

[54] **RECESSED LIGHTING STRUCTURE**

[75] Inventor: **Edison A. Price**, New York, N.Y.

[73] Assignee: **The Mint Factors**, New York, N.Y.

[22] Filed: **Mar. 13, 1972**

[21] Appl. No.: **234,280**

[52] U.S. Cl. **240/51.12, 52/28, 240/9 R, 240/52.1, 240/78 R**

[51] Int. Cl. **H05b 33/02**

[58] Field of Search **240/51.11 R, 51.12, 240/52.1, 9 R, 78 R; 52/28**

[56] **References Cited**

UNITED STATES PATENTS

3,426,188	2/1969	Baranowski.....	240/9 R
3,152,277	10/1964	Cutler et al.....	240/51.11 R X
3,146,956	9/1964	Schwartz et al.....	240/51.11 R X
3,352,071	11/1967	Sutter	52/28

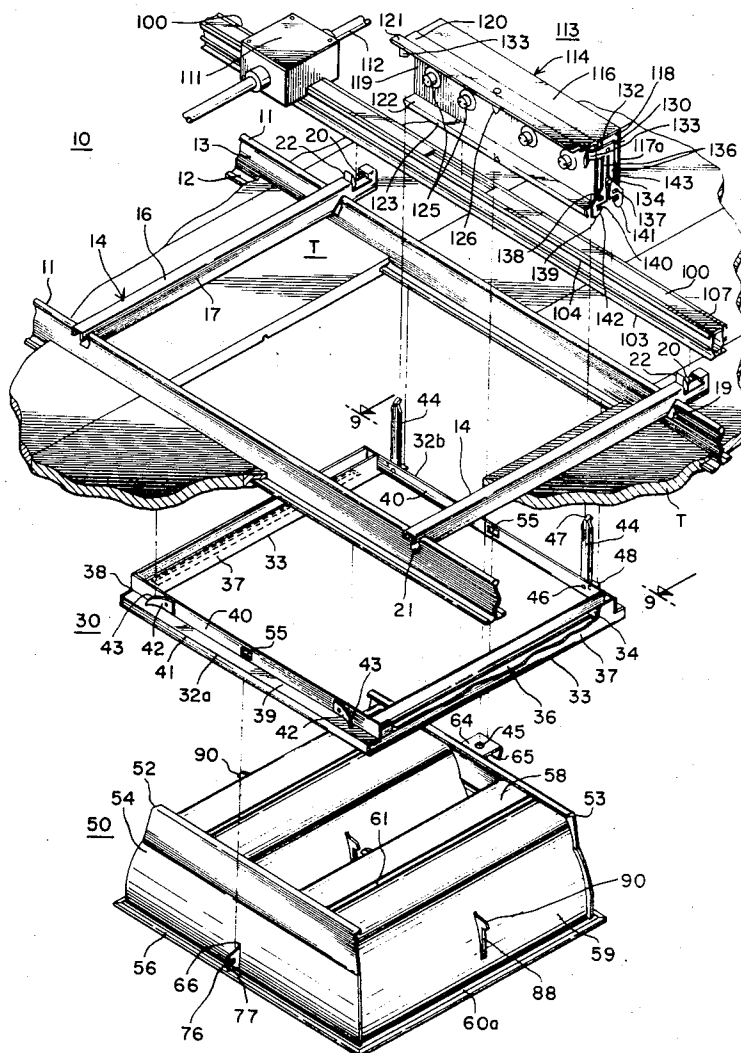
Primary Examiner—Richard L. Moses

Attorney—William R. Liberman

[57] **ABSTRACT**

A recessed lighting structure includes suspended spaced parallel beams interconnected by snap fastened pairs of longitudinally spaced cross-pieces extending across pairs of adjacent beams, and spaced frame members are supported by and releaseably locked to adjacent beams. Conductor-carrying longitudinal conduits are supported by the cross-pieces along corresponding frames, and ballast and lamp socket-carrying boxes are locked to the conduits along each frame and are coupled to the conductors. A lamp housing unit, which may be provided with reflectors and removable baffles, is releaseably supported by each frame with the sockets registering with openings in the unit to receive corresponding lamp bases. Locating elements are provided for guiding and positioning the various components. In alternative arrangements, the cross-pieces extend between successive frames and support pairs of conduits or the cross-pieces and the conduits are omitted and the ballast and socket boxes are mounted on the housings or on brackets supported by the frames and are connected to the power line by flexible cables.

23 Claims, 16 Drawing Figures



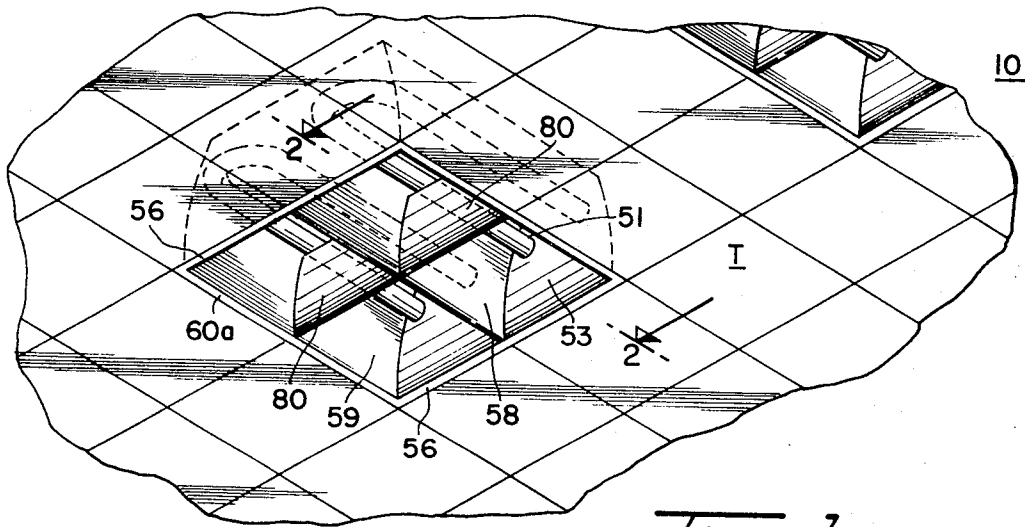


Fig. 1.

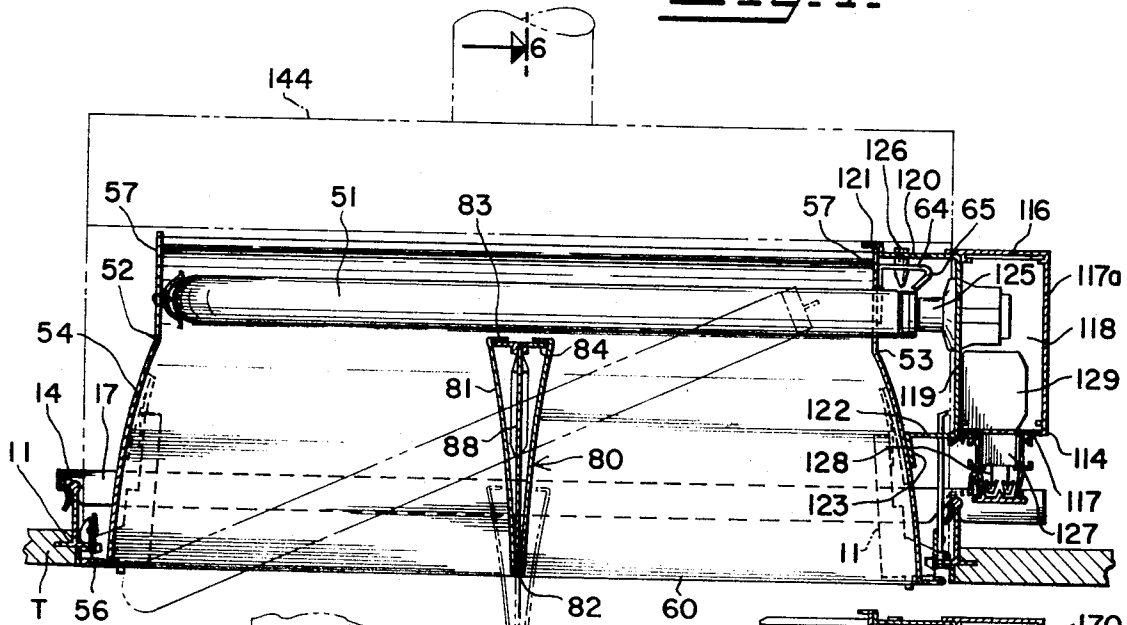


Fig. 2.

