

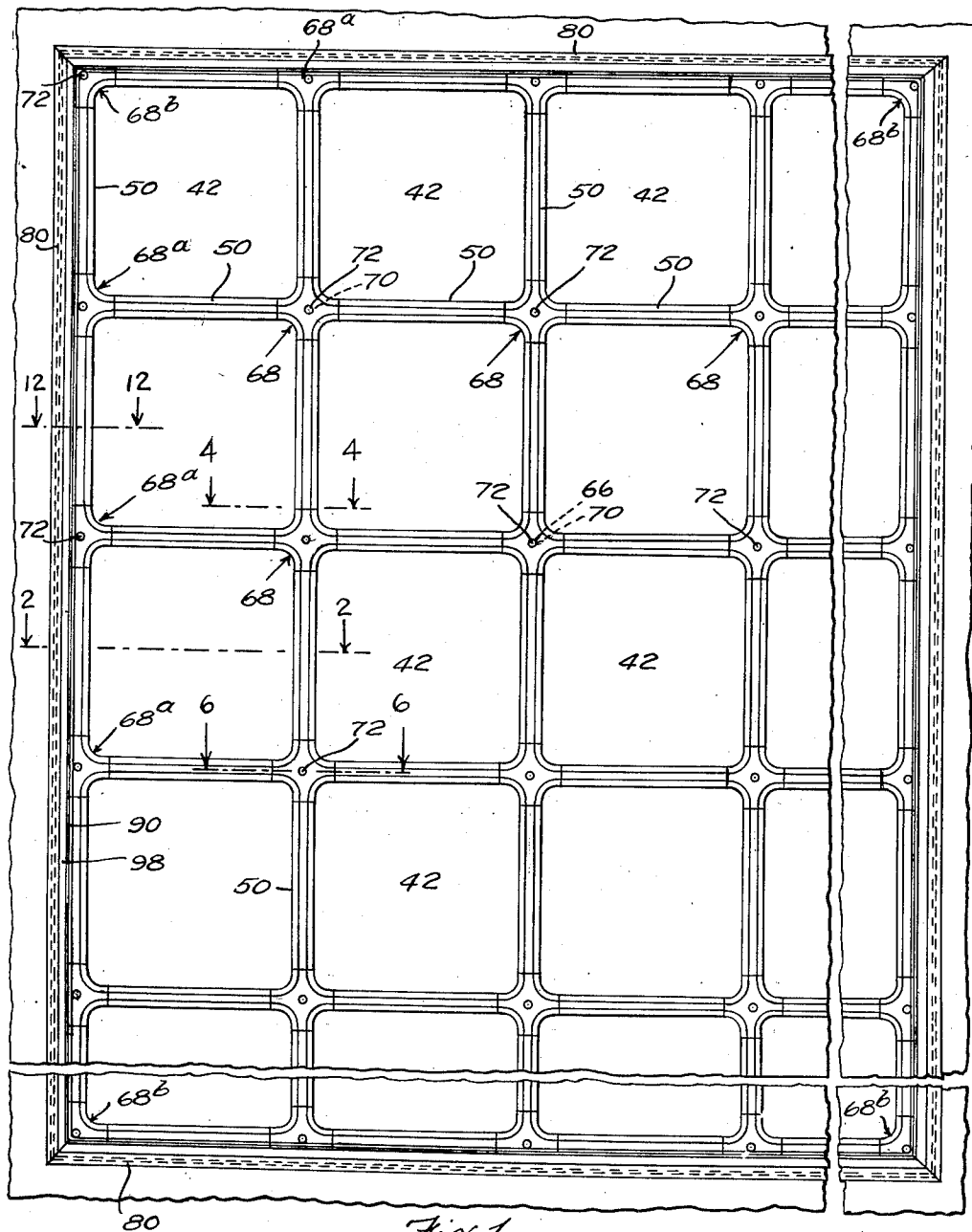
April 6, 1954

L. S. HARRISON
CEILING ILLUMINATION

2,674,686

Filed April 4, 1950

8 Sheets-Sheet 1



