

[54] LUMINAIRE

[72] Inventor: Edward R. Jablonski, South Milwaukee, Wis.

[73] Assignee: McGraw-Edison Company, Elgin, Ill.

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[51] Int. Cl. ....F21s 1/10

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Primary Examiner—John M. Horan

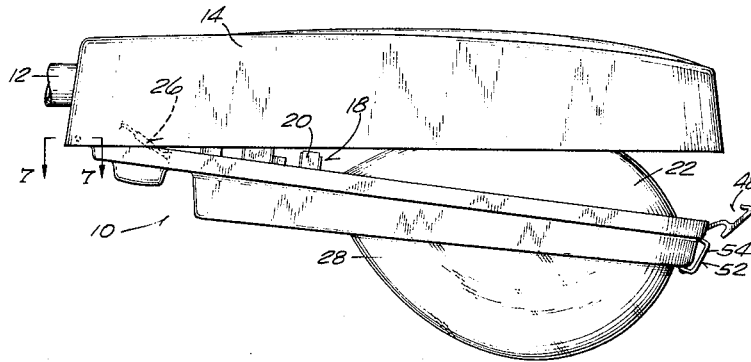
Assistant Examiner—Kenneth C. Hutchison

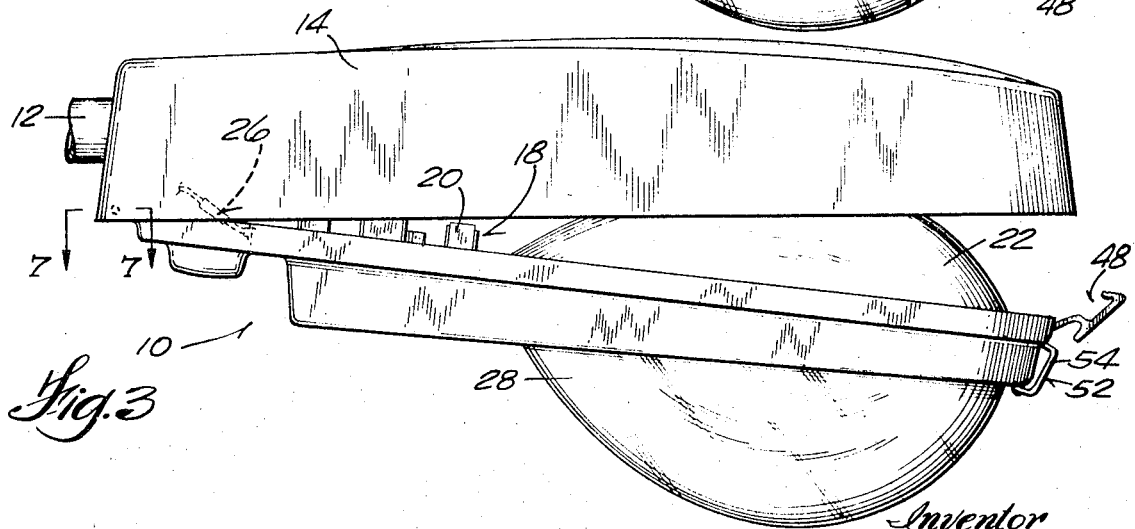
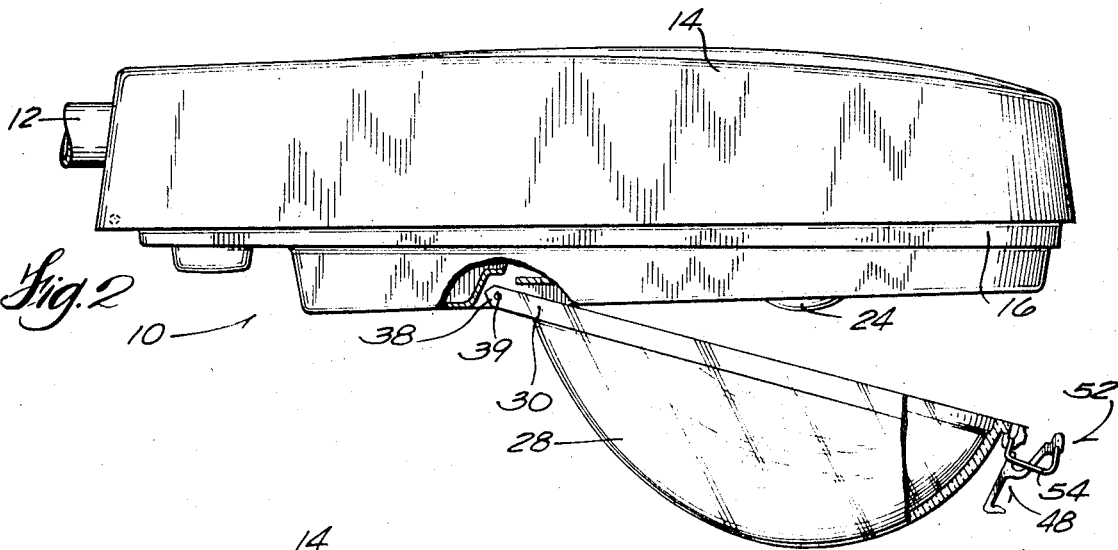
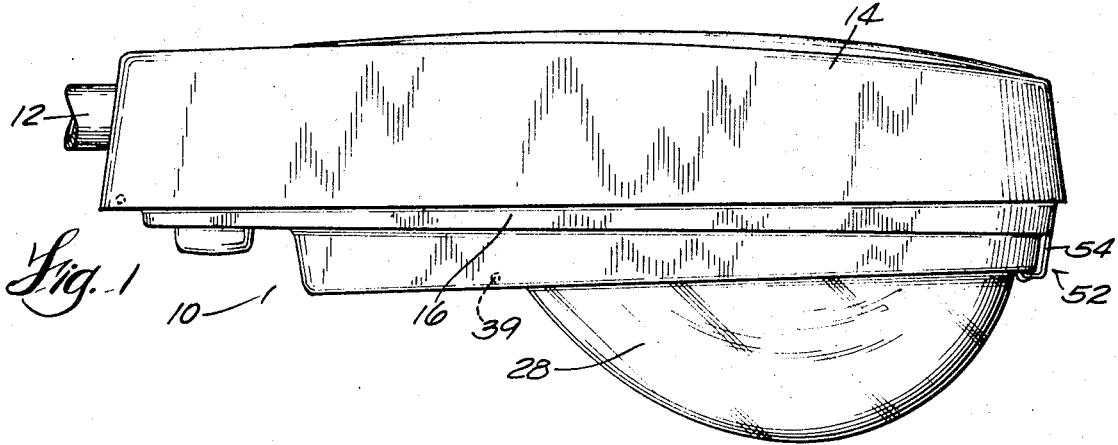
Attorney—John W. Michael, Gerrit D. Foster, Bayard H. Michael, Paul R. Puerner, Joseph A. Gemignani, Andrew O. Riteris and Spencer B. Michael

