United States Patent

[11] 3,560,732

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[54] **DIFFUSER MOUNTING ARRANGEMENT FOR LIGHTING FIXTURES**
8 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **240/147,** 240/78
[51] **Int. Cl.** **F21v 17/00**
[50] **Field of Search** 240/147, 78, 146

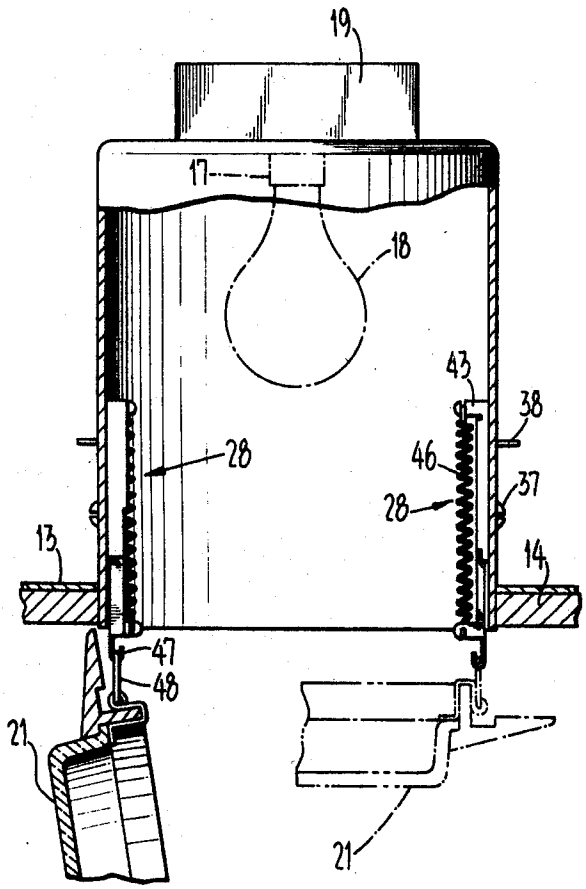
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Assistant Examiner—Richard M. Sheer
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ABSTRACT: A mounting arrangement for the diffuser of a recessed lighting fixture which enables the diffuser to be selectively securely retained in a normal position closing the open end of a light housing, and an actuated position outwardly spaced from the open end of the housing wherein access to the housing interior for servicing, or the like is facilitated. The arrangement is such as to continuously support the diffuser during movement between the normal and actuated positions and to positively lock the diffuser in the actuated as well as the normal position. Inadvertent return of the diffuser from actuated to normal position is thereby prevented.