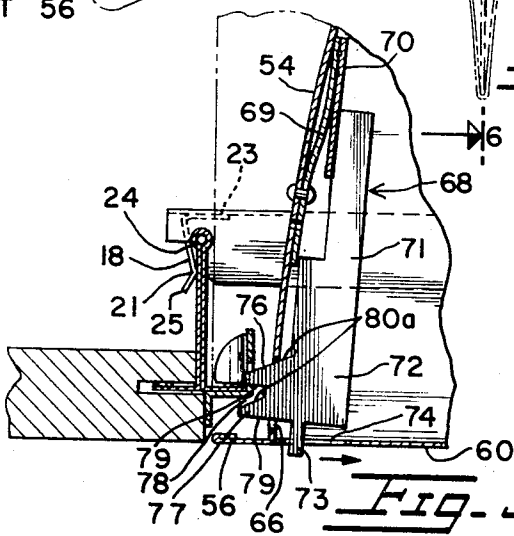


Fig. 3.

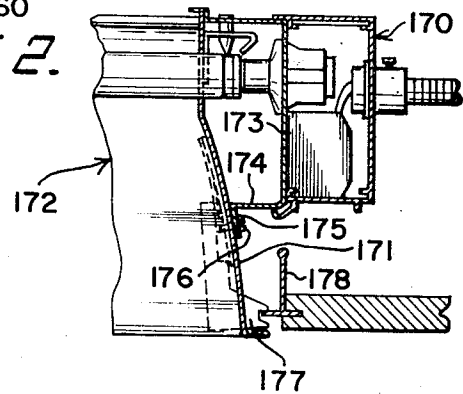
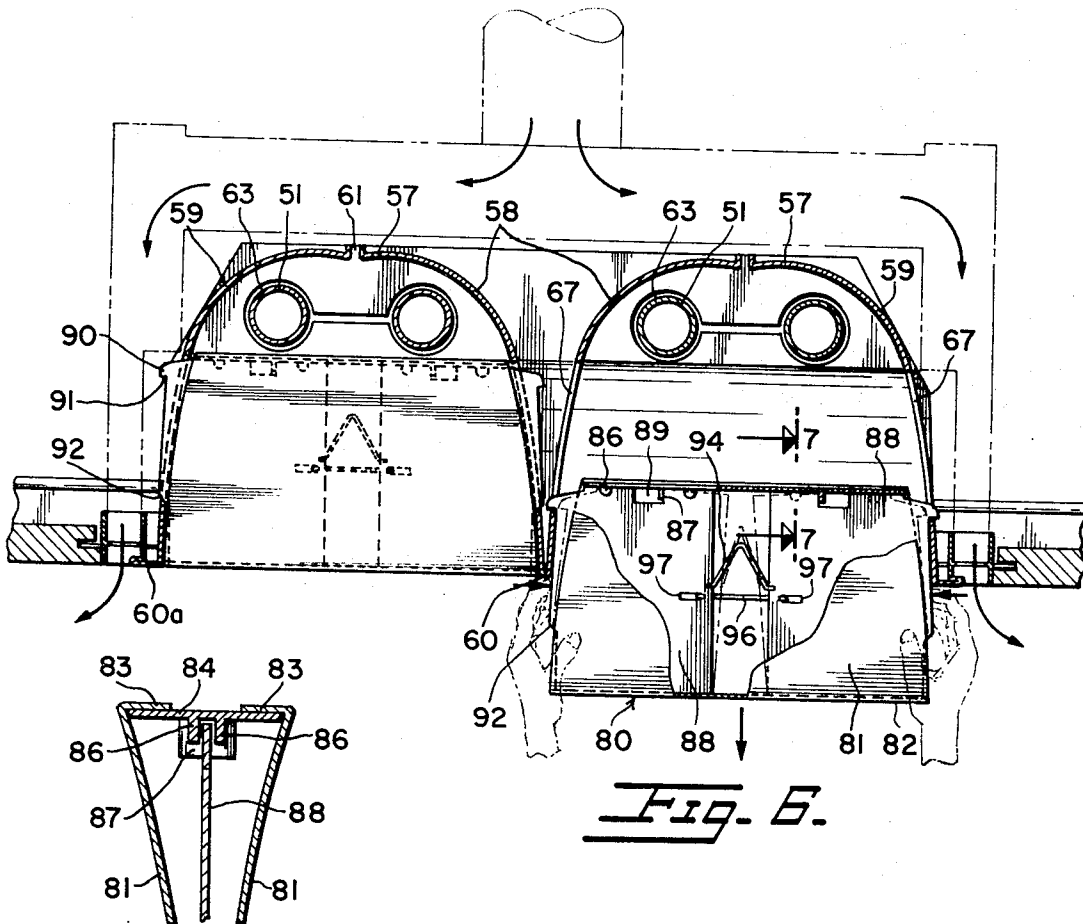
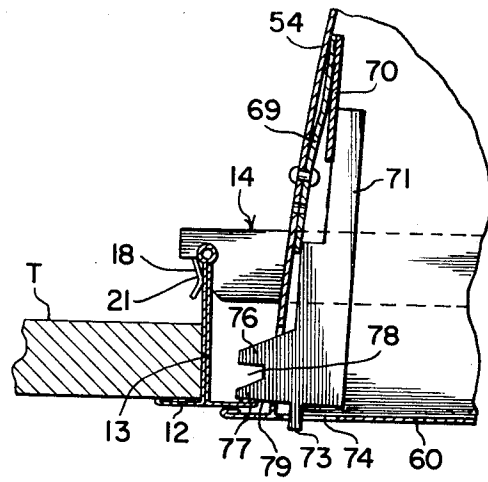
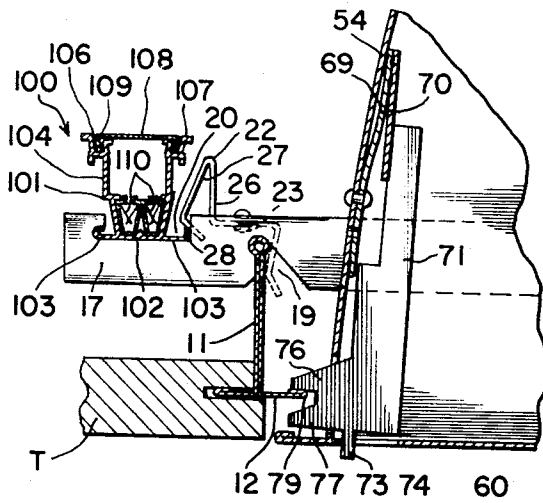


Fig. 2A.