[57] ABSTRACT

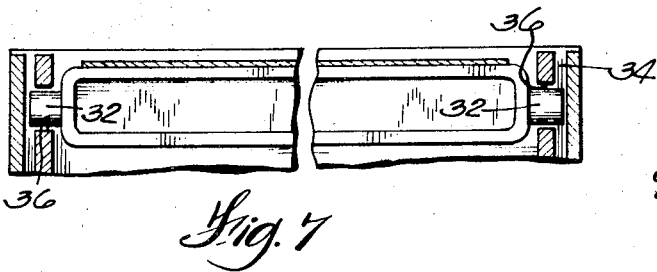
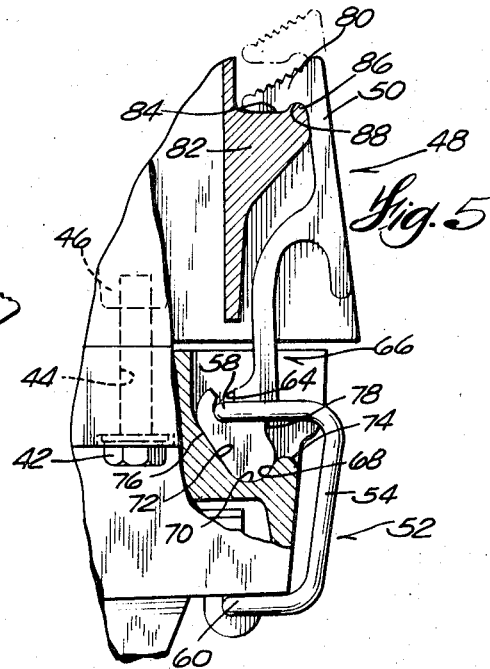
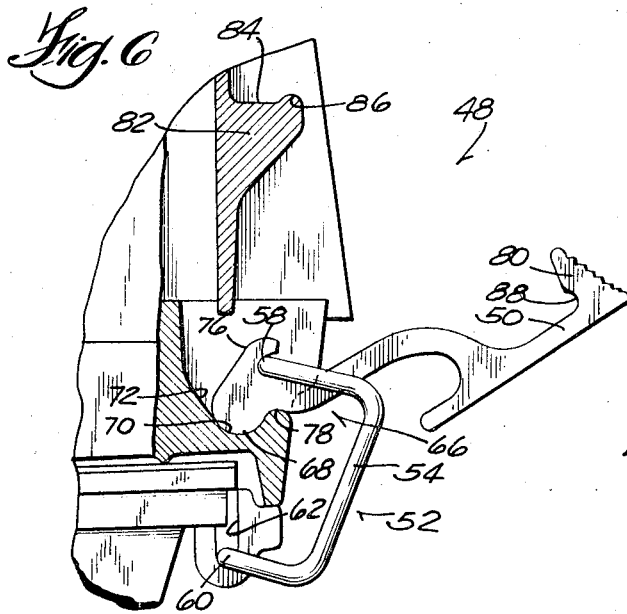
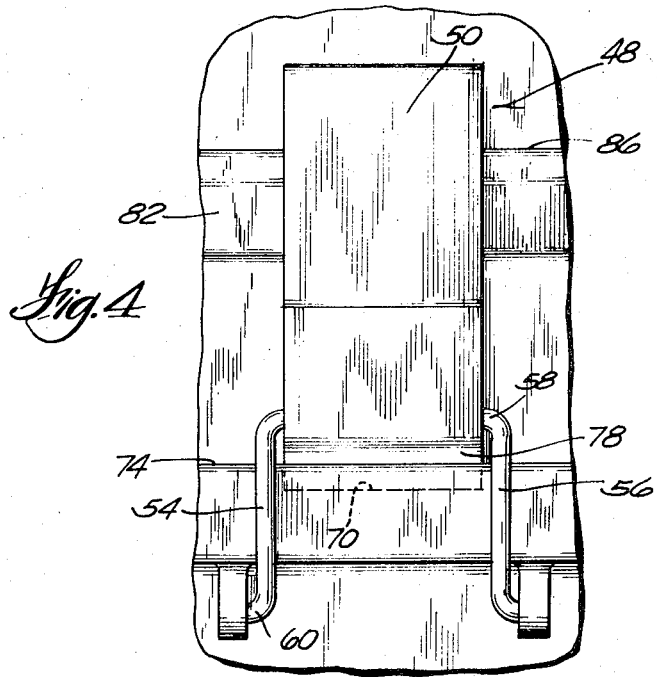
A luminaire has a deck assembly pivotally mounted on a housing by a separable connection to allow removal of the deck assembly from the luminaire. A refractor assembly is pivotally connected to the deck assembly, also by a separable connection for movement with or independent of the deck assembly. A selectively operable latch has a latched position holding the housing, deck assembly, and the refractor assembly, as a unit, an intermediate position holding the deck and refractor assemblies together but releasing them for movement relative to the housing, and an open position wherein the refractor assembly is released for movement relative to the deck assembly. A releasable connection separate from the latch is also provided between the housing and deck assembly. Selective access to all interior elements of the luminaire is thus provided.

14 Claims, 7 Drawing Figures





Inventor  
Edward P. Jablonski  
BY Jay A. Lemigiani  
attorney



Inventor  
Edward P. Jablonski  
By Joseph A. Lemignani  
Attorney

## LUMINAIRE

## BACKGROUND OF INVENTION

This invention relates to luminaires and, more particularly, to the servicing, repair, and/or inspection of luminaires.