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FIG_1

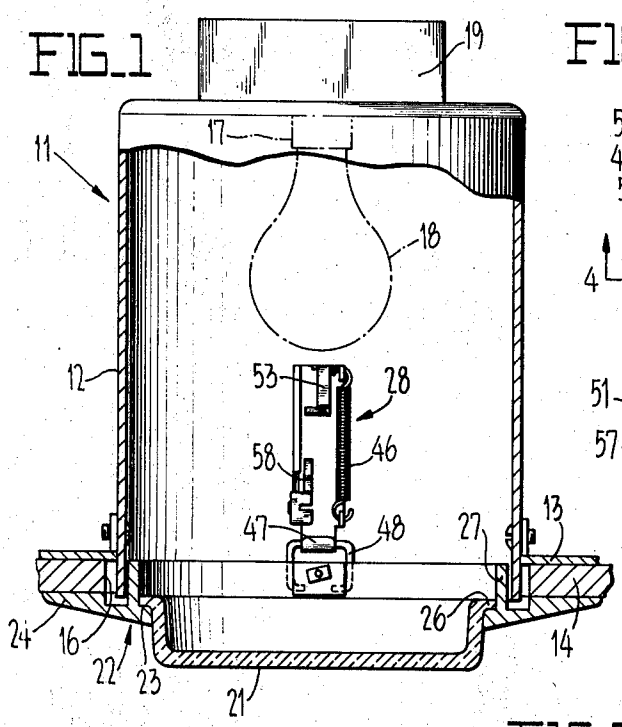


FIG_3

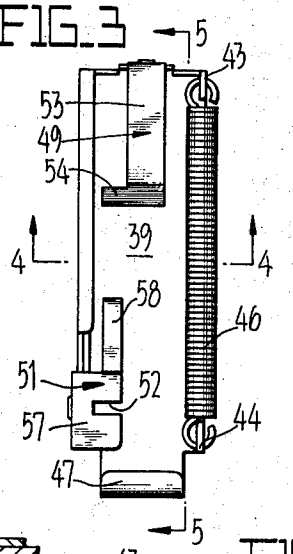


FIG_4

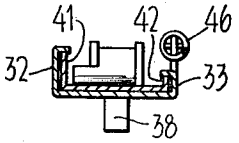


FIG_5

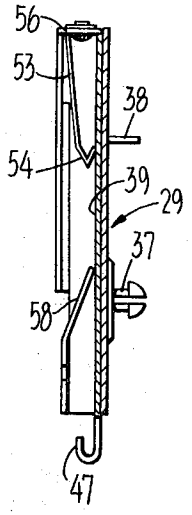


FIG_6

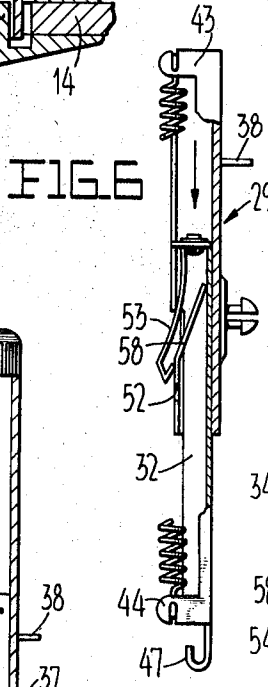


FIG_7

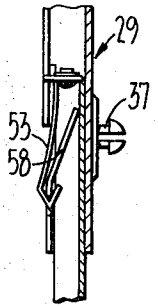


FIG_2

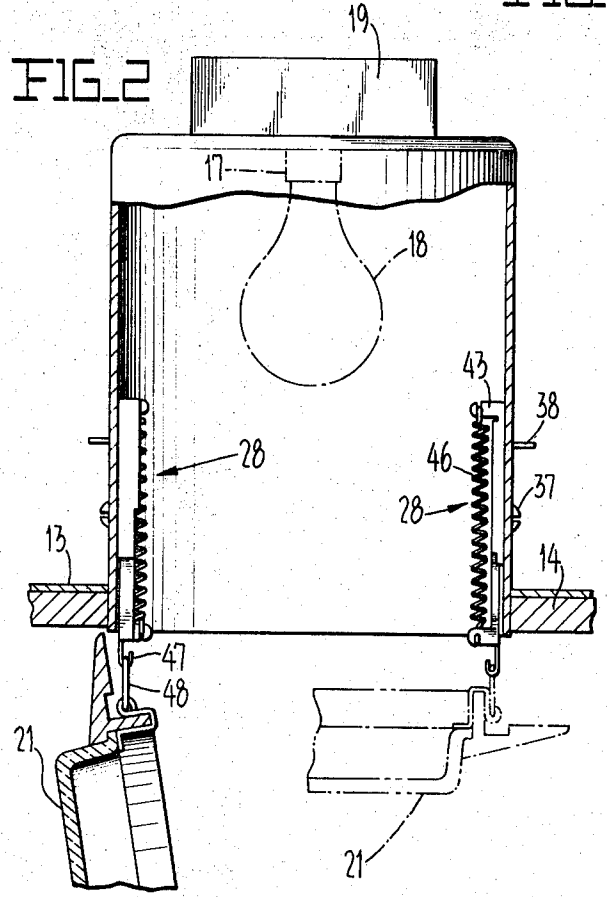


FIG_8

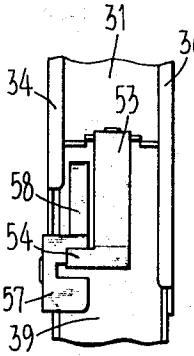


FIG_9

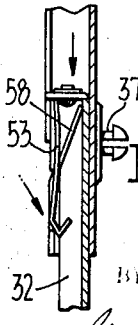
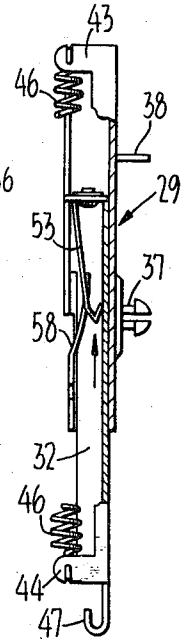


FIG_10



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DIFFUSER MOUNTING ARRANGEMENT FOR LIGHTING FIXTURES

BACKGROUND OF THE INVENTION

With most recessed lighting fixtures it is desirable that the diffuser be selectively movable between a normal position in closing relation to the open end of the recessed light housing of the fixture, and in actuated position spaced from the open end of the housing wherein access to the housing interior is facilitated. The diffuser is advantageously continuously supported from the housing during movement between and in the respective positions in order to simplify the changing of light bulbs or other servicing functions requiring access to the housing interior. In this regard it is merely necessary to manipulate the diffuser to its retentively supported actuated position to afford access to the housing interior, whereupon both hands are free to conduct the servicing function. Heretofore various mounting arrangements have been provided to accomplish the previously noted retentive support and selective movement of the diffuser between the normal closed and actuated open positions. Many of these mounting arrangements have been spring operated to facilitate automatic return of the diffuser from open to closed position. Although means have been provided to retain the diffuser in its actuated open position upon movement thereto, the retention means have generally not been such as to provide a positive locking action for preventing undesirable inadvertent spring loaded return of the diffuser to its closed position. Where retention mechanisms have been arranged to provide a positive locking action, they have been overly complex in design and of prohibitively high cost, while being cumbersome to operate.

SUMMARY OF THE INVENTION

The present invention relates to a spring operated diffuser mounting arrangement for recessed lighting fixtures having positive locking retention means of relatively simple design which yet enable the diffuser to be selectively positively locked in, or released from an actuated open position in a readily manipulative manner.

The diffuser mounting arrangement of the present invention is such that in response to movement of the diffuser to its actuated open position displaced from the open end of the light housing, the retention means are automatically operable to positively lock the diffuser therein. The diffuser may then be unobstructively pivoted away from the housing to provide for full access to the interior thereof. In accordance with a particularly important feature of the invention, the retention means are automatically operable, in response to subsequent movement of the diffuser from actuated position in a direction away from the housing, to release the diffuser for spring loaded return to its normal position in closing relation to the open end of the housing.