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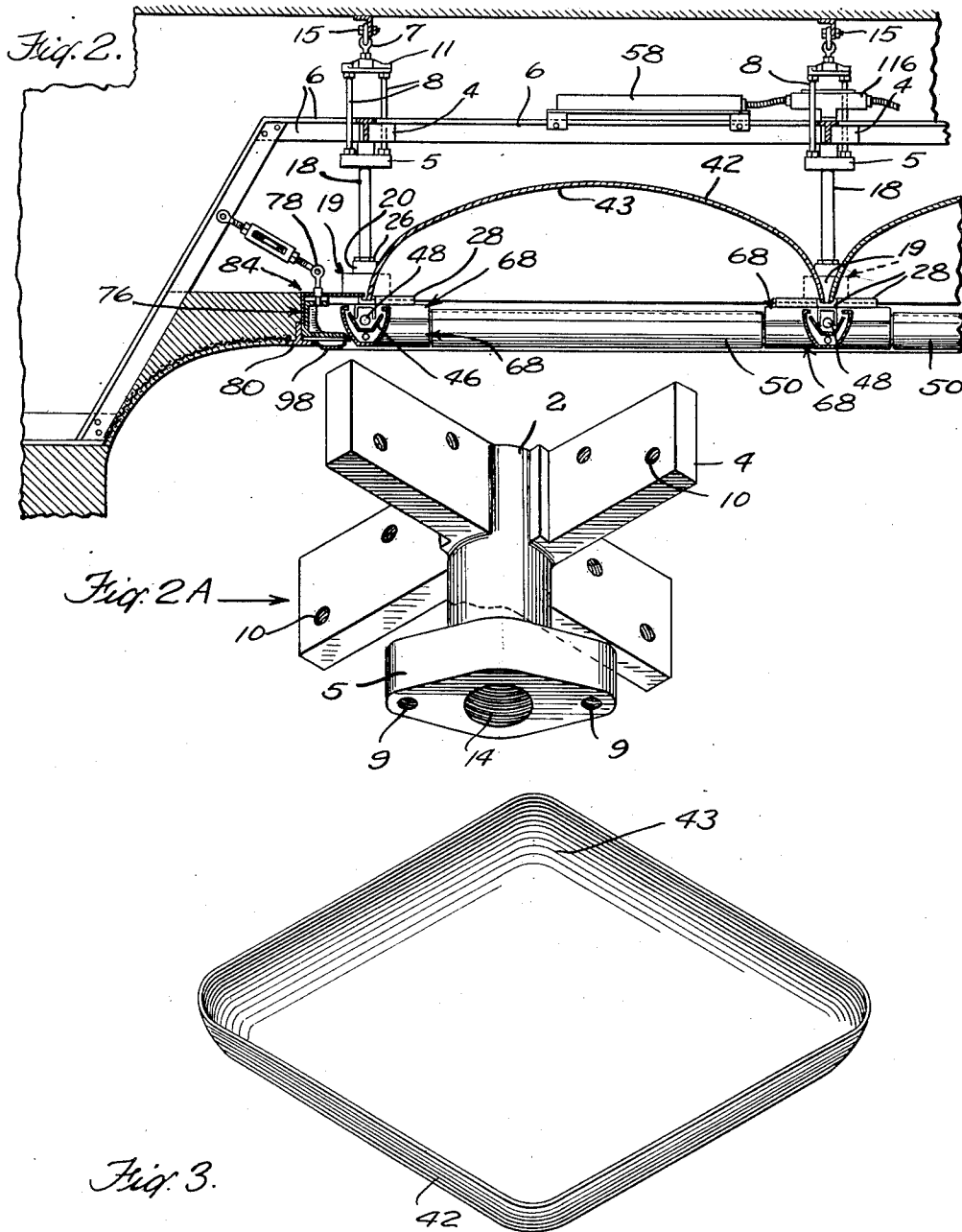
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8 Sheets-Sheet 2