The necessity for periodic inspection, repair, and/or servicing of luminaires has long been recognized. The operating elements of the luminaire (bulb, reflector, ballasts, electrical connections, etc.), are generally housed internally so that some means must be provided for gaining access to the luminaire interior. Also, from time to time, the interior of the refractor may have to be cleaned which also requires some dismantling of the luminaire. Various arrangements have been proposed to provide for access to the interior of the luminaire and/or to the refractor. Since most luminaires are pole mounted and require a serviceman to work above ground the number of parts which must be handled should be kept to a minimum for reasons of both safety and the time required to service a given luminaire. Prior proposals have been deficient in this regard in that they have not been entirely safe, requiring undue manipulation and handling of parts on the part of the serviceman, and/or have not adequately provided for easy access to the entire interior of the luminaire.

U.S. Pat. Nos. 3,204,092 and 3,400,963, assigned to the assignee of this invention, illustrate types of latches which have been provided to latch the luminaire parts together in a safe and reliable manner during operation while providing for access to the luminaire interior on a selective basis.

## SUMMARY OF INVENTION

This invention is concerned with the problems encountered in servicing, repair, and maintenance of luminaires and has among its general objects the provision of a luminaire in which ready and facile access can be had to the interior of the luminaire, wherein the elements are positively held together during operation by a simple and effective latch arrangement, and wherein the parts to be handled and the amount of manipulation required on the part of a serviceman are kept to a minimum while at the same time providing for complete, ready and facile access to all of the internal elements of the luminaire.

For the achievement of these and other objects, this invention proposes a luminaire having a housing, a deck assembly, and a refractor assembly. The housing is fixed and the deck assembly and refractor assembly are pivotally mounted to permit movement of both together relative to the housing and of the refractor assembly alone relative to the deck assembly and housing. A latch mechanism has a latched position wherein the housing, deck assembly, and refractor assembly are latched together for normal operation. The latch mechanism is movable from the latched position to an intermediate position wherein the deck assembly and refractor assembly are still latched but they are freed from the housing and can be pivoted to expose the housing interior, the latch mechanism is further movable beyond the intermediate position to an open position wherein the refractor assembly is freed from the deck assembly and can be moved alone. The deck assembly has a releasable connection to the housing apart from the latch mechanism and one which can be released prior to movement of the latch mechanism, during this release operation the latch mechanism holds the deck assembly and refractor assembly suspended from the housing so that it need not be supported by the serviceman. Thus, the housing interior can be fully exposed and the refractor assembly can be moved as desired making all internal elements of the luminaire accessible.

The latch mechanism maintains positive latching engagement in both the latched and intermediate positions by reason of a toggle arrangement.

Both the refractor assembly and the deck assembly have releasable pivot mountings so that, if desired, they can be completely removed from the luminaire, i.e. either the refractor assembly alone can be removed or it and the deck assembly.

Other objects and advantages will be pointed out in or be apparent from the specification and claims, as will obvious modifications of the single embodiment shown in the drawings, in which:

FIG. 1 is a side elevation of a luminaire with the latch arrangement in its latch position;

FIG. 2 is a side elevation of the luminaire with the refractor assembly freed for movement relative to the deck assembly and the housing;

FIG. 3 is a side elevation of the luminaire with the deck and refractor assemblies freed for joint movement relative to the housing;

FIG. 4 is an enlarged end view of a portion of the luminaire;

FIGS. 5 and 6 illustrate the latch mechanism and its latched and intermediate positions; and

FIG. 7 is a section view along line 7—7 in FIG. 3.

## DESCRIPTION OF PREFERRED EMBODIMENT

For purposes of illustration, the invention has been shown as embodied in a generally horizontal luminaire 10. In a conventional manner, the luminaire is connected to a support arm 12 by means of a slip fitter (not shown) housed interiorly of the luminaire and is positioned above the roadway or the like which is to be illuminated by the luminaire.