In the accomplishment of the foregoing, the diffuser mounting arrangement of the present invention generally includes a pair of diffuser support mechanisms adapted to be secured in diametrically opposed relation to the interior wall of a light housing adjacent an open end thereof. Each support mechanism includes a slide plate slidably translatable longitudinally of a guide member securable to the housing. The slide plates are arranged at one end for securance to the diffuser and are spring loaded relative to the guide members in the direction of the interior of the housing to normally hold the diffuser in closing relation to the open end thereof. The slide plates may be translated longitudinally of the guide members against the spring loading to displace the diffuser away from the housing to an actuated position wherein the open end of the housing is exposed. The retention means for positively locking the diffuser in actuated position comprises a resilient latch carried by each slide plate and a resilient guide cam secured to each guide member having a notch engageable by the corresponding latch when the diffuser is in its actuated position. More particularly, each latch has one end secured in outwardly spaced relation to the surface of the slide plate and a hook portion at the opposite end resiliently urged inwardly into engagement with the plate surface. Each guide cam then preferably includes a platform having the notch therein secured to the guide member in outwardly spaced relation to the slide plate, and a resilient tongue inwardly inclined from the platform towards the latch into engagement with the surface of the slide plate. Upon translation of the slide plate in the direction of the guide cam, the latch is urged outwardly in passing over the tongue to a position wherein the hook portion is resiliently snapped inwardly into positively locked engagement with the notch. When the slide plate is subsequently translated a slight distance in the same direction, the hook portion is resiliently urged inwardly through the notch into engagement with the surface of the slide plate, thereby releasing the slide plate for spring loaded return of the diffuser to its normal position. During the return movement of the slide plate, the resilient tongue yields to permit the hook portion of the latch to pass thereunder.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a sectional view of a lighting fixture embodying the diffuser mounting arrangement of the present invention, the diffuser being depicted in its normal closed position relative to the light housing.

FIG. 2 is a view similar to FIG. 1, but depicting the diffuser in its actuated open position relative to the light housing.

FIG. 3 is a side elevational view of a diffuser support mechanism of the mounting arrangement, the parts of the mechanism being depicted in position to retentively support the diffuser in its normally closed position.

FIG. 4 is a sectional view taken at line 4–4 of FIG. 3.

FIG. 5 is a sectional view taken at line 5–5 of FIG. 3.

FIG. 6 is a view similar to FIG. 5, but illustrating the positions of parts of the support mechanism during translation towards the actuated open position of the diffuser.

FIG. 7 is a fragmentary view similar to FIGS. 5 and 6, but illustrating the parts of the mechanism in positively locked relation to retentively support the diffuser in its actuated position.

FIG. 8 is a fragmentary elevational view of the mechanism with the parts in the same relation as in FIG. 7.

FIG. 9 is a fragmentary view similar to FIG. 5—7, but illustrating the positions of the parts just prior to release from locked relation.

FIG. 10 is a view similar to FIGS. 5—7 and 9, but illustrating the positions of the parts of the mechanism during spring loaded return translation of the diffuser to normal position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing in detail, FIGS. 1 and 2, in particular, there is shown a recess lighting fixture 11, which in the present case includes a light housing 12 of circular cross section, although same may be alternatively of other cross sections, such as rectangular. The housing is closed at one end and provided with an opening at the other, while an outwardly flared supporting flange 13 projects from the housing adjacent its open end. The flange is adapted to engage the upper or unexposed surface of a ceiling 14, or other wall, about an opening 16 provided therein to thus support the housing in recessed position relative to the ceiling with only a small portion adjacent the open end of the housing extending into the ceiling opening. A socket 17 is provided within the housing at the closed end thereof for receiving a light bulb 18, and a junction box 19 is mounted upon the closed end of the housing to facilitate electrical wiring of the socket. Alternative forms of light sources may of course be similarly mounted within the housing in place of the illustrated single bulb. In any event, it will be appreciated that with the housing mounted in recessed position relative to the ceiling, access to the housing interior for purposes of replacing the bulb 18, or other light source, or otherwise servicing the interior, is only provided through the open lower end of the housing.

The open lower end of the light housing **12** is conventionally closed by a diffuser **21**, or equivalent light transmitting element. To facilitate mounting of the diffuser there is provided a mounting ring **22** which, in the illustrated case, has inwardly and outwardly projecting annular flanges **23** and **24**, respectively, at its lower end. The diffuser is provided with an outwardly extending annular flange **26** which is seated upon the flange **23** and fitted within the upwardly extending flange **27** of ring **22**. With the ring positioned with its flange **27** concentrically disposed within the open lower end of the light housing **12**, as shown in FIG. **1**, the diffuser **21** will fully close the opening of the housing, and the outwardly projecting flange **24** of the ring will flushly engage the lower surface of the ceiling **14** about the opening **16**. As a result the light housing and opening are neatly obscured from view.