SHEET 3 OF 6

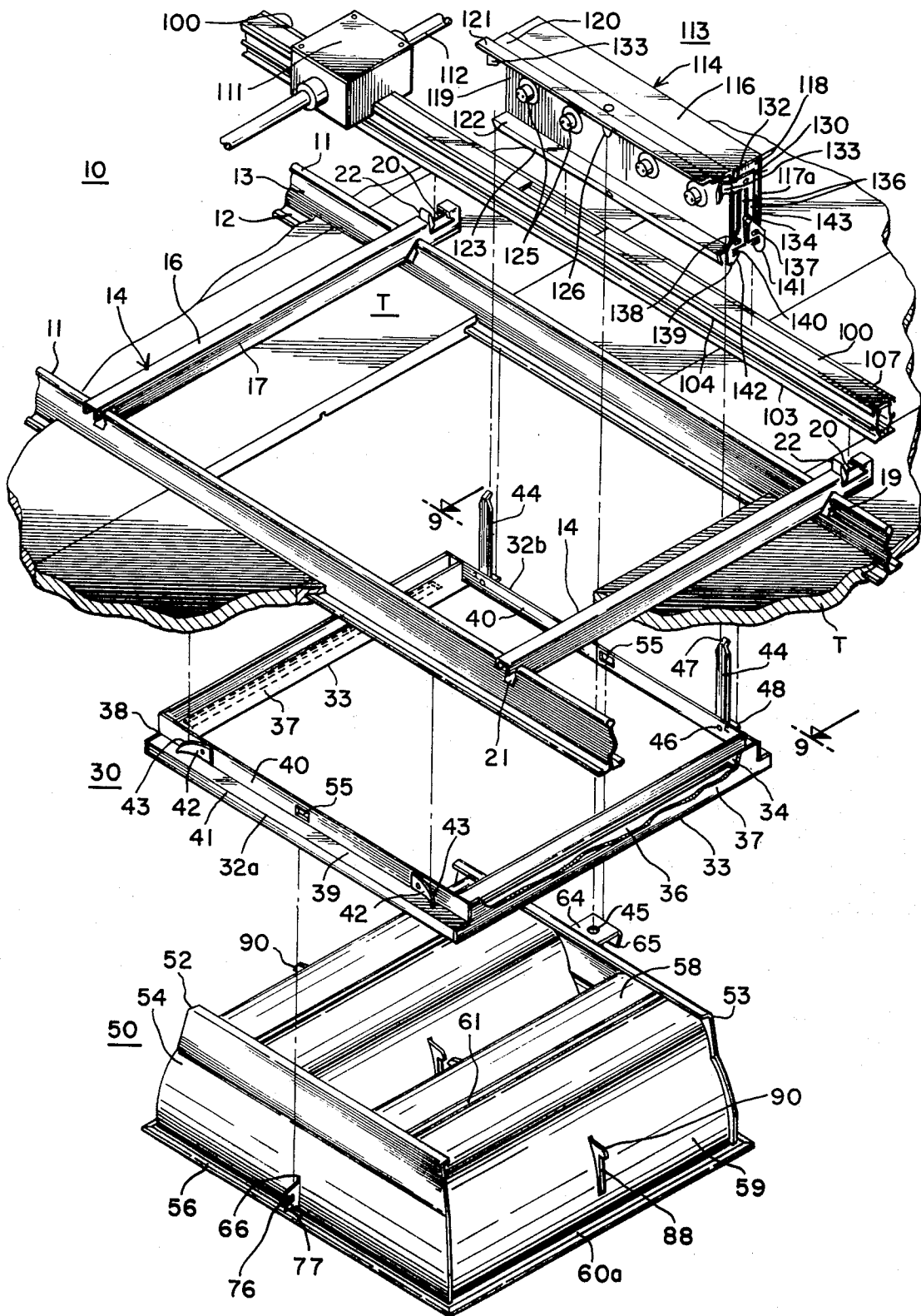


Fig. 8.

SHEET 4 OF 6

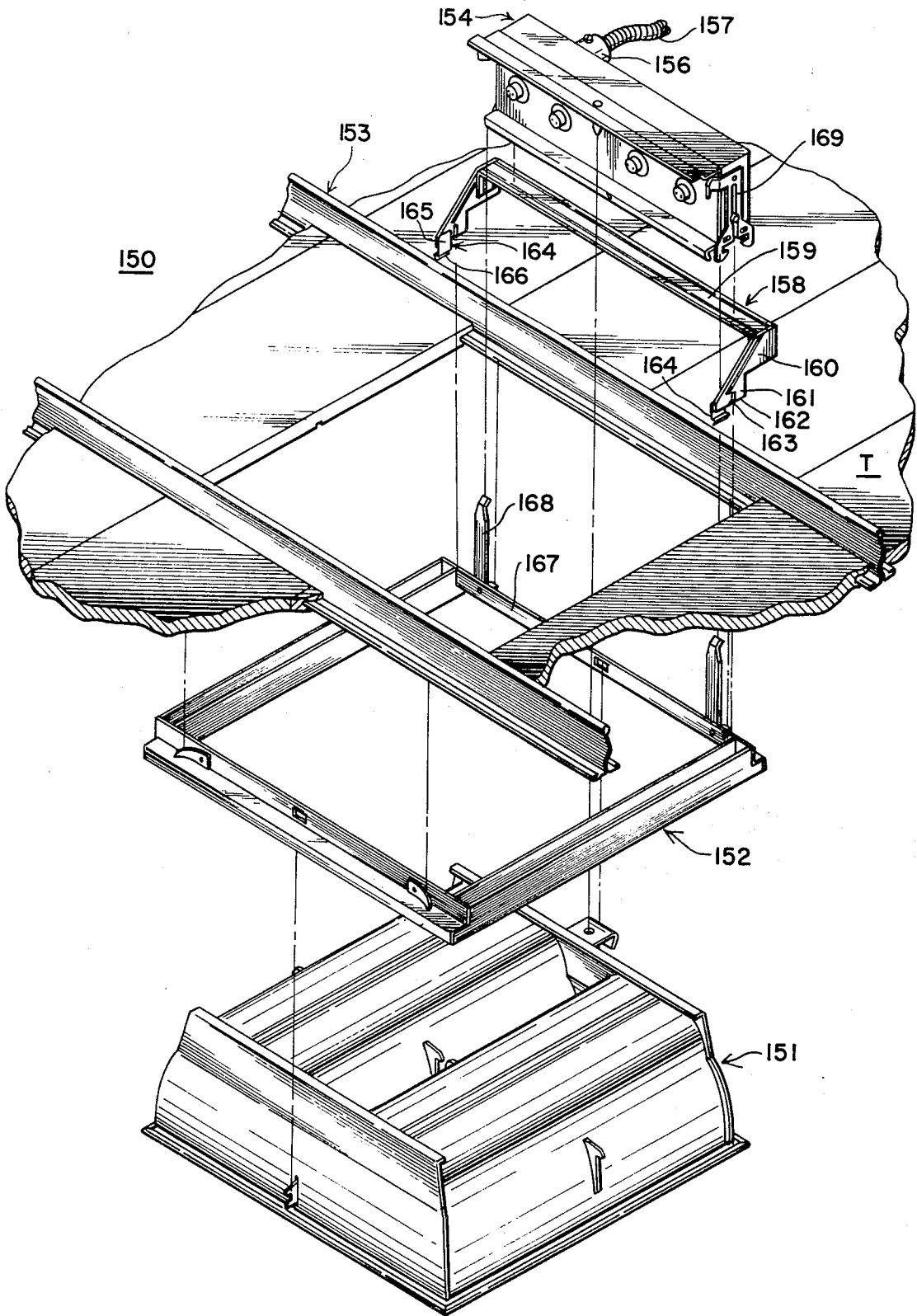


Fig. 8A.

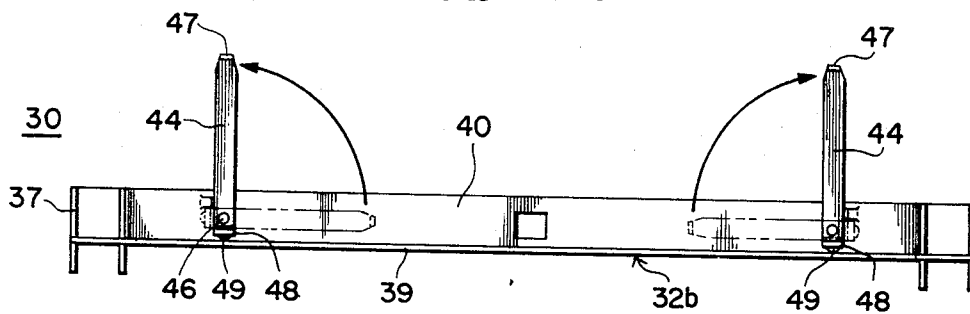


Fig. 9.

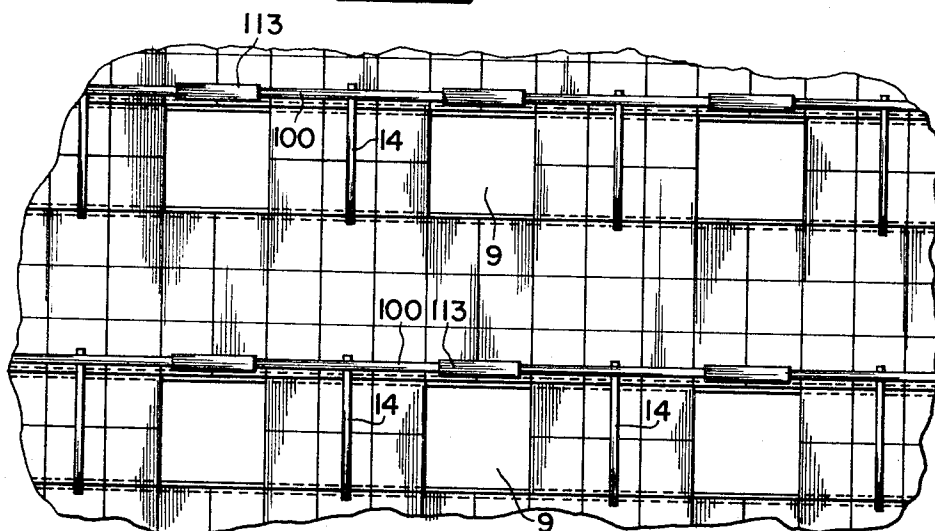


Fig. 10.