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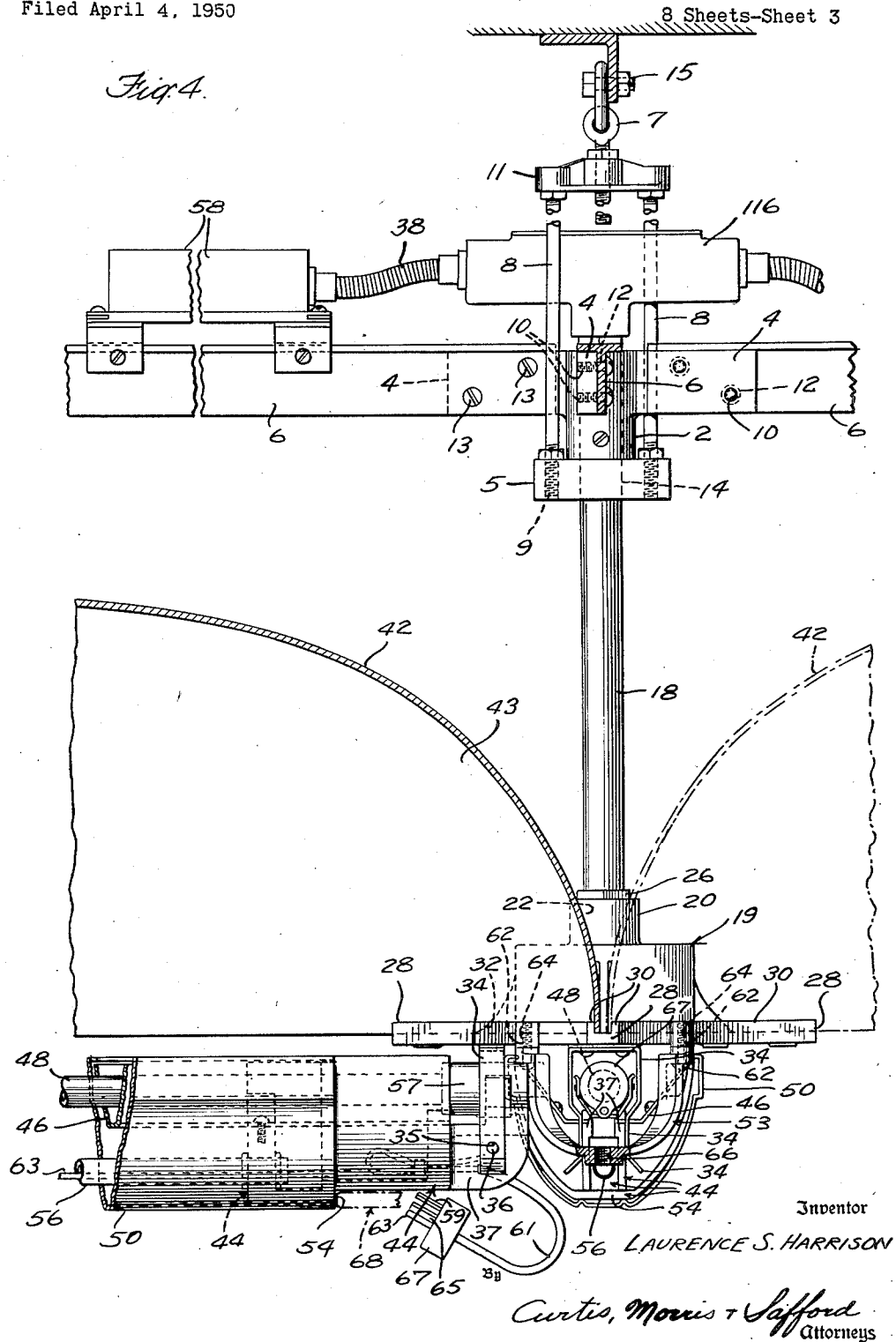
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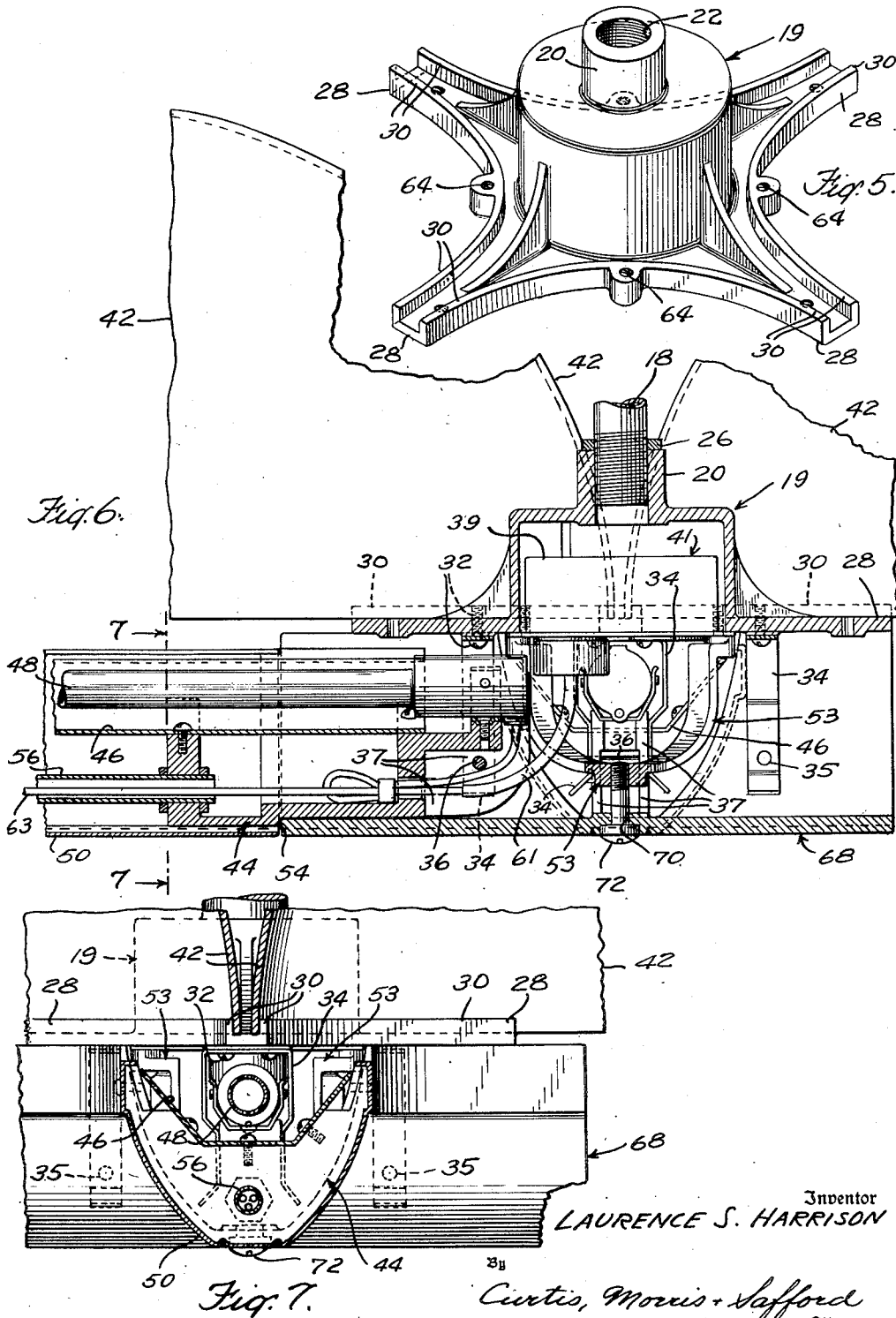