In accordance with the particularly salient aspects of the present invention, a diffuser mounting arrangement is provided to selectively retentively support the diffuser unit formed by the diffuser **21** and ring **22** in the above noted normal position in closing relation to the open of the housing, or in a positively locked actuated position downwardly displaced therefrom, as shown in phantom line in FIG. **2**. In the actuated position, the diffuser mounting ring may be unobstructively pivoted downwardly to the full line position depicted in FIG. **2** to permit free access to the housing interior for purposes of changing the bulb **18**, or the like. More particularly, the diffuser mounting arrangement includes a pair of diffuser support mechanisms **28** adapted to be secured in diametrically opposed relation to the interior wall of housing **12** adjacent its open lower end. In this regard, each mechanism preferably includes a guide member **29** of substantially channel shaped configuration including a rectangular web **31** having parallel spaced side legs **32** and **33** projecting right angularly from the opposite longitudinal sides thereof. The width of leg **32** (i.e., dimension of the leg in a direction normal to the web) is substantially greater than that of leg **33**. Legs **32** and **33** are respectively formed with right-angularly inwardly turned retention flanges **34** and **36** in parallel spaced relation to the web. The legs **32** and **33** and flanges **34** and **36**, together with the web **31** thus respectively define a pair of opposed guide channels which are offset from each other in a direction normal to the web. The guide members **29** are secured to the interior wall of housing **12** in diametric opposition adjacent its open lower end and with longitudinal orientations. In the illustrated case securance of each guide member is facilitated by means of an expansion pin **37** and tab **38** projecting outwardly from the web **31** and extending through the wall of the housing.

Each support mechanism **28** further includes an elongated rectangular slide plate **39** substantially conformed to the dimensions of the web **31** of the guide member **29**. The opposite longitudinal sides of the plate **39** are provided with right-angularly projecting rails **41** and **42** which respectively slidably engage the channels defined by the side legs **32** and **33**, flanges **34** and **36**, and web **31** of the guide member. The slide plate is spring loaded with respect to the guide member to a normal position wherein the opposite ends of the plate are flush with the opposite ends of the web of the guide member, as best shown in FIG. **5**. In this regard, tabs **43** and **44** preferably project respectively from one end of guide member side leg **33** and the opposite end of slide plate rail **42**, and a spring **46** is secured therebetween to resiliently urge the plate to the previously noted normal position. The slide plate may, of course, be pulled against the loading of the spring to an extended actuated position, as best shown in FIG. **6**.

To facilitate securance of the diffuser **21** and mounting ring **22** to the slide plates **39** of the support mechanisms **28**, the lower end of each plate is preferably formed with a hook **47** which projects beyond the corresponding end of the web of the guide member **29**. The hooks of the slide plates are arranged for releasable connection with links **48** pivotally secured to the ring **22** at diametrically opposed positions, preferably at the outer side of the upwardly extending flange **27**. Hence, with the links engaging the hooks and the plates in their normal retracted positions, the diffuser and mounting ring are supported in their normal positions in closing relation to the open lower end of the housing **12** and in engagement with the lower surface of the ceiling **14**, as shown in FIG. **1**. Upon pulling downward on the diffuser and ring, the slide plates are translated to their extended actuated positions and the diffuser and ring are displaced from the open lower end of the housing to the actuated open position shown in phantom line in FIG. **2**. Positive locking of the plates in their actuated positions, and thus retentive support of the diffuser and ring in actuated position, is facilitated in a manner subsequently described. One of the links **48** may then be detached from the associated hook **47** so that the ring and diffuser may be swung downwardly to the full line position of FIG. **2** to permit free access to the interior of the light housing **12**. With the link reattached to the hook, the ring and diffuser are returned to their normal position under the loading of springs **46** upon release of the slide plates **39** from their locked condition.

