the aesthetic appeal of the fixture. The rib **44** projects from the exterior surface of the second side panel **26** and is designed to receive the fastener F. The fastener F is used to secure the lens tray **14** in a closed position, ensuring that the fixture remains sealed and protected from environmental elements. The rib **44** and fastener F work together to provide a secure locking mechanism for the lens tray **14**. The second hole **64** is formed in the rib **44**, allowing the fastener F to be inserted and engaged, securing the lens tray **14** to the housing **12**. The tray hinge member **58** is located on the exterior surface of the lens tray **14** and works in conjunction with the hinge member **40** to allow for the rotational movement of the lens tray **14**. This hinge system is designed to provide smooth and reliable operation, ensuring that the lens tray **14** can be easily opened and closed as needed.

[0045] FIG. **3** illustrates an exploded view of the solid-state canopy light fixture **10**, showcasing the assembly components. The figure includes a housing **12**, a lens tray **14**, a diffuser lens **16**, a board **18**, solid-state lighting elements (SSLE) **20**, a base panel **22**, a first side panel (FSP) **24**, a second side panel (SSP) **26**, a third side panel (TSP) **28**, a fourth side panel (FSP) **30**, an interior volume **32**, a top opening **34**, access openings **36**, removeable tabs **38**, mounting elements **39**, a hinge member **40**, an exterior surface **42**, a rib **44**, a first hole **48**, a base tray panel (BTP) **50**, a first face **52**, a second face **54**, an exterior surface **60**, a tray hinge member (THM) **58**, a tray rib **62**, a second hole **64**, an outer edge **76**, an inner portion **78**, a sealing element **80**, a sealing element **82**, and an access opening **84**.

[0046] The housing **12** forms the structural foundation of the light fixture **10**, providing a robust enclosure for the internal components. The housing includes the base panel **22**, which serves as the bottom surface, and the first side panel **24**, second side panel **26**, third side panel **28**, and fourth side panel **30**, which collectively define the perimeter of the housing **12**. These panels enclose the interior volume **32**, offering protection and support for the components housed within. The top opening **34** allows access to the interior volume **32**, facilitating installation and maintenance. The lens tray **14** is mounted to the housing **12**, allowing rotational movement through the hinge member **40** and tray hinge member **58**. This hinge mechanism enables the lens tray **14** to move between open and closed positions, facilitating convenient access to the interior volume **32** for maintenance and installation purposes. The base tray panel **50**, featuring a first face **52** and a second face **54**, serves as a foundation for the diffuser lens **16** and the board **18**. The tray rib **62**, with the second hole **64**, aligns with the rib **44** and first hole **48** on the housing **12**, allowing a fastener F to secure the lens tray **14** in a closed position.

[0047] The diffuser lens **16** is secured within the lens tray **14**, ensuring that the outer edge **76** is recessed within the side wall of the lens tray **14**, providing protection and enhancing the aesthetic appeal of the fixture. The inner portion **78** of the diffuser lens **16** is designed to spread the light emitted from the SSLE **20** housed within the light fixture **10**. The sealing element **80** is positioned adjacent to the outer edge **76**, inhibiting moisture ingress and protecting the internal components. Additionally, the sealing element **82** bounds the top opening **34**, ensuring a secure seal when the lens tray **14** is in the closed position. The board **18** carries the SSLE **20**, which are positioned between the diffuser lens **16** and the base tray panel **50**. The access opening **84** in the base tray panel **50** allows for wiring to be extended from the interior volume **32** and into electrical connection with the board **18**. The access openings **36** in the housing **12** facilitate the passage of wiring and connections with auxiliary components. Removeable tabs **38** are provided to seal the access openings **36** not in use. Mounting elements **39** are used to secure the light fixture **10** to a

surface, ensuring stability and proper alignment.