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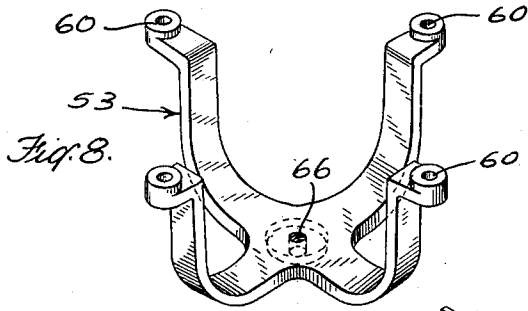
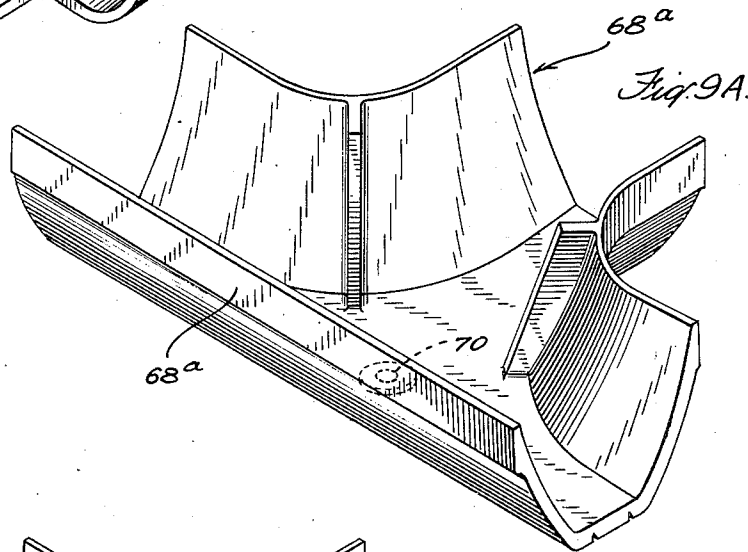
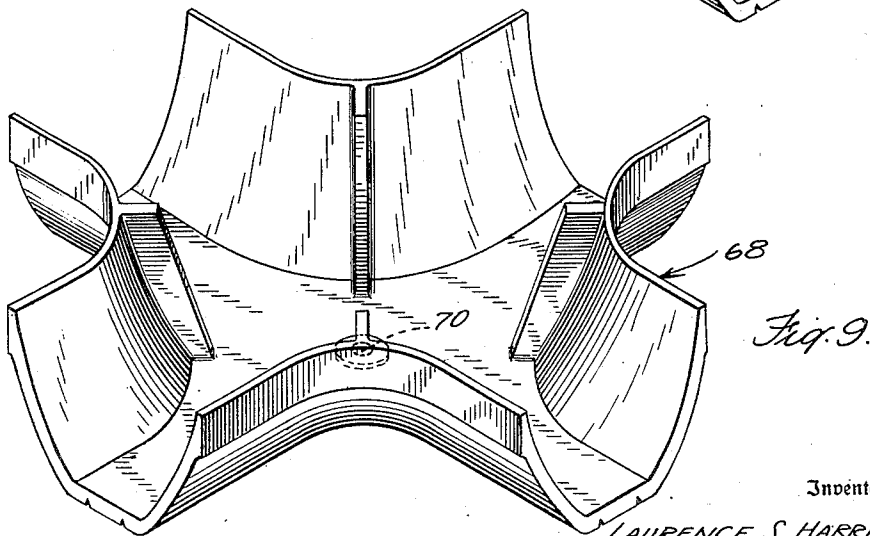
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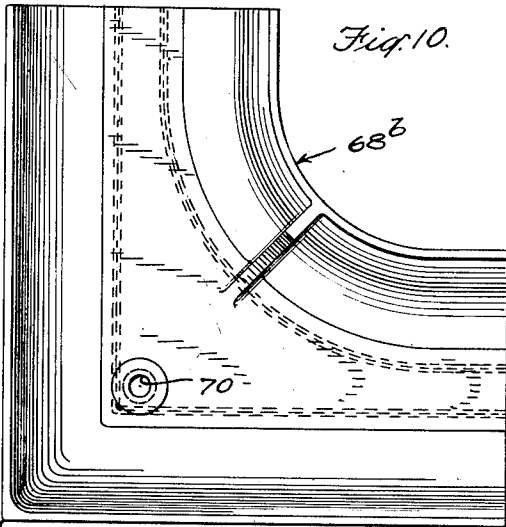