The luminaire includes an upper, open bottomed housing 14 and a deck assembly 16. The specific details of the operating elements of the luminaire, such as the electrical connections, the ballast assembly, the refractor, lamp socket, and lamp, are not necessary to a complete understanding of this invention and hence will not be described in detail. It is sufficient to point out that ballast assembly 18, lamp socket 20, dished reflector 22, and lamp 24, together with electrical connections, such as a disconnect coupling 26 are connected to and supported on deck assembly 16. The lamp of the luminaire is generally positioned with a horizontal orientation and can be any type of conventional lamp, such as mercury or sodium. To complete a general structural description of the luminaire, it also includes a refractor assembly including refractor 28 and refractor ring 30 from which the refractor is supported.

Deck assembly 16 is pivotally supported from housing 14 at the left end (as viewed in the drawings) of the deck assembly. More specifically, the deck assembly includes a pair of oppositely directed pins 32 positioned on opposite side of end 34 of the deck assembly. Pins 32 fit into upwardly opening slots 36 provided in housing 14. Thus, the deck assembly is capable of pivotal movement relative to the fixed housing 14 about the pivot defined by the pin and slot arrangement.

Similarly, the refractor assembly is supported for pivotal movement relative to the deck assembly. More specifically, oppositely directed pins 39 are provided on opposite sides of end 38 of refractor ring 30. These pins fit into upwardly opening slots provided in the deck assembly.

With the just described pivotal arrangements, the refractor assembly is capable of pivotal movement alone with respect to both the deck assembly and the housing, and the deck assembly and the refractor assembly are capable of joint pivotal movement with respect to the housing. Moreover, with the pin and open slot arrangement defining the pivot, the refractor assembly can be separated from the deck assembly by swinging it partially open and lifting the pin from the open slots and, similarly, the deck assembly can be removed from the housing by pivoting it partially open and removing it from the open slot in the housing. The refractor assembly can be removed alone or with the deck assembly as a unit. Preferably, the end 34 of the deck assembly and end 38 of the refractor assembly are provided with a configuration which produces an interference with the housing or deck assembly, respectively, when an attempt is made to lift the pins 34 or 39 out of their respective slots unless the deck assembly and refractor assembly are properly positioned. More specifically, the interference can be such that either the refractor assembly or the deck assembly

must be pivoted to a particular angle, for example, 45° from their normal operating positions, and then require a positive lifting of the assembly in a generally upward and forward direction to remove the pins from their respective slots. This interference fit is desirable in that it prevents accidental separation of either the refractor assembly or the deck assembly.

With the description to this point, it can be readily seen that the entire interior of the luminaire is readily accessible for service, repair, or inspection. For example, the deck assembly can be pivoted down to expose the ballast, electrical connections, etc. which are attached to the deck assembly and the entire deck assembly can be removed from the luminaire should extensive servicing be required. Similarly, the refractor assembly can be pivoted to expose the interior of the refractor, the lamp, and the interior of the refractor for inspection, cleaning, relamping, or whatever service is required.

To further facilitate the ready access to the housing interior while maintaining at a minimum the manipulation required by a serviceman, a multi-position latch mechanism is used in the luminaire.

Initially it will be noted that a pair of screws 42 located on either side of the outer or free end of the luminaire (free as opposed to the end connected to the support arm), extend between deck assembly 16 and housing 14. More specifically, the screws are held captive in through holes 44 in deck assembly 16 and can be threaded into bosses 46 provided in housing 14. When screws 42 are threaded into their respective bosses, the deck assembly is fixed with respect to housing 14; but after the bolts are loosened the deck assembly is free for pivotal movement relative to the housing.

Latch mechanism 48 provided at the outer end of the luminaire is designed to be capable of assuming a latched position wherein the refractor and deck assemblies are latched together as a unit and are held in latched position with respect to housing 14. The latched position is illustrated in FIGS. 1 and 5. The latch mechanism is movable from the latched position to an intermediate position wherein the deck assembly and refractor assembly have been freed from the housing assembly for pivotal movement on pins 32 but wherein the deck assembly and the refractor assembly are still latched together as a unit, this is illustrated in FIGS. 3 and 6. The latch assembly is capable of still further movement from the intermediate position to an open position (FIG. 2) wherein the refractor assembly is released from the deck assembly.

More specifically, latch mechanism 48 includes a movable latch member 50 and a resilient spring 52 having two generally U-shaped side portions 54 and 56 connected by web 58. Pins 60 are held in slots 62 in refractor ring 30 and web 58 fits into a groove 64 provided in lower end 66 of movable latch member 50. In this manner, spring 52 is carried by the refractor assembly but extends between the refractor assembly and the movable latch member 50 so that the movable latch member is held captive with the refractor ring and thus in the overall luminaire assembly.