As a particularly important feature of the present invention, each of the support mechanisms **28** includes retention means of unique design for positively locking the slide plate **39** in the previously noted extended actuated position. Such retention means comprises a resilient latch **49** secured to the upper or distal end of plate **39** relative to hook **47** and a resilient guide cam **51** secured to the elevated side leg **32** of guide member **29** at the proximal end thereof relative to the hook. The guide cam is formed with a notch **52** which is engageable by the latch **49** when the plate is in its extended actuated position. MOre particularly, the latch is provided as a resilient elongated rectangular leaf **53** having a laterally projecting V-shaped hook portion **54** at one end. The opposite end of the leaf **53** is secured to the slide plate in outwardly spaced relation to the surface thereof. In this regard, a lug **56** projects right-angularly outward from the upper end of the slide plate longitudinally centrally thereof. The end of the leaf is secured to the lug such that the leaf is inclined inwardly therefrom towards the surface of the plate to resiliently engage the hook portion **54** therewith. The hook portion is reentrantly directed inwardly towards the plate and upwardly towards the lug **56**.

The guide cam **51** includes a rectangular platform **57** projecting right-angularly inward from side leg **32** in parallel spaced relation to the surface of the slide plate and such platform has the notch **52** formed therein. The cam further includes a resilient tongue **58** inclined inwardly and upwardly from the platform, i.e., in the direction of the latch, into resilient contact with the surface of the plate. It is important to note that the width dimension of the notch is less than the reentrant longitudinal extent of the hook portion **54**.

With the positive locking retention means provided as physically described above, upon translation of the slide plate **39** downwardly against the loading of spring **46**, the hook portion **54** of the latch **49** encounters the tongue **58** of the guide cam **51**. Continued translation of the plate causes the hook portion to ride outwardly upon the tongue **58** into contact with the platform **57**, as depicted in FIG. **6**, the leaf **53** at this time resiliently yielding in the outward direction. When the hook portion encounters the notch **52** the resiliency of the leaf snaps the hook portion inwardly into engagement with the notch, as shown in FIGS. **7** and **8**, thereby positively locking the slide plate in extended actuated position. To release the slide plate for return translation, under the influence of spring **46**, to normal position, it is merely necessary to translate the slide plate a short distance downward. The outer surface of the hook portion then encounters the lower edge of the notch as shown in FIG. **9**, and is guided inwardly therethrough under the resilient force of the leaf back into engagement with the surface of the slide plate. The hook portion is thus disengaged from the notch to thereby free the slide plate for return upward translation to its normal position. During return translation of the plate the resilient tongue **58** yields outwardly upon being engaged by the outer surface of the hook portion, as shown in FIG. **10**. The tongue thus permits the hook portion to pass thereunder during the return translation of the slide plate.

I claim:

1. A lighting fixture comprising a light housing having an open end, a diffuser unit for closing said open end, and a pair of opposed diffuser support mechanisms secured to the interior wall of said housing adjacent the open end thereof, said support mechanism secured to said diffuser unit and adapted to retentitively selectively support same in a normal position in closing relation to the open end of said housing and an actuated position spaced from the open end of said housing, said support mechanisms each including a guide member secured longitudinally of said interior wall of said housing adjacent said open end thereof, a slide plate mounted for slidable translation longitudinally of said guide member between normal retracted and actuated extended positions thereof respectively when said slide plate is in said retracted and extended positions, spring loading means coupled between said slide plate and said guide member for resiliently urging said slide plate to said retracted position, releasable retention means carried by said slide plate and by said guide member for cooperative positive locking engagement when said slide plate is in said extended position, said retention means comprising a resilient latch carried by said slide plate and a resilient guide cam secured to said guide member and resiliently engaging said plate, said cam having a notch, said cam operable to guide said latch into locking engagement with said notch in response to translation of said plate to said extended position and to guide said latch to a position of disengagement from said notch in response to further translation of said plate in a direction away from said retracted position.