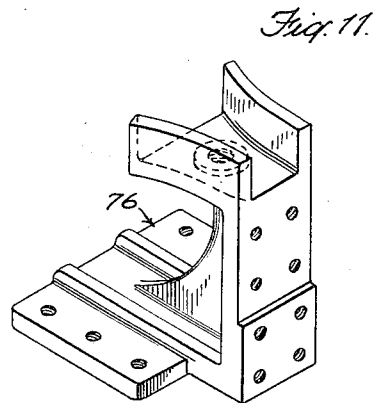
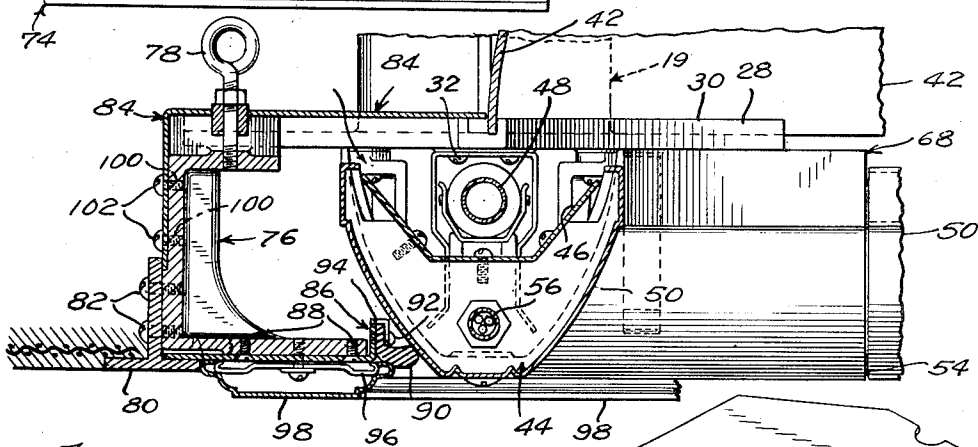
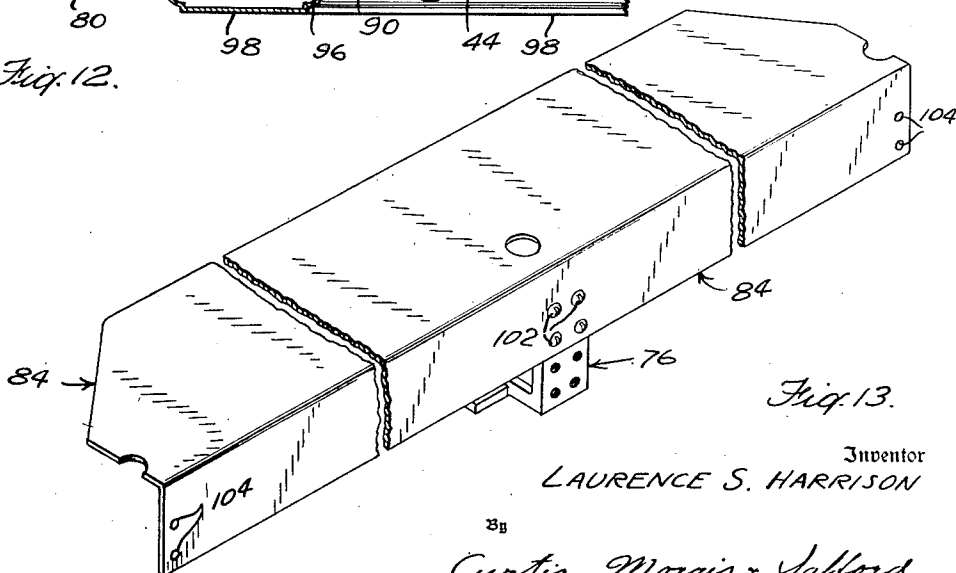
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8 Sheets-Sheet 7