The movable latch member 50 is arranged for general pivotal movement into and out of its latched and intermediate positions. To this end latch member 50 engages deck assembly 16 and that engagement, together with the arrangement of spring 52, achieves a type of toggle or over-center action on the movable latch member 50 to insure a positive latching force holding latch member 50 in both the latched and intermediate positions. More specifically, end 66 of the latch member is provided with a surface 68 which is generally elongated but is arcuate in cross section as can be seen in FIGS. 5 and 6. This arcuate surface of the latch member fits into a complementary indentation 70 provided in the outer end of deck assembly 16. Surface 70 is also generally elongated but is again arcuate in cross section as viewed in the drawings. Moreover, this surface terminates at one end in a linear surface 72, which is generally tangential to surface 70, and at its other end is an oppositely curved projection 74. In other words, where surface 70 is generally concave to receive con-

vex surface 68 of the latch member, surface 74 is convex. As will appear from the following discussion, surfaces 72 and 74 provide stops limiting the movement of the latch member in the latched and intermediate positions respectively. Lower end 66 of the latch member also includes a linear surface 76 which corresponds to surface 72 of the deck assembly and a concave surface 78 which is complementary to convex surface 74. Surfaces 76 and 78 of the latch member cooperate with surfaces 72 and 74 of the deck assembly to locate the latch member in its latched and intermediate positions.

At this point, it should also be noted that in the latched position the distance between web 58 and pins 60 is greater than that distance would be between when spring 52 is relaxed (see FIG. 2). Thus the spring exerts a biasing force on the latch member, and with the positioning of the various parts as illustrated in FIG. 5, i.e. web 58 is above and to the left of the pivot defined by surfaces 68 and 70, the line of action of the spring 52 urges latch member 50 in a counter-clockwise direction thereby asserting a positive pressure maintaining the latched position.

With reference to FIG. 6, it will be noted that latch member 50 has been pivoted in a clockwise direction about the inner pivot defined by surfaces 68 and 70 to the point where concave surface 78 of the latch member has engaged convex surface 74. This engagement of surfaces 78 and 74 defines an outer pivot. In the intermediate position, the distance between web 58 and pins 60 still exceeds that distance when the spring is in a relaxed position and web 58 is still over-center, i.e., it is above and to the left of the outer pivot, so that a biasing force is still present tending to maintain engagement between the latch member and the deck assembly and hold the intermediate position. More specifically, it (the spring) urges the latch member into engagement with surfaces 70 and 74 so that the deck assembly and the refractor assembly are positively latched together in the intermediate position. The stop surfaces thus limit movement of the latch member toward both the latched and intermediate positions and also provide surfaces against which the toggle or over-center force of the spring can react.

Before proceeding with the discussion, it will be noted that latch member 50 includes an upper hook end 80 which engages catch 82 provided on the housing. Catch 82 has an upwardly directed horizontal surface 84 terminating in a raised projection 86. Hook end 80 rests on surface 84 and has a mating indentation 88 which receives projection 86. The over-center action of the movable latch member and spring 52 in the latched position also serves to maintain engagement of end 80 with catch 82. So engaged, the latch member provides a means of supporting the refractor and/or deck assemblies should it be desired to loosen screws 42.

Returning now to FIG. 5 and the illustration of the latch mechanism in its latched position, the operation of the latch mechanism to selectively release, for movement, either the refractor assembly alone or the refractor assembly with the deck assembly will now be discussed. Should the serviceman want to pivot the deck assembly with respect to the housing to expose the electrical connections, the ballasts or the other mechanisms attached to the deck assembly, he will disengage screws 42 from the housing. In doing so he need not support the deck and refractor assemblies since they are held in position by latch member 50. After the screws have been freed, he need only raise the deck assembly and refractor assembly a slight distance to free projection 86 from indentation 88. Thus freed, latch member 50 can be pivoted clockwise about the inner pivot (complementary surfaces 68 and 70) from the latched position to the intermediate position. The latch mechanism, in the latched position, holds the deck and refractor assemblies as a unit during inspection. Should it become necessary to remove the deck assembly, the serviceman need only pivot it to the necessary angular relationship and move it up and forward to remove pins 32 from their slots 36. To return the luminaire to its operative state, the deck assembly pins are reengaged in slots 34, the deck assembly is pivoted to

housing 14, and latch member 50 is pivoted counter-clockwise to engage catch 82. Screws 42 are then threaded into the housing to complete the connection.