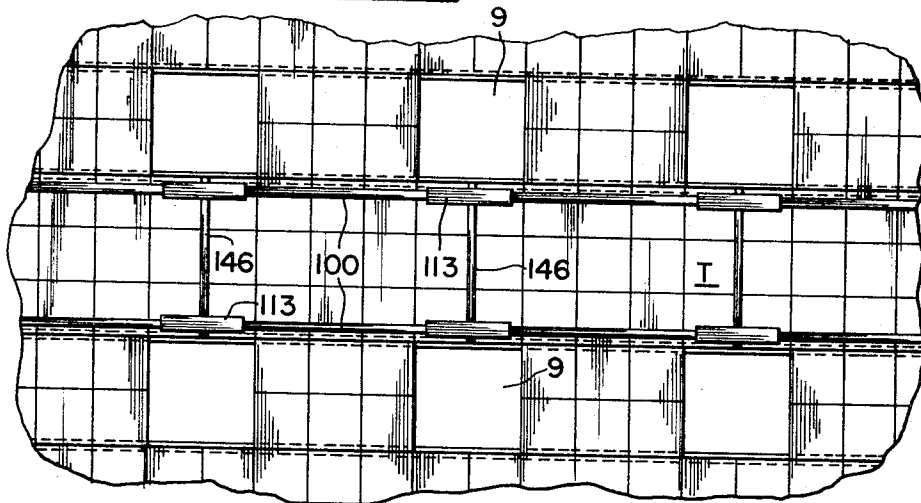


Fig. 11.

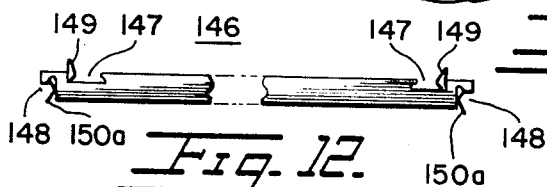


Fig. 12.

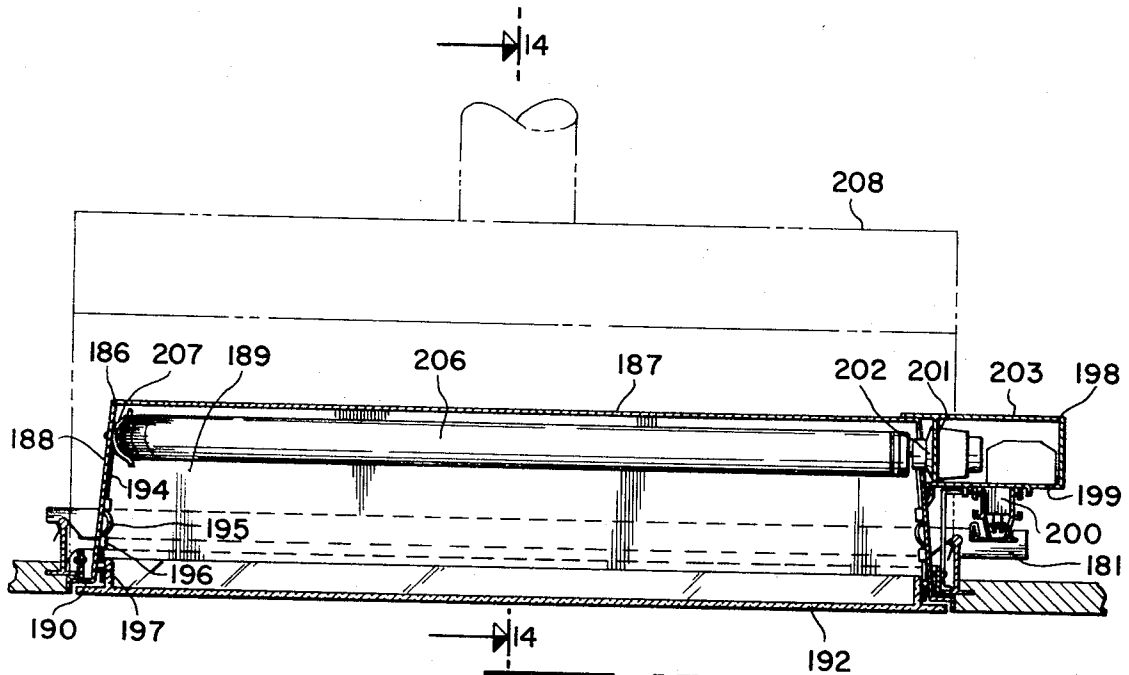


Fig. 13.

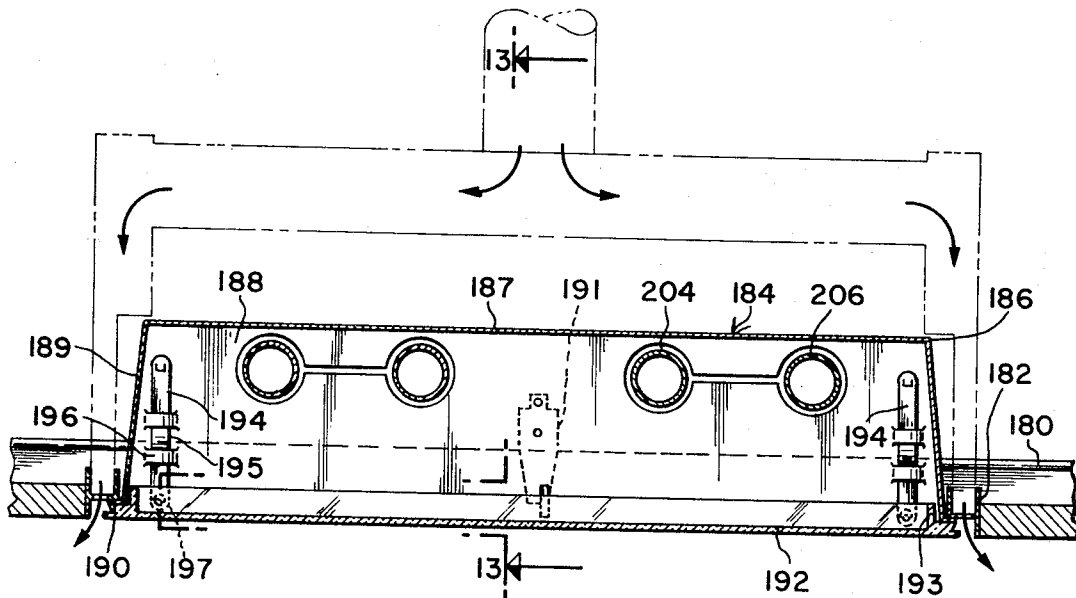


Fig. 14.

RECESSED LIGHTING STRUCTURE

BACKGROUND OF THE INVENTION

The present invention relates generally to improvements in electrical lighting fixture installations and it relates particularly to an improved overhead recessed lighting structure.

The conventional suspended ceiling recessed lighting structures of the type employing fluorescent bulbs possess numerous drawbacks and disadvantages. The lighting fixtures are bulky and cumbersome devices which are difficult to service and maintain because accessibility to the various components thereof is difficult.

Furthermore, the installation of the lighting fixtures and the various accessories is a difficult and time consuming procedure requiring the use of highly skilled labor and hence is very expensive. In addition, the overall structures of the prior art are of little versatility and adaptability and hence leave very much to be desired.

SUMMARY OF THE INVENTION

It is principal object of the present invention to provide an improved electrical lighting structure.

Another object of the present invention is to provide an improved overhead supported fluorescent lighting structure.

Still another object of the present invention is to provide an improved suspended ceiling-recessed structure employing U-shaped fluorescent lamps.

A further object of the present invention is to provide an improved recessed lighting structure which may be easily and rapidly snap-assembled and locked in an installed condition without the use of permanent fastening devices such as screws, rivets or the like and without the use of fastening, applying and tightening tools.

Still a further object of the present invention is to provide a recessed lighting structure of rugged and simple construction in which access to the various components is simple and convenient to facilitate the servicing and maintenance thereof.