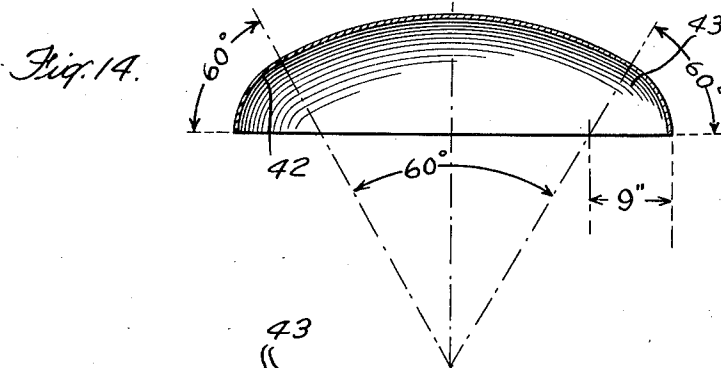
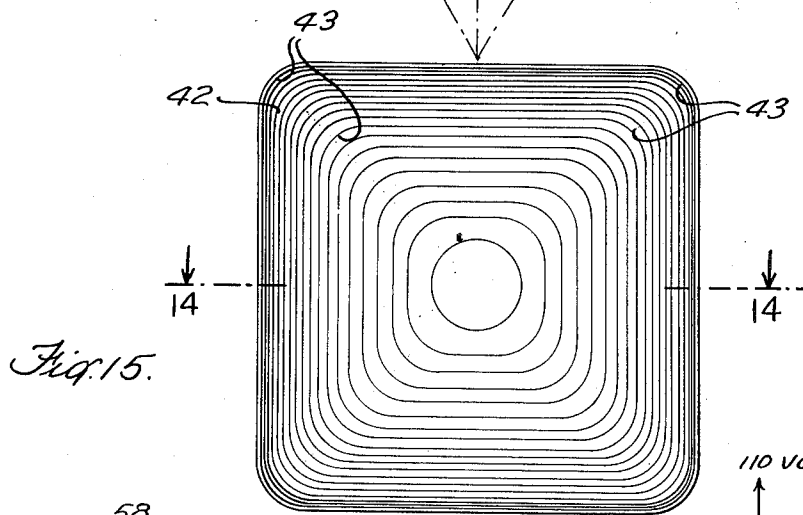
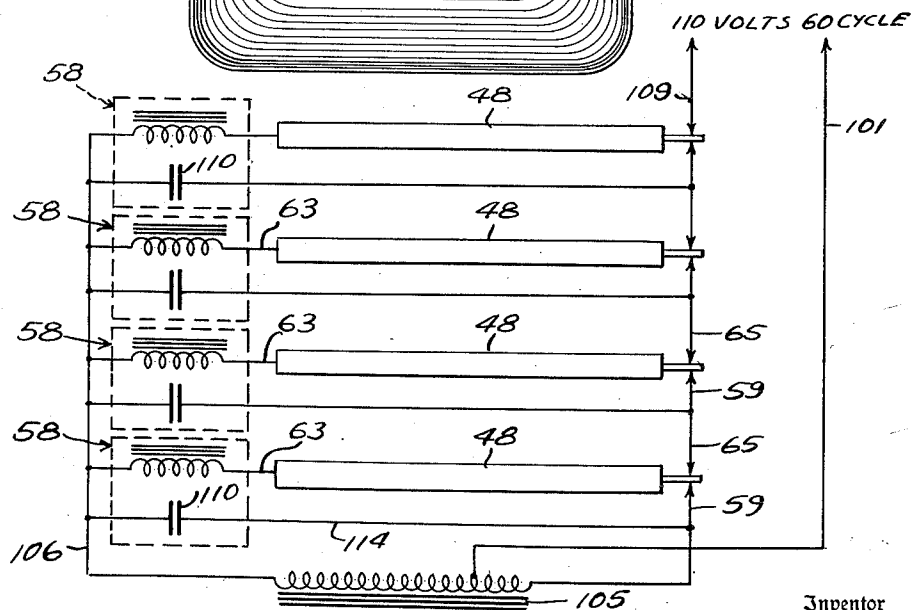


Fig. 17

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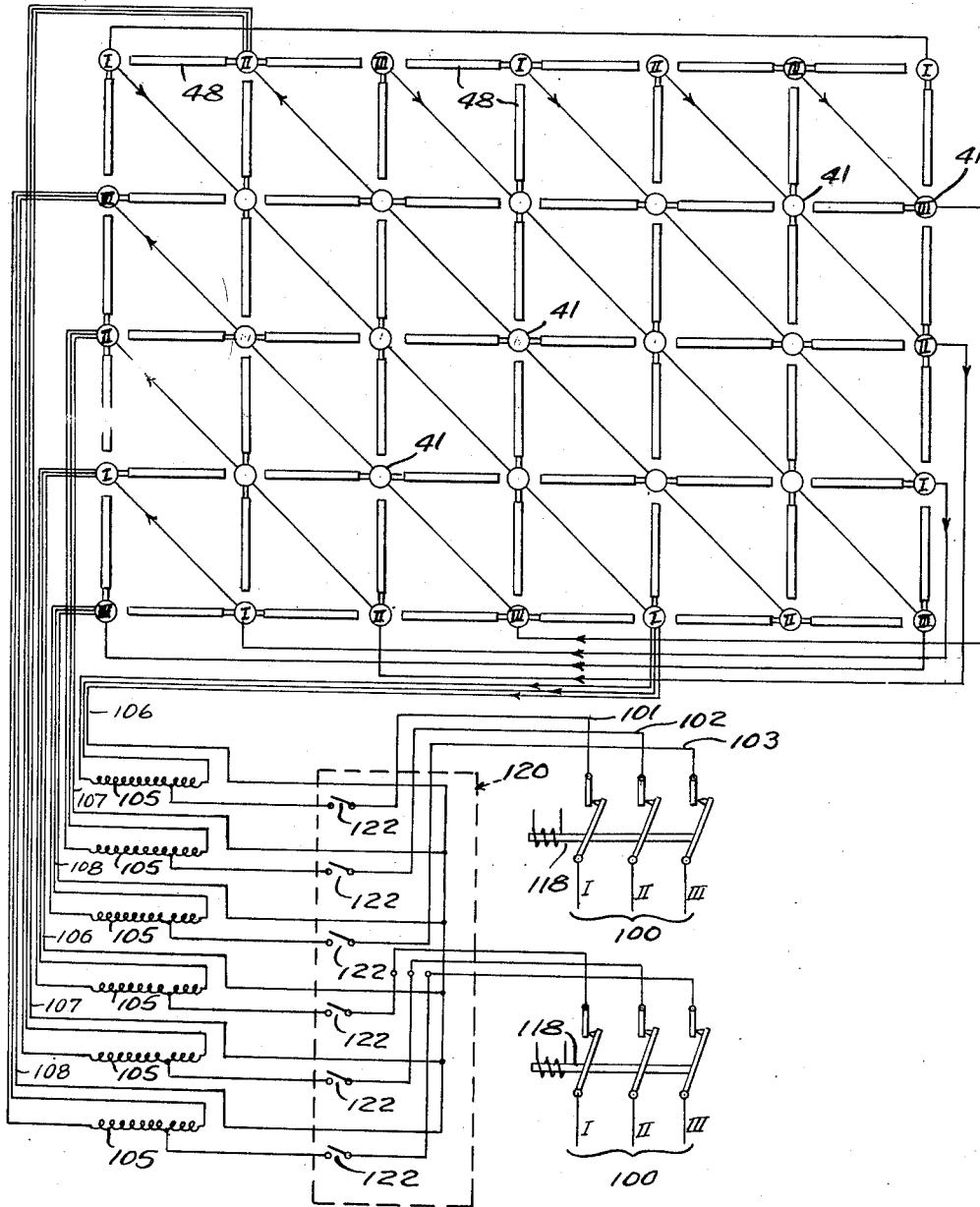