Should it be desired to pivot only the refractory assembly to expose the interior of the reflector, the lamp, or the refractor, this is readily accomplished by moving the latch member to its full open position. More particularly and again starting with FIG. 5, the deck and refractor assemblies are raised slightly to free hook end 80 from catch 82 (the dotted line showing in FIG. 5); however, screws 42 are not freed from housing 14. With the hook end freed from the catch, movable latch 50 is pivoted about the inner pivot to the intermediate position and then about the outer pivot to its full open position. More particularly, when the latch member reaches the intermediate position illustrated in FIG. 6, pivotal movement in a clockwise direction is continued. Now the latch member 50 pivots about the outer pivot, surfaces 74 and 78, until the latch member is completely freed from the deck assembly. The latch member then can fall freely to its full open position but is still held captive in the refractor ring. With the latch mechanism so released, the refractor assembly can be pivoted away from the deck assembly to expose the interior of the reflector, the lamp, and the interior of the refractor. The refractor assembly can also be removed if desired without disturbing the remainder of the luminaire. This is done by disengaging its pins 39 from their respective slots in the deck assembly in the same manner as the separation of the deck assembly from the housing, i.e., by pivoting the refractor assembly to clear the interference of the pivot. To return the refractor assembly to its operative position, the refractor assembly is pivoted into engagement with the deck assembly, surface 78 of the movable latch is engaged with the surface 74 and the latch member is then pivoted into its fully latched position.

With this arrangement, the entire interior of the luminaire is readily accessible with a minimum manipulation of parts, without requiring the serviceman to handle loose parts when working at the elevated level of the luminaire, and the principal subassemblies of the luminaire (i.e., the deck and refractor assemblies with their attached elements), can be selectively exposed for servicing and inspection and can be fully removed from the luminaire for required maintenance. The latch arrangement which is utilized facilitates selective entry into the luminaire and also provides a safety catch which prevents accidental separation of the elements. For example, when screws 42 are being freed, the serviceman need not concern himself with holding the deck assembly and/or refractor assembly since this is accomplished by the latch mechanism. Moreover, the toggle action of the latch mechanism insures a positive force maintaining the housing, deck assembly and refractor assembly as a unit in the latched position and also a positive force maintaining the deck and refractor assemblies in a latched condition in the intermediate position.

Although but one embodiment of the present invention is illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the spirit of this invention or the scope of the appended claims.

I claim:

1. In a luminaire the combination of  
 a housing,  
 a deck assembly,  
 means mounting said deck assembly for pivotal movement relative to said housing,  
 a refractor assembly,  
 means mounting said refractor assembly for pivotal movement relative to said deck assembly,  
 latch means having a latched position operatively engaged with and latching said housing, deck assembly, and refractor assembly together,  
 said latch means being movable from said latched position to an intermediate position releasing the latching engagement with said housing while maintaining latching engagement with said deck assembly and refractor assembly

so that said deck assembly and refractor are freed for joint movement relative to said housing,

said latch means further being movable from said intermediate position to release the latching engagement thereof between said deck assembly and refractor assembly so that said refractor assembly is thereby freed for movement relative to said deck assembly, and

means defining a relatively releasable connection between said housing and deck assembly, in addition to said connection provided by said latch means.

2. The luminaire of claim 1 wherein said latch means includes

a movable latch member and means defining a toggle connection of said latch member relative to said deck assembly and refractor assembly effective to exert a latching force between said deck assembly and refractor assembly in both said latched and intermediate positions and in said latched position said latch member engaging said housing.