Another object of the present invention is to provide a structure of the above nature characterized by its low cost of production and installation, and great versatility and flexibility in use, and its application without modification to a large number of arrangements, and its adaptability for functioning as an outlet for overhead air conditioning ducts.

The above and other objects of the present invention will become apparent from a reading of the following description, taken in conjunction with the accompanying drawings which illustrate preferred embodiments thereof.

In a sense the present invention contemplates the provision of a recessed lighting structure comprising a plurality of transversely spaced longitudinally extending overhead beams, a plurality of spaced lamp housings registering with and projecting above the beams, and first means releasably locking each of the lamp housings to the beams.

Another feature of the present invention resides in the provision of a recessed lighting structure comprising a plurality of transversely spaced parallel longitudinally extending overhead beams, an elongated electrical conduit mounted on the support structure and containing first electrical coupling means positioned along the length of the conduit, a component housing box

mounted proximate the conduit, a second electrical coupling means positioned externally of the box and releasably engaging the first electrical coupling, a lamp socket located on the exterior of the housing box, means connecting the lamp socket to the second electrical coupling, a lamp housing mounted on and projecting above the support structure proximate the housing box and having access to the lamp socket and ceiling panels supported by the beams. Advantageously spaced rectangular frame members extend between pairs of successive beams and are locked in place by connecting elements carried by the frames, and the lamp housings register with and are locked to respective frame members.

While the component housing boxes are advantageously mounted directly on the conduit and are provided with pairs of prongs which releasably engage the coupling means in the conduit, which prongs are in the form of pairs of confronting resilient contact fingers extending along the length of the conduit, they may be otherwise mounted in proximity to the end walls of the respective lamp housings. In one embodiment, the lamp housing includes curved reflectors having spring biased latching arms along the inside faces of the end walls provided with fingers which are movable with the arms into and out of locking engagement with the frame members and the end walls have openings registering with the lamp sockets mounted on the outside face of the respective component box. A baffle member is provided with spring biased support plates having vertically spaced shoulders which releasably engage corresponding shoulders on the reflector walls. The various components of the structure are provided with snap fastening devices to expedite the separable assembly thereof, and locating elements are carried by the frame member, lamp housing and component or ballast box to assure the accurate relative positioning thereof in assembly.

The improved structure is simple and rugged and is easily and rapidly assembled and disassembled without the use of skilled labor, tools and fasteners such as screws, rivets or the like. The components and fixtures are light in weight and easily accessible for servicing and maintenance and the components may be installed in numerous arrangements and patterns.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary bottom perspective view of a ceiling assembly employing one form of fixture installation constructed according to and embodying the present invention;

FIG. 2 is a sectional view taken along line 2 — 2 in FIG. 1;

FIG. 2a is a fragmentary sectional view similar to FIG. 2 illustrating a modified construction;

FIG. 3 is an enlarged detailed sectional view of a portion of FIG. 2;

FIG. 4 is an opposite fragmentary view similar to FIG. 3 of another portion of FIG. 2, shown without the use of a frame member;

FIG. 5 is a view similar to FIG. 4 illustrating a different assembled condition and application of the components;

FIG. 6 is a vertical sectional view taken along line 6 — 6 in FIG. 2 illustrating the lowering or removal of a baffle;

FIG. 7 is a vertical sectional view taken along line 7 — 7 in FIG. 6;

FIG. 8 is a fragmentary exploded perspective view of the assembly shown in FIGS. 1 and 2;

FIG. 8a is a view similar to FIG. 8 of a modified installation also constructed according to and embodying the present invention;

FIG. 9 is a view taken along line 9 — 9 in FIG. 8;

FIG. 10 is a bottom plan view of a modified installation of the arrangement of FIG. 1;

FIG. 11 is a view similar to FIG. 10 of another form of installation;

FIG. 12 is a fragmentary elevational view of the cross-piece in the installation of FIG. 11;

FIG. 13 is a longitudinal vertical sectional view of another embodiment of the present invention taken along line 13 — 13 in FIG. 14; and

FIG. 14 is a sectional view taken along line 14 — 14 in FIG. 13.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, particularly FIGS. 1 to 9 thereof which illustrate a preferred embodiment of the present invention, reference numeral 10 generally designates the improved installation as applied to a suspended ceiling construction provided with a plurality of rectilinearly arranged lighting fixtures 9 and which includes a plurality of longitudinally extending parallel beams 11 suitably suspended by hangers from overhead supports at regularly transversely spaced distances preferably correlated to the standard ceiling tile dimensions. Each beam 11 is of inverted T-shaped cross section and includes a bottom horizontal web 12 and a medial vertical web 13 beaded along its top edge.

Pairs of similarly constructed longitudinally spaced parallel transverse cross-pieces 14 are mounted at desirably spaced intervals on the beams 11. Each cross-piece 14 is channel shaped including a top web 16 and a pair of depending side webs 17. Each side web has a similar rectangular notch 18 in a bottom end thereof, the notches 18 having longitudinally aligned arcuate recesses in its corners which engage the beaded top edge of a corresponding beam web 13. Also formed in each cross-piece web 17, spaced inwardly from the ends opposite notches 18, are triangular notches 19 having vertical outer edges bevelled at their bottoms and abutting a face of beam web and upwardly inclined inner edges 15. The apex of notches 19 are circular and engage the beaded top edge of the web 13 of a beam 11 next to the beam engaged by notches 18. Formed in the top of each beam 17 outwardly of notches 19 is a seat-defining recess 20 having horizontal bottom edges, vertical inner edges, terminating in vertical shoulders and vertical outer edges provided at their bottoms with arcuate notches formed in webs 17, web 16 having a rectangular opening in the top thereof.

Cross-pieces 14 are snap fastened onto beams 11 and releasably locked in position by opposite leaf spring members 21 and 22. Spring member 21 includes a horizontal top leg 23 secured to the underface of cross-piece web 16 proximate notches 18. Depending from the outer end of leg 23 is a resilient angulated leg 25 having downwardly inwardly and downwardly outwardly inclined upper and lower sections which join at an elbow which bears on beam web 13 to clamp it between the inner edge of notch 18 and the spring mem-

ber elbow. Spring member 22 includes a horizontal leg secured to the underface of cross-piece web 16 and provided at its inner end with a depending angulated leg 24 having an elbow bearing on the side of web 13 opposite that engaged by the outer edge of notch 19 and at its outer end in a vertical leg 26. Extending downwardly and outwardly from the top of leg 26 is an outwardly downwardly inclined arm 27 which terminates in an inwardly downwardly inclined leg 28 registering with the inside corner of seat 20.

In a preferred assembly, a rectangular frame 30 registers with and is mounted in the space delineated by a pair of cross-pieces 14 and successive beams 11, and includes a pair of longitudinally spaced transverse legs 32a and 32b and a pair of transversely spaced transverse legs 33. Each leg 33 is channel shaped including a bottom web 34 having an elongated air passageway slot 36 and vertical upright side webs 37. The outer upper ends of webs 37 are notches to provide steps 38. Each leg 32a and 32b includes an angle section registering with and extending between web steps 38, and includes a horizontal web 39 engaging the step horizontal edges, an inner vertical web 40 engaging the step vertical edges, and a vertical web 41 depending from the outer edge of web 39 and abutting the end edges of webs 34 and 37. The legs of frame 30 are suitably secured to each other and their top edges are coplanar, as are their bottom edges.

Positioned on and proximate the opposite ends of the outside face of web 40 of frame leg 32a are a pair of leaf spring resilient mounting elements 42. Each mounting element 42 is secured at its inner end to web 40 and is normally curved outwardly away from web 40, and has a horizontal bottom edge parallel to and spaced above web 39 a distance about equal to the outer thickness of beam web 12, and an outwardly downwardly curved cam-defining top edge 43. A pair of locking guide arms 44 are swingably mounted on the outside face of web 40 of leg 32b, inwardly of the outer ends thereof, by pivot pins 46 connecting the lower parts of arms 44 to web 40. Arms 44 terminate at their tops in outwardly directed inclined outwardly tapered ears 47 and at their bottoms in outwardly directed legs 48 provided with clamp dimples 49 on their under-faces. Medially located on each web 40 is a rectangular aperture 55. In the assembled condition of installation 10 one beam web 12 is engaged between mounting elements 42 and frame web 39 and the web 12 of the next beam is clamped between web 39 of leg 32b and the dimples 49 on legs 48 with the arms 44 in their upright guide positions as illustrated in FIG. 9. The frame legs 33 are spaced inwardly of the opposite cross-pieces 14.