2. A lighting fixture according to claim 1, further defined by said latch having a first end secured to said plate in outwardly spaced relation to the outer surface thereof and a second end formed with a hook portion resiliently urged inwardly into engagement with said outer surface of said plate, and said guide cam having a platform with said notch formed therein secured to said guide member in outwardly spaced parallel relation to said outer surface of said plate and a resilient tongue inwardly inclined from said platform towards said latch into engagement with said outer surface of said plate, said tongue engageable by said hook portion to guide same into engagement with said notch.

3. A lighting fixture according to claim 2, further defined by said latch comprising an elongated rectangular resilient leaf having a first end secured to said plate in outwardly spaced relation to said outer surface thereof and a second end with said hook portion projecting laterally therefrom, said leaf inwardly inclined from the first end thereof to resiliently engage said hook portion with said outer surface of said plate, said hook portion being of V-shaped configuration and reentrantly inwardly directed towards said plate and longitudinally towards said first end of said leaf.

4. A lighting fixture according to claim 3, further defined by said notch having a width less than the reentrant longitudinal extent of said hook portion.

5. A lighting fixture comprising a light housing having an open end, a diffuser unit for closing said open end, and a pair of opposed diffuser support mechanisms secured to the interior wall of said housing adjacent the open end thereof, said support mechanisms secured to said diffuser unit and adapted to retentitively selectively support same in a normal position in closing relation to the open end of said housing and an actuated position spaced from the open end of said housing, said support mechanism each including a guide member secured longitudinally of said interior wall of said housing adjacent said open end thereof, a slide plate mounted for slidable translation longitudinally of said guide member between normal retracted and actuated extended positions relative thereto, said slide plate secured to said diffuser unit to support same in said normal and actuated positions thereof respectively when said slide plate is in said retracted and extended positions, spring loading means coupled between said slide plate and said guide member for resiliently urging said slide plate to said retracted position, releasable retention means carried by said slide plate and by said guide member for cooperative positive locking engagement when said slide plate is in said extended position, said guide member being of generally channel shaped configuration including a rectangular web having first and second parallel spaced side legs projecting right angularly from the opposite longitudinal sides thereof, said first side leg having a dimension in a direction normal to said web substantially greater than that of said second side leg, said side legs having right-angularly inwardly turned flanges in parallel spaced relation to said web, said side legs and flanges defining with said web a pair of longitudinally extending guide channels, and said slide plate being of rectangular configuration substantially conformed to said web and having right-angularly projecting rails along the opposite longitudinal sides thereof slidably engaging said guide channels.

6. A lighting fixture according to claim 5, further defined by said releasable retention means comprising a latch including an elongated rectangular resilient leaf having a first end secured to the distal end of said plate relative to said diffuser unit in outwardly spaced relation to the outer surface of said plate and a hook portion projecting laterally from the second end of said leaf, said leaf inwardly inclined from the first end thereof to resiliently engage said hook portion with said outer surface of said plate, said hook portion being of V-shaped configuration and reentrantly inwardly directed towards said plate and longitudinally towards said first end of said leaf, and a resilient guide cam having a rectangular platform projecting right-angularly inward from said first side leg of said guide member in parallel spaced relation to said web at the proximal end thereof relative to said diffuser unit, said platform having a notch therein, said cam having a resilient tongue inwardly inclined from said platform towards said latch into engagement with said outer surface of said plate, said tongue engageable by said hook portion to guide same into engagement with said notch.

7. A lighting fixture according to claim 6, further defined by said notch having a width less than the reentrant longitudinal extend of said hook portion.

8. A lighting fixture according to claim 7, further defined by said spring loading means comprising a tab projecting from said second side leg of said guide member at the distal end thereof relative to said diffuser unit, a second tab projecting from the corresponding rail of said slide plate at the proximal end thereof relative to said diffuser unit, and a spring secured between said first and second tabs.