Fig. 16.

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UNITED STATES PATENT OFFICE

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CEILING ILLUMINATION

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Application April 4, 1950, Serial No. 153,950

15 Claims. (Cl. 240—9)

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This invention relates to the indirect illumination of rooms, and to lighting devices including lamps and associated reflectors on and in the ceiling of a room for providing diffuse illumination throughout the room.

In most schemes for effecting indirect illumination of a room the light sources give visible areas of relatively high level of illumination, often at relatively widely spaced points, and with considerable variation in the intensity of the illumination in different parts of the room. The present invention aims so as to distribute the light sources over the ceiling area and so to effect the reflection of the light from the light sources that there will be a luminescent appearance of substantially uniform light intensity across substantially the entire area of the ceiling and a soft, uniform, diffuse illumination of the entire room.

To this end the invention utilizes coffer-like reflectors in such an arrangement thereof as to form a coffered ceiling in which the coffers serve as reflectors to distribute light to the room below. These coffers, according to the present invention are made as "pans" of standard shape and size, advantageously of sheet metal stampings, light castings, or pulp moldings with approximately polygonal peripheral form, and are supported by an assembly of standard framing units and electrical conduits. Carried by these framing units and connected into the wiring in the electrical conduits are the light sources, for example fluorescent tubes extending along the edges of each coffer. Each lamp is provided with a reflector under the lamp and the edges of the adjacent coffer reflectors so that approximately half of the light from each lamp will be reflected into each of said coffer reflectors (except for the lamps in the perimeter of the coffered ceiling). With such an arrangement of lamps and reflectors it will be seen that if the reflectors be properly designed to reflect both downwardly and laterally the light received therein, substantially uniform illumination may be obtained throughout the area to be illuminated.

More particularly the invention aims to provide a coffered ceiling for indirect room illumination which can be assembled from standard parts in such manner that a ceiling embodying the present invention and of pleasing architectural design can be made to fit almost any existing room and that the installation of such a ceiling can be effected comparatively easily and without substantial disruption of the original ceiling structure.

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An important feature of the invention is the manufacture of the standard parts of which the coffered ceiling of the present invention is composed from inexpensive materials, of light weight and of good light-reflection characteristics.

Another important feature of the invention is the method of developing the reflecting surfaces of the coffers, and particularly the method of developing the radii of the coffer corners so that, ascending along the vertical curvature of the dome of the coffer, they meet tangentially cylindrical side portions between them, which become progressively shorter until the corners merge in a spherical section at the top. By having the corner radii of the same size throughout the spring or arch of the coffer a spherical dome is formed on a substantially square base without appreciable break or juncture of its smooth surface, and thus minimizes or avoids concentration of light in local areas. The design also facilitates the profiling of the necessary forming dies for stamping such coffers from sheet metal and with a profile permitting such forming at a single draft.

Another important feature of the invention is the provision of novel supports both for the coffered reflectors and for the associated lamps and mullion reflectors which serve not only to support the coffered reflectors and the lamps and mullion reflectors in their proper relation to each other but also to permit ready removal of any lamp and mullion reflector for replacement of parts and for servicing, such as cleaning and repair.

Not only do the novel supports for the coffered reflectors and for the associated lamps and mullion reflectors facilitate the ready removal of the parts for replacement, servicing, cleaning and repair, but these supports have their constituent elements so constructed and arranged that they facilitate the ready assembly of the coffered ceiling from below.

The use of coffered ceilings in conjunction with illuminating lamps to assist in distributing the light from the lamps had been known before the present invention. One outstanding example of such use is in the Cranbrook School designed by Saarinen, at Bloomfield Hills, Birmingham, Michigan. Such ceilings, however, have been too expensive for general use. My invention not only gives an improved result, but also brings the cost within the reach of such institutions as museums, libraries and department stores, etc