A fluorescent bulb housing reflector assembly 50 is releasably supported by and locked to frame 30 or in the absence of the frame, by the beam webs 12, and is illustrated as accommodating two U-shaped fluorescent lamps 51. Assembly 50 comprises a pair of opposite end walls 52 and 53, each of which includes a curved upwardly inclined main section 54 terminating at its bottom in an outwardly directed horizontal flange 56 and a flat vertical top section terminating in an inwardly directed flange. Extending between walls 52 and 53 and suitably secured thereto are a pair of similar open bottom concave reflectors 57 of conventional curvature. Reflectors 57 include integrally formed inner half sections 58 converging downwardly to a medial longitudinally extending apex 59 and outer half

sections 59 terminating at their bottoms in outwardly directed flanges 60a, which are coplanar with flanges 56 and apex 60. The top confronting edges of reflector sections 58 and 59 terminate in spaced lips which delineate longitudinal vent opening 61.

Two transversely spaced pairs of transversely spaced circular openings 63 joined by horizontal slots are symmetrically formed in section 57 of end wall 53 to receive the base sections of a pair of U-shaped lamps. An inwardly projecting positioning lug 64, having a central aperture 55, is medially mounted on the top outside face of wall 53 above openings 64 and terminates in an inwardly inclined depending lip 65. A pair of opposite short vertical slots 66 are medially formed in the lower borders of end walls 52 and 53 shortly above flanges 56 and a vertical slot 67 is medially formed in each of the reflector sections 58 and 59 and extends from a point a short distance above the respective section to a point below the top thereof.

In order to mount reflector assembly 50 releasably in frame 30 or on beam webs 12, a latching assembly 68 is medially positioned on section 54 of each end wall 52 and 53 in the space between opposite reflector sections 58. Each latching assembly 68 includes a first leaf spring or resilient arm 69 riveted at its lower end to the inside face of an end wall section 54 and extending upwardly and having secured to the upper inner face thereof a depending resilient arm 70, arms 69 and 70 being normally resiliently urged toward the respective section 54.

A flat latch arm 71 depends from and is secured to arm 70 and is provided at its bottom with an enlarged outwardly projecting head 72 having a narrow depending finger piece 73 projecting through and slideably engaging a slot 74 formed in the end of reflector bottom apex section 60. The head 72 includes a pair of vertically spaced outwardly directed upper and lower fingers 76 and 77 separated by a recess 78. Each finger 76 and 77 includes a substantially horizontal shoulder-defining bottom edge 79 and an upwardly inwardly inclined top edge 80a. In the frame supported position of reflector assembly 50, the assembly projects upwardly through frame 30 and the latch fingers 76 and 77 are spring urged outwardly through slots 66, one pair of opposite latch fingers projecting through frame apertures 55, depending on the desired level of the reflector assembly 50 relative to beams 11 with the bottom shoulders 79 of the respective fingers resting on frame flanges 39 or beam webs 12.

Reflector assembly 50 includes a pair of transversely aligned transverse baffle members 80 separably medially positioned between each pair of opposing reflector sections 58 and 59. Each baffle member 80 includes a pair of integrally formed panels 81 diverging upwardly from a bottom apex or fold line 82 and terminating at their tops in inwardly directed flanges 83, the outer edges of panels 81 being curved to match the curvature of reflector sections 58 and 59. A guide plate 84 underlies flanges 83 and extends between the top edges of panels 81 and is provided with longitudinally spaced and aligned medially located pairs of transversely spaced depending guide ears 86 and a pair of medially located longitudinally spaced depending stop elements 87.

A pair of similarly shaped flat latching plates 88 are transversely moveable positioned in spaced end-to-end relationship in each baffle member 80 between panels

81. Each latch plate 88 has parallel horizontal bottom and top edges, the bottom edges resting on the inside face of apex 82 and the top edge registering with the guide passage defined by ears 86. Formed in the top edge of each plate 88 is a longitudinally extending notch 89 which is engaged by a stop element 87 to limit the path of longitudinal movement of the respective latch plate 88. Formed at the upper outer corner of each latch plate 88 is an outwardly directed finger 90 having a horizontal shoulder defining bottom edge 91 and the plate outer edge is inwardly offset between its bottom and about one-third upwardly thereof to form a cam defining upwardly outwardly inclined downwardly facing shoulder 92. Latch plates 88 are resiliently urged outwardly by a V-shaped spring member 94 disposed between and bearing on the confronting inner edges of plates 88, and a horizontal connector rod extends between the inner borders of plates 88 and terminates in hooked ends which slideably engage short horizontal slots 97 formed in the inside medial border of plates 88.

In the fully inserted condition of baffles 80 their bottom edges are coplanar with the flanges 60a and their tops are below the bottom level of openings 63, and the cam shoulders 92 rest on the bottom edges of slots 67, with latch plates 80 being outwardly extending to project through slots 67. By pulling downwardly on a baffle 80 the bottom edges of slots 67 bear on cams 92 to urge the plates 88 inwardly beyond the outer edges of cams 92 and permit the lowering of the baffle until shoulders 72 about the bottom edges of slots 67. To remove baffle 80 fully, the plates are finger pushed completely inwardly until the fingers 90 are retracted from slots 67 to free the baffle for complete separation.

A longitudinally extending bus or conductor housing conduit 100 of the general construction of that described in copending application Ser. No. 134,341, filed Apr. 15, 1971 extends longitudinally and is supported in and locked to seats 20 in cross-pieces 14. Conduit 100 includes a polarized channel member 101 with a bottom cross web 102 having outwardly projecting coplanar inner and outer side flanges 103 terminating in rounded and vertically lipped opposite borders and upwardly directed side walls 104. Longitudinally extending channels 106 are formed along the tops of side walls 106, and have integrally formed outwardly directed flanges 107. Except where access to the busses in conduit 100 is desired, the open top of the conduit is closed by cover panels 108 having depending side lips engaging opposite channels 106. In mounting conduit 100 in seats 20 the conduit curved outer flange 103 is inserted in the corresponding notched portion of seats 20 and the conduit is then turned clockwise, as viewed in FIG. 4, to press the edge of inner flange 103 onto spring arm 27 to effect the retraction of spring arm 27 until the underface of conduit 100 rests on the bases of seats 20 and the retracted spring arm 28 returns to overlie the inner flange 103 and lock the conduit 100 in a properly oriented position. As described in the above identified patent application, a pair of longitudinally extending conductor busses 110 provided with longitudinally extending resilient confronting contact arms are nested and locked in side-by-side joined insulator channels secured in the base of conduit 100. A junction box 111 of suitable construction is mounted in conduit 100 and contains connections between the busses 110 and conductors extending from the junction

box 111 through suitable conduit 112 to the electric power lines.

A fixture of ballast box 113 for housing ballasts and supporting lamp sockets is mounted on conduit 100 and coupled to conductors 110. Box 113 includes a housing 114 having integrally formed top and bottom rectangular walls 116 and 117 and a rear wall 117a, the ends of the housing being closed by end walls 118. A socket mounting plate 119 defines the front wall of housing 114 and suitably engages the front edges of walls 116, 117 and 118 and is provided at its top with a forwardly directed horizontal flange 120 terminating in an upwardly offset horizontal lip 121 and at its bottom with a forwardly directed flange 122 narrower than flange 120 and terminating in a depending rearwardly inclined skirt 123. Depending from flange 120 is a medially located positioning pin 126 having a tapered tip and matching the aperture 45 in positioning ear 64. Mounted on plate 119 are two symmetrically positioned pairs of longitudinally spaced forwardly directed lamp sockets 125 corresponding in location to apertures 63.

Affixed to and depending from housing bottom wall 117 is an electrical plug 127 of a diameter slightly less than the space between the conduit upper walls 104, and having depending prongs 128 which are engaged between respective bus fingers of conductors 110 when box 113 is mounted on conduit 100. One or more ballasts 129 are positioned in housing 114, and ballasts 129, lamp sockets 125 and socket prongs 128 are connected in the usual electrical manner.