3. The luminaire of claim 1 wherein said latch means includes

a latch member,  
 a resilient member,

means defining a selectively separable pivotal engagement between said latch member and one of said deck assembly and refractor assembly and about which said latch member is movable between said latched and intermediate positions and whereby said latch member is separated from said pivotal engagement when moved beyond said intermediate position; and

means connecting said resilient member to said latch member and the other of said deck assembly and refractor assembly to provide a toggle action in both said latched and intermediate positions and between said resilient member, latch member and the engagement of said latch member with said one of said deck assembly and refractor assembly so that latching engagement is maintained with said deck assembly and refractor assembly in both said latched and intermediate positions.

4. The luminaire of claim 3 wherein said means defining said pivotal engagement between said latch member and said one of said deck assembly and refractor assembly comprises

a generally arcuate in cross section surface on said latch member,

a surface on said one of said deck assembly and refractor assembly complementary to said generally arcuate latch member surface, said arcuate surface being engaged with said complementary surface in said latched position, said intermediate position, and during movement therebetween,

said complementary surface terminating at both ends thereof in stop surfaces and said latch member arcuate surface terminating at both ends thereof in surfaces complementary to said stop surfaces, said stop surfaces limiting latch member movement toward said latched and intermediate positions, and

said resilient member exerting a force in said latched and intermediate positions and during movement therebetween urging said arcuate latch member surface into engagement with said surface complimentary thereto.

5. The luminaire of claim 4 wherein said surface complementary to said arcuate latch member surface is on said deck assembly and said resilient member is engaged in said refractor assembly.

6. The luminaire of claim 4 wherein said stop surface corresponding to said latched position is generally linear, and

said stop surface corresponding to said intermediate position comprises an arcuate surface curved oppositely to said complementary surface.

7. The luminaire of claim 4 wherein said means pivotally mounting said deck assembly and refractor assembly further define selectively releasable

pivot connections to permit separation of said deck assembly from said housing and said refractor assembly from said deck assembly.

8. The luminaire of claim 1 wherein said housing is an open bottom member and said deck assembly and refractor assembly pivot in vertical planes relative to said housing, said latch means further including a catch and a movable latch member selectively engageable with said catch whereby said deck assembly and refractor assembly are suspended from said catch by said movable latch member when said releasable connection between said housing and deck assembly is released.

9. The luminaire of claim 8 wherein said latch means includes a resilient member, means defining a selectively separable pivotal engagement between said latch member and one of said deck assembly and refractor assembly and about which said latch member is movable between said latched and intermediate positions and whereby said latch member is separated from said pivotal engagement when moved beyond said intermediate position; and

means connecting said resilient member to said latch member and the other of said deck assembly and refractor assembly to provide a toggle action in both said latched and intermediate positions between said resilient member, latch member, and the engagement of said latch member with said one of said deck assembly and refractor assembly so that latching engagement is maintained with said deck assembly and refractor assembly.

10. The luminaire of claim 9 wherein said means defining said pivotal engagement between said latch member and said one of said deck assembly and refractor assembly comprises a generally arcuate in cross section surface on said latch diameter, a surface on said one of said deck assembly and refractor as-

sembly complementary to said generally arcuate latch member surface, said arcuate surface being engaged with said complementary surface in said latched position, said intermediate position and during movement therebetween,

said complementary surface terminating at both ends thereof in stop surfaces and said latch member arcuate surface terminating at both ends thereof in surfaces complementary to said stop surfaces, said stop surfaces limiting movement of said latch member toward said latched and intermediate positions,

and said resilient member exerting a force in said latched and intermediate positions and during movement therebetween urging said arcuate latch member surface into engagement with said surface complementary thereto.

11. The luminaire of claim 10 wherein said surface complementary to said arcuate latch member surface is on said deck assembly and said resilient member is engaged in said refractor assembly.

12. The luminaire of claim 11 wherein said stop surface corresponding to said latched position is generally linear, and said stop surface corresponding to said intermediate position comprises an arcuate surface curved oppositely to said complementary surface.

13. The luminaire of claim 10 wherein said means pivotally mounting said deck assembly and refractor assembly further define selectively releasable pivot connections to permit separation of said deck assembly from said housing and said refractor assembly from said deck assembly.

14. The luminaire of claim 8 including means defining a toggle connection of said latch member relative to said deck assembly and refractor assembly effective to exert a latching force between said deck assembly and refractor assembly in both said latched and intermediate position.

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