[0048] FIG. 4 shows a perspective view illustrating the solid-state canopy light fixture **10**, which comprises a housing **12** and a lens tray **14**. The light fixture **10** is designed to provide efficient illumination in various environments, such as parking structures and walkways. The housing **12** serves as the structural foundation of the light fixture **10**, while the lens tray **14** is mounted to the housing **12**, allowing for rotational movement. The housing **12** is box-shaped and provides a robust enclosure for the internal components of the light fixture **10**. The design aims to protect the components from environmental elements, ensuring durability and reliability. The housing **12** includes features that facilitate mounting and installation, making the housing adaptable for various applications. Additionally, the housing **12** supports the lens tray **14**, allowing rotation between open and closed positions for convenient access to the interior volume. The lens tray **14** serves as a component of the light fixture **10**, designed to hold the diffuser lens **16** securely. The lens tray **14** is attached to the housing **12** through a hinge mechanism, allowing rotational movement. This design facilitates convenient access to the interior of the fixture for maintenance and installation purposes. The lens tray **14** ensures that the diffuser lens **16** is recessed within the side wall, providing protection and enhancing the aesthetic appeal of the fixture.

[0049] FIG. 5 illustrates a perspective view of the solid-state canopy light fixture **10**, which comprises a housing **12** and a lens tray **14**. The light fixture **10** is designed to provide efficient illumination in various environments, such as parking structures and walkways. The housing **12** serves as the structural foundation of the light fixture **10**, while the lens tray **14** is mounted to the housing **12**, allowing for rotational movement. The housing **12** is box-shaped and provides a robust enclosure for the internal components of the light fixture **10**. The design aims to protect the components from environmental elements, ensuring durability and reliability. The housing **12** includes features that facilitate mounting and installation, making the housing adaptable for various applications. Additionally, the housing **12** supports the lens tray **14**, allowing rotation between open and closed positions for convenient access to the interior volume. The lens tray **14** serves as a component of the light fixture **10**, designed to hold the diffuser lens securely. The lens tray **14** is attached to the housing **12** through a hinge mechanism, allowing rotational movement. This design facilitates convenient access to the interior of the fixture for maintenance and installation purposes. The lens tray **14** ensures that the diffuser lens is recessed within the first side panel **24**, providing protection and enhancing the aesthetic appeal of the fixture. The first side panel (FSP) **24** and the fourth side panel (FSP) **30** are integral parts of the housing **12**, contributing to the structural integrity of the light fixture **10**. The FSP **24** and FSP **30** are positioned to enclose the interior volume, providing a secure and stable enclosure for the internal components. These panels are designed to withstand environmental stresses, ensuring the longevity and reliability of the light fixture **10**.

[0050] FIG. 6 shows a schematic diagram illustrating the rotational connection between the lens tray **14** and the housing **12** in the solid-state canopy light fixture. The figure includes the tray rib **62**, the second hole **64**, the first hole **48**, the rib **44**, the housing **12**, the diffuser lens **16**, the lens tray **14**, and the fastener F. This configuration demonstrates how the lens tray **14** is secured to the housing **12**, allowing for rotational movement between open and closed positions. The tray rib **62** is a component of the lens tray **14**, designed to align with the rib **44** on the housing **12**. The tray rib **62** includes the second hole **64**, which is configured to align with the first hole **48** on the rib **44** when the lens tray **14** is in the closed position. This alignment allows the fastener F to be inserted through the second hole **64** and into the first hole **48**, securing the lens tray **14** to the housing **12**.

[0051] The second hole **64** is formed in the tray rib **62** and is designed to receive the fastener F. When the lens tray **14** is in the closed position, the second hole **64** aligns with the first hole **48** on the rib **44**, allowing the fastener F to be inserted and engaged. This configuration ensures that the lens tray **14** is securely fastened to the housing **12**, preventing unwanted movement and maintaining the integrity of the fixture. The first hole **48** is located on the rib **44**, which projects



from the housing **12**. The first hole **48** is sized to receive the fastener F, allowing the fastener to engage with the second hole **64** on the tray rib **62**. This alignment and engagement provide a secure locking mechanism for the lens tray **14**, ensuring that the lens tray remains in the desired position. The rib **44** is a structural component of the housing **12**, designed to interact with the tray rib **62** on the lens tray **14**. The rib **44** includes the first hole **48**, which aligns with the second hole **64** on the tray rib **62** when the lens tray **14** is in the closed position. This alignment allows the fastener F to be inserted and engaged, securing the lens tray **14** to the housing **12**.

[0052] The housing **12** serves as the structural foundation of the light fixture **10**, providing a robust enclosure for the internal components. The housing **12** supports the lens tray **14**, allowing for rotational movement between open and closed positions. The rib **44** and first hole **48** are integral parts of the housing **12**, facilitating the secure attachment of the lens tray **14**. The diffuser lens **16** is also positioned within the housing **12**, enhancing the light distribution from the light fixture **10**. The tray rib **62** and second hole **64** further contribute to the assembly and functionality of the lens tray **14** within the housing **12**. The fastener F is utilized to secure the components together, ensuring stability and reliability in operation.

[0053] The diffuser lens **16** is secured within the lens tray **14**, ensuring that the outer edge is recessed within the side wall of the lens tray **14**. This design provides protection and enhances the aesthetic appeal of the fixture. The diffuser lens **16** is positioned to spread the light emitted from the solid-state lighting elements housed within the light fixture **10**. The lens tray **14** is designed to hold the diffuser lens **16** securely. The lens tray **14** is attached to the housing **12** through a hinge mechanism, allowing rotational movement. This design facilitates convenient access to the interior of the fixture for maintenance and installation purposes. The fastener F is used to secure the lens tray **14** to the housing **12**. When the lens tray **14** is in the closed position, the fastener F is inserted through the second hole **64** on the tray rib **62** and into the first hole **48** on the rib **44**. This engagement ensures that the lens tray **14** is securely fastened to the housing **12**, preventing unwanted movement and maintaining the integrity of the fixture.

[0054] FIG. 7 illustrates a schematic diagram of the hinged connection between the housing **12** and the lens tray **14** in the solid-state canopy light fixture. The figure includes the housing **12**, the lens tray **14**, the diffuser lens **16**, the rib **44**, the first hole **48**, the tray rib **62**, and the second hole **64**. This configuration demonstrates the rotational connection that allows the lens tray **14** to move between open and closed positions relative to the housing **12**. The housing **12** serves as the structural foundation of the light fixture **10**, providing a robust enclosure for the internal components. The rib **44** projects from the housing **12** and is designed to interact with the tray rib **62** on the lens tray **14**. The first hole **48** is located on the rib **44** and is sized to receive a fastener F, allowing the lens tray **14** to be secured to the housing **12**. The lens tray **14** is attached to the housing **12** through a hinge mechanism, allowing rotational movement. The tray rib **62** is a component of the lens tray **14**, designed to align with the rib **44** on the housing **12**. The tray rib **62** includes the second hole **64**, which is configured to align with the first hole **48** on the rib **44** when the lens tray **14** is in the closed position. This alignment allows a fastener F to be inserted through the second hole **64** and into the first hole **48**, securing the lens tray **14** to the housing **12**. The diffuser lens **16** is secured within the lens tray **14**, ensuring that the outer edge is recessed within the side wall of the lens tray **14**. This design provides protection and enhances the aesthetic appeal of the fixture. The diffuser lens **16** is positioned to spread the light emitted from the solid-state lighting elements housed within the light fixture **10**.

[0055] FIG. 8 shows a detailed perspective view of the lens tray **14** of the solid-state canopy light fixture. The lens tray **14** comprises a base tray panel (BTP) **50**, a first face **52**, a second face **54**, a side wall **56**, a tray hinge member (THM) **58**, a tray rib **62**, a second hole **64**, and a pin opening **68**. This configuration illustrates the structural elements that facilitate the secure attachment and rotational movement of the lens tray **14** within the fixture.

[0056] The base tray panel **50** serves as the foundational surface of the lens tray **14**, providing

support for the diffuser lens **16** and other components. The first face **52** of the BTP **50** is the primary surface that interfaces with the diffuser lens **16**, ensuring a stable and secure attachment. The second face **54**, located on the opposite side of the BTP **50**, is designed to accommodate the solid-state lighting elements and other internal components of the fixture. The side wall **56** extends perpendicularly from the base tray panel **50**, forming a continuous border around the perimeter of the lens tray **14**. This side wall **56** is configured to maintain the structural integrity of the lens tray **14**, providing protection and support for the diffuser lens. The side wall **56** also ensures that the outer edge of the diffuser lens is recessed, enhancing the aesthetic appeal and durability of the fixture.

[0057] The tray hinge member **58** is located on the exterior surface of the side wall **56** and is designed to interact with the hinge member on the housing **12**. This THM **58** allows for the rotational movement of the lens tray **14**, facilitating easy access to the interior of the fixture for maintenance and installation. The pin opening **68** is part of the THM **58**, providing a secure point of attachment for the hinge mechanism. The tray rib **62** is an extension of the side wall **56**, featuring the second hole **64**. This tray rib **62** is designed to align with a corresponding rib on the housing **12**, allowing a fastener **F** to be inserted through the second hole **64** to secure the lens tray **14** in a closed position. This alignment ensures that the lens tray **14** remains securely attached to the housing **12**, preventing unwanted movement and maintaining the integrity of the fixture.

[0058] FIG. **9** shows a detailed perspective view of the hinge mechanism in the solid-state canopy light fixture, specifically illustrating the housing **12** and associated components. The figure includes the hinge member **40**, pin **66**, locking detent **70**, terminal end **72**, and flange **74**, which collectively facilitate the rotational movement of the lens tray relative to housing **12**.

[0059] The hinge member **40** is a component of the housing **12**, designed to support the rotational connection with the lens tray **14**. This component provides a stable point of attachment for the pin **66**, ensuring smooth and reliable operation. The hinge member **40** is positioned to allow the lens tray **14** to rotate between open and closed positions, facilitating easy access to the interior of the fixture for maintenance and installation. The pin **66** connects the hinge member **40** to the lens tray **14**, facilitating rotational movement. The design of the pin **66** ensures a secure fit within the pin opening, creating a pivot point for the lens tray **14**. Additionally, the pin **66** includes a locking detent **70**, which is arranged to resist withdrawal from the pin opening, thereby maintaining the secure attachment of the lens tray **14** to the housing **12** during operation.

[0060] The locking detent **70** is a feature of the pin **66** that enhances the security of the hinge connection. The locking detent is designed to bypass the pin opening with sufficient insertion, preventing accidental disengagement of the pin **66** from the hinge member **40**. This mechanism ensures that the lens tray **14** remains in the desired position, maintaining the integrity of the fixture **10**. The terminal end **72** of the pin **66** is secured to the hinge member **40**, providing a stable point of attachment. The design holds the pin **66** in place, ensuring that the hinge mechanism operates smoothly. The terminal end **72** contributes to the overall stability and reliability of the hinge connection, facilitating the rotational movement of the lens tray **14**. The flange **74** radiates outwardly from the pin **66**, acting as a stop against excessive insertion into the pin opening. The flange functions as a guide surface during the rotation of the lens tray **14**, ensuring that the hinge member **40** operates smoothly and reliably. The flange **74** enhances the structural integrity of the hinge connection, providing additional support and stability.

## Claims

1. A solid-state canopy light fixture comprising: a box-shaped housing having a base panel, a first side panel, a second side panel, a third side panel, and a fourth side panel, the first, second, third, and fourth side panels perimetrically bounding the base panel such that the base panel and the first, second, third, and fourth side panels collectively define an interior volume, the first, second, third,

and fourth side panels defining a top opening, spaced from the base panel, through which the interior volume is accessible; at least one hinge member formed on an exterior surface of the first side panel opposite the interior volume; a rib projecting from an exterior surface of the second side panel opposite the interior volume, a first hole being formed in the rib for receiving a fastener; a lens tray having a base tray panel, with opposing first and second faces, and a continuous side wall bounding the base tray panel, the side wall protruding from the first face, at least one tray hinge member formed on an exterior surface of the side wall opposite the base tray panel, and a tray rib formed on an exterior surface of the side wall opposite the base tray panel, a second hole being formed in the tray rib, wherein the at least one tray hinge member is hingedly connected to the at least one hinge member so that the lens tray is rotatably displaceable, relative to the housing, between a first position, where the tray rib is adjacent the rib with the second hole being coaxially aligned with the first hole, and a second position, where the tray rib is spaced from the rib with the second hole not being coaxially aligned with the first hole; a diffuser lens having a generally planar outer edge bounding an inner portion, wherein the diffuser lens is secured to the lens tray so that the outer edge is located wholly within the side wall; at least one board containing a plurality of solid-state lighting elements located between the lens and the base tray panel of the lens tray; and, at least one sealing element adjacent the outer edge.

2. The canopy light fixture of claim 1, wherein the diffuser lens is secured to the lens tray by fasteners extending through the outer edge of the diffuser lens into engagement with the base tray panel of the lens tray.

3. The canopy light fixture of claim 1, wherein an access opening, spaced from the side wall, is formed in the base tray panel.

4. The canopy light fixture of claim 1, wherein the first hole is internally threaded.

5. The canopy light fixture of claim 1, wherein the at least one sealing element is a continuous gasket formed to extend along a full length of the outer edge of the diffuser lens.

6. The canopy light fixture of claim 1, wherein the housing includes at least one sealing element bounding the top opening configured to be in sealing contact with the lens tray with the lens tray in the first position.

7. The canopy light fixture of claim 1, wherein the housing includes one or more access openings extending through at least one of the base panel, the first side panel, the second side panel, the third side panel, and the fourth side panel into communication with the interior volume.

8. The canopy light fixture of claim 1, wherein the second side panel is located opposite the first side panel across the base panel.

9. A solid-state canopy light fixture apparatus, comprising: a box-shaped housing including: a base panel; a first side panel; a second side panel; a third side panel; and a fourth side panel, wherein the base panel and the first, second, third, and fourth side panels collectively define an interior volume and a top opening spaced from the base panel for access to the interior volume; the housing further including: a hinge member formed on an exterior surface of the first side panel; and a rib projecting from an exterior surface of the second side panel, the rib defining a first opening sized to receive a fastener; a lens tray mounted to the housing in a manner that allows rotation, the lens tray comprising: a base tray panel having opposing first and second faces; a continuous side wall extending from the base tray panel to form a peripheral border; at least one tray hinge member formed on an exterior surface of the side wall, the tray hinge member being hingedly coupled to the hinge member of the housing to permit rotation of the lens tray; and a tray rib formed on the exterior surface of the side wall and including a second opening configured to align with the first opening when the lens tray is in a closed position and to be out of alignment when the lens tray is rotated to an open position; a diffuser lens secured to the lens tray, the diffuser lens having a generally planar outer edge entirely recessed within the side wall; at least one board carrying a plurality of solid-state lighting elements, the board being disposed between the diffuser lens and the base tray panel; and a sealing element positioned adjacent the outer edge of the diffuser lens for

inhibiting an ingress of moisture.

- 10.** The solid-state canopy light fixture apparatus of claim 9, wherein the diffuser lens is secured to the lens tray by fasteners extending through an outer edge of the diffuser lens into engagement with the base tray panel.
  - 11.** The solid-state canopy light fixture apparatus of claim 9, further comprising an access opening formed in the base tray panel, the access opening being spaced from the continuous side wall.
  - 12.** The solid-state canopy light fixture apparatus of claim 9, wherein the housing further includes at least one sealing element bounding the top opening and configured to be in sealing contact with the lens tray when the lens tray is in a closed position.
  - 13.** The solid-state canopy light fixture apparatus of claim 9, wherein the second side panel is positioned opposite the first side panel across the base panel.
  - 14.** The solid-state canopy light fixture apparatus of claim 9, further comprising a fastener removably received in the first opening of the rib and the second opening of the tray rib when the lens tray is in the closed position to secure the lens tray to the housing.
  - 15.** The solid-state canopy light fixture apparatus of claim 9, wherein the hinge member and the tray hinge member are interconnected via a pin configured with a locking detent to resist withdrawal of the pin from a corresponding pin opening.
  - 16.** The solid-state canopy light fixture apparatus of claim 9, wherein the board is positioned wholly within an inner portion of the diffuser lens.
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