Mounted on each end wall 118 is a member 130 for releasably interlocking box 113 and conduit 100, locking member 130 being formed of a resilient material and including a cross arm 132 secured to a corresponding box end wall 118. Integrally formed with and projecting forwardly of housing front wall 119 is a resilient guide arm 133 having front and rear sections converging inwardly to a vertical track-defining elbow. Also, integrally formed with cross arm 132 and depending therefrom along the outside face of end wall 118 is a symmetrically shaped pair of latch arms 134 including transversely spaced vertical resilient narrow upper sections 136 terminating at their bottoms in enlarged heads 137. Horizontal slots 138 are formed in heads 137 and are slideably engaged by guide pins secured to the lower border of end wall 118.

The bottom of heads 137 are in the form of hook sections 139 having confronting horizontal slots 140 provided with parallel top and bottom edges. The lower legs 141 of hook sections 139 are shorter than the upper edges of slots 140 and have inwardly upwardly inclined cam-defining bottom edges 142. When latch arms 134 are in their relaxed conditions the distance between the outer ends of slots 140 is somewhat less than that between the outer edges of conduit lips 107. The upper confronting edges of arms 134 are parallel and their lower confronting edges converge downwardly. A spreading pin 143 has a shank vertically slideably disposed between the confronting edges of arms 134 and has a head entrapped between wall 118 and arms 134, the lowering of pin 143 separating the inner ends of hook legs 142 a distance greater than that between the outer edges of conduit lips 107. In the mounted assembled condition of installation 10 latch hooks 139 engage conduit lips 107, guide arms 133 en-

gage upright locking arms 44 and positioning pin 126 engages the aperture 55 in positioning ear 64.

The improved lighting fixture may be rapidly and easily erected and installed without the use of fasteners and fastening tools, and may be similarly partially or fully disassembled for servicing, maintenance purposes or for the replacement of components. Beams 11 are installed in the known manner and a pair of cross pieces 14 are snapped in position at the desired locations on beams 11, being secured thereon by spring arms 22 and 24. A conduit 100 is then mounted on cross pieces 14 being locked in seats 20 by spring arms 27, the conduits 100 being properly oriented by reason of the polarization of seats 20 and of opposite conduit flanges 103 and the busses being connected to the current through junction box 111. Frame 30 is then mounted on a pair of beams 11 medially between a pair of cross-pieces 14 by inserting the frame 30 to engage a beam flange 12 between a frame leg flange 39 and locking legs 48 with arms 44 in their horizontal positions and then swinging the frame leg 32a upwardly so that the cam edges 43 of spring elements 42 bear on the corresponding beam flange 12 to urge spring elements 42 inwardly to clear flange 12. When frame leg 32a abuts the underface of beam flange 12, spring elements 42 are released to swing outwardly and engage the top face of flange 12 and then the arms 44 are swung to their vertical positions to lock frame leg 32a to the opposite beam flange 12.

Box 113 is then plugged into and mounted on conduit 100 in proper relationship to frame 30 by pressing it downwardly as guided by upright arms 44 slideably engaging the elbows of respective guide arms 133. Flanges 107 spread latching hooks 139 and when the base of box 113 rests atop conduit 100 and plug prongs 128 engage fingers of busses 110, the hook arms 141 are released to effect the contraction of latch arms 134 thereby to lock box 113 in position. Thereafter, reflector assembly 50, with or without the baffles, is raised into registry with the mounted frame 30 and latching arms 68 retracted by pressing on fingers pieces 73. When the reflector assembly is properly positioned, as assured by the registration of positioning pin 126 with positioning aperture 45, and is at the desired level, as illustrated in FIG. 3, finger pieces 73 are released and latch arms 68 are spring advanced to project fingers 76 through openings 55 so that respective shoulders 79 of fingers 76 bear on beam flanges 12 or the bases of apertures 55 or both. It should be noted that openings 63 are positioned so as to be aligned with lamp sockets 125 when the reflector assembly is in its locked position as effected by latch arms 68. With baffles 80 removed or lowered, as previously described, the U-shaped fluorescent lamps 51 are plugged into sockets 125, as shown in FIG. 2, and are raised to horizontal positions to bring their cross arm sections into engagement with corresponding curved spring brackets 35 mounted on the upper portion 57 of end wall 54, and baffles 80 are then raised to their upper locked positions. The ceiling tiles T are supported in the known manner either by resting on flanges 12 of beams 11, as shown in FIG. 5, or by having slots formed in the sides thereof which slots engage flanges 12, as shown in FIG. 4. The various components of the assembly 10 may be easily removed for maintenance or service in a manner opposite to that described above in the assembly and installation of the unit. It should be noted that an air

conditioning conduit system may be provided having outlet units 144 straddling the lighting fixture unit and having outlet openings registering with the frame vent slots 36. Moreover, as shown in FIGS. 4 and 5, the reflector assembly may be mounted directly on the beam webs 12 at different levels with opposite beam webs being engaged by either finger shoulders 78 or 79 for upper or lower positions respectively.

It should be noted that while cross-pieces 14 may be separated a distance only a little greater than the length of a frame 30, as seen in FIG. 8, they may be more widely separated; for example, successive cross-pieces 14 may be separated by six tile lengths and they may be arranged in transversely spaced rows, as illustrated in FIG. 10. Thus, cross-pieces 14 interdigitate successive lighting fixtures which are regularly arranged in longitudinal rows and support respective conduits 100 on which boxes 113 are mounted as earlier set forth.

As illustrated in FIGS. 11 and 12, by the use of a modified form of cross-piece 146, the number of cross-pieces required may be cut by half where the lighting fixtures are regularly arranged in transversely and longitudinally spaced rows and columns. Cross-piece 146 differs in construction from cross-piece 14 in that it is longer, and that beam-engaging notches, conduit supporting seats, and beam and conduit locking springs are provided at both ends of each cross-piece 146. Specifically, each cross-piece 146 has formed in the top thereof, proximate each end, a seat 147 corresponding but of opposite orientation to seat 20 and has formed in the ends of the side webs thereof beam engaging notches 148 corresponding to notches 18. Mounted proximate each end of cross-piece 146 is a spring member which includes an upper upwardly directed section 149 proximate the outer end of each seat 147 and a lower depending section 150a registering with notch 148 and corresponding in shape to the respective upper and lower sections of spring member 22. In other respects cross-pieces 14 and 146 are similar.

In employing cross-pieces 146, they are mounted on and extend between a pair of successive beams 11 along the confronting sides of successive rows of lighting fixtures 9, and a pair of transversely spaced longitudinal conduits 100 rest and are locked in longitudinal aligned groups of seats 147, and boxes 113 are mounted on the conduits 100 in association with each lighting fixture.

The improved lighting fixture 9 and box 113 may be employed without the use of conduit 100 by connecting the electrical components of box 113 to the current source by way of conventional flexible conduit or other flexible cable, and by otherwise mounting box 113 in proper relationship to the lighting fixture 9. An example of such an arrangement 150 which may be employed to advantage is illustrated in FIG. 8A.

Specifically, arrangement 150 includes a reflector and baffle assembly 151, a frame 152 and suspended beams 153 corresponding and similar in structure and relationship to the reflector and baffle assembly 50, frame 30, and beams 11 of the first described embodiment. There is also provided a fixture box 154 corresponding to the earlier described box 113 and differing therefrom only in that box 154 does not have a depending coupling plug 127 but instead is provided with a coupling collar 156 which engages a flexible metal sheath 157 enclosing conductors which connect the electrical components of box 154 to the power lines.

In order to support box 154 suitably and in proper relationship to the end wall of reflector assembly 151, there is provided a box mounting bracket 158. Bracket 158 includes a longitudinally extending horizontal crossarm 159 of a length approximately that between the transverse legs 160 of frame 152 and of a width equal to the distance between the outside edges of conduit lips 107. Suitably secured to the opposite end of cross arm 159 are a pair of parallel, similar, downwardly inwardly inclined side arms 160 terminating in end sections 161 having horizontal bottom edges 162 and vertical medial slots 163 extending upwardly from edges 162. Depending from the secured to the inside face of the outer end of each arm 160 is a leaf spring element 164 including a vertical resilient panel 165 terminating at its bottom in angular outwardly bent fingers 166.

In installing the lighting fixture of arrangement 150, the bracket 158 is mounted on frame 152 by bringing slots 163 into engagement with the upper vertical web 167 of the frame arm carrying the depressed locking arms 168 with the outer faces of the forward ends of bracket arms 160 and the spring fingers 166 bearing on the inner faces of frame legs 160. The bracket carrying frame is then inserted between and locked to a pair of beams 153 and the box 154 is positioned on bracket arm 159 as guided by frame locking arms 168 in the manner earlier described, and is locked to the bracket plate 159 by spring latching members 169 on the end walls of box 154. The reflector assembly 151 is then inserted, positioned and releasably locked in place, as in the case of assembly 50.

The embodiment illustrated in FIG. 2A of the drawing differs from that last described only in that the ballast and socket box 170 is mounted directly on end wall 171 of reflector assembly 172, which, in turn, may be directly supported by and between a pair of successive beams 178 and the frame member is omitted. Box 170, similar in construction to box 154 but not requiring latching arms 169, includes a front wall from the lower edge of which there forwardly projects a flange 174 terminating in a depending flange 175 abutting the outside face of and secured to wall 171 by screws 176. As in the earlier forms, box 170 and reflector wall 171 are provided with mating positioning pin and apertured ear, which may be obviated. In all other respects the present embodiment is similar to those earlier described, it being noted that latching arms 177 associated with reflector assembly 172 engage the horizontal webs of beams 178 without passing through any associated frame member.

The embodiment of the present invention illustrated in FIGS. 13 and 14 of the drawings differ from that first described primarily in that the lighting fixture is of a different type and that the configuration of the ballast and socket box is accordingly modified. The present installation, like that shown in FIGS. 1 to 9, includes transversely spaced longitudinal beams 180, cross-pieces 181 and a frame 182, somewhat similar in construction and relationship to beams 11, cross-pieces 14 and frame 30, and a bus carrying conduit 183 similar in construction to conduit 100 is mounted in seats on cross-pieces 181 as described earlier.

A lamp housing fixture 184 comprises an open bottom shell 186 including a rectangular top wall 187 and depending diverging end and side walls 188 and 189, terminating in a peripheral flange 190. The shell 186 is

supported by and projects above frame 182 and is releasably locked thereto by a pair of vertical leaf spring elements 191 medially located on opposite end walls 188 and carrying at their bottom ends latching tongues which releasably engage correspondingly positioned apertures in the frame 182 and end walls 188. A light transmitting panel 192 registers with the bottom of shell 186 and is provided with a raised peripheral shoulder abutting the underface of flange 190 and an upright lip 193 along the inner periphery of the shoulder. Panel 192 is releasably secured to shell 186 by means of opposite pairs of vertical resilient bands 194 having inwardly bulged medial sections 195 located along the inside faces of end walls 188 proximate side walls 189. The bands 194 are slideably supported by corresponding pairs of vertically spaced straps 196 formed on walls 188 and normally engaging bands 194 above and below bulges 195 and which straps have apertures at their lower ends to engage pins 197 along the outside face of panel lip 193.

A ballast and socket box 198 similar in function to box 154 includes a bottom wall 199 from which depends a plug 200 which includes prongs releasably engaging the bus fingers in conduit 183. The front wall 201 of box 198 carries two pairs of fluorescent lamp sockets 202 and the box top wall 203 projects forwardly of front wall 201 and overlies the adjacent border of shell top wall 187. Socket members 202 project through corresponding openings 204 formed in the adjacent shell end wall 188 and are engaged by a pair of U-shaped fluorescent lamps 206, the outer ends of which are releasably engaged by spring brackets 207 mounted on the corresponding opposite end wall 188.

The assembly, disassembly and application of fixture 184 is similar to that first described, and an air conditioning outlet 208 may be associated therewith in the manner of outlet 144.

While there have been described and illustrated preferred embodiments of the present invention, it is apparent that numerous alterations, omissions and additions may be made without departing from the spirit thereof.

I claim:

1. A recessed lighting structure comprising a plurality of transversely-spaced, parallel, longitudinally extending overhead beams, an elongated electrical conduit mounted on said support structure and containing first electrical coupling means positioned along the length of said conduit, a component housing box mounted proximate said conduit, a second electrical coupling means positioned externally of said box and releasably engaging said first electrical coupling, a lamp socket located on the exterior of said box, means connecting said lamp socket to said electrical coupling, a lamp housing mounted on and projecting above said support structure proximate said box and having access to said lamp socket, and ceiling panels supported by said beams.

2. The lighting structure of claim 1 including a pair of horizontally-spaced lamp sockets mounted on a wall of said box and a U-shaped fluorescent lamp located in said lamp housing and releasably engaging said lamp sockets.

3. The lighting structure of claim 1, wherein said box is mounted on said conduit.

4. The lighting structure of claim 3, wherein said first electrical coupling means comprises a pair of longitudi-

nally extending conductors extending along the length of said conduit, each of said conductors includes a longitudinally extending pair of fingers resiliently urged toward other, and said second electrical coupling means comprises a plug member having a pair of contact prongs engaging corresponding pairs of said contact fingers.

5. The lighting structure of claim 4, comprising a cross-piece extending across and releasably connected to a pair of adjacent beams, said conduit being mounted on said cross-piece.

6. The lighting structure of claim 1, including a frame member extending between and supported by a pair of adjacent beams proximate said box said lamp housing being separably registering with and releasably engaging said frame member.

7. The lighting structure of claim 6, including locating elements on said box and on said frame member for positioning said box relative to said frame member.

8. The lighting fixture of claim 6, including locating elements on said box and said housing for positioning said housing relative to said box.

9. The lighting fixture of claim 6, wherein said lamp housing comprises an open bottom reflector shell having an end wall provided with an opening registering with said lamp socket.

10. The lighting fixture of claim 4, wherein said lamp housing includes an end wall spaced from and confronting said box, and comprises top and bottom panels extending from said box into engagement with said end wall.

11. A recessed lighting structure comprising a plurality of transversely-spaced longitudinally extending overhead beams, a plurality of spaced lamp housings registering with and projecting above said beams and first means releasably locking each of said lamp housings to said beams and wherein said first means include a latch arm having an outwardly directed finger swingably depending from each of said housings and means to urge said finger to a lock position relative to said beams.

12. The structure of claim 11, wherein each of said lamp housings comprises a pair of side-by-side open bottom curved reflector members having downwardly converging inner side walls delineating a space there between, opposite outer side walls and opposite end walls, said end walls having vertical medial slots proximate the bottom edges thereof, said latching arm is vertically extended and medially swingably mounted on each of said end walls and disposed in said space between said reflector inner walls and said outwardly directed finger registers with said slot, and including spring means urging said latching arm to an advanced lock position with said finger projecting through a respective slot into said lock position relative to said beams.

13. The structure of claim 12, wherein an opening is formed between said inner reflector walls proximate each end thereof, and each of said latch arms includes a depending finger piece projecting through a respective opening.

14. The structure of claim 11, wherein said lamp housing comprises a longitudinally-extending open bottom curved reflector member, a vertically movable transverse generally V-shaped baffle registering with said reflector between the ends thereof, and latch plate means between the legs of the baffle releasably retain-

13

ing said baffle in a raised position in said reflector member.

15. The structure of claim 14, wherein said reflector member has formed therein opposite vertical slots extending from points above the bottom edges of said reflector member, said baffle comprises a pair of upwardly diverging panels joined at the bottoms thereof, and said retaining means comprises a pair of opposite laterally movable latching plates positioned between said panels and having outer edges registering with said vertical slots and having upwardly outwardly inclined downwardly directed cam edges in the lower portions thereof engaging the lower edges of said slots when said baffle is in its raised position.

16. The structure of claim 15, including fingers projecting outwardly from the upper corners of said plates into sliding engagement with said vertical slots.

17. The structure of claim 11, comprising a plurality of rectangular frame member extending between corresponding pairs of said beams and second means for releasably locking said frame member to said respective beams, said first means releasably locking each of said lamp housings to respective frame member.

18. The structure of claim 17, wherein said lamp

14

housing includes an end wall having an opening formed therein and comprises an electrical component-containing box positioned proximate said end wall, a lamp socket mounted on an outer face of said box and registering with said housing end wall opening, and means for connecting said box to a source of current.

19. The structure of claim 18, wherein said box is mounted on said housing end wall.

20. The structure of claim 18, including a bracket separably mounted on said frame member proximate said housing end wall, said box being releasably mounted on said bracket.

21. The structure of claim 18, including locating elements on said box and said housing for positioning said housing relative to said box.

22. The structure of claim 18, including locating elements on said box and on said frame member for positioning said box relative to said frame member.

23. The structure of claim 22, wherein said second means includes an arm mounted on said frame and movable to an upright position locking said housing to said frame, said arm defining one of said locating elements.

* * * * *

25

30

35

40

45

50

55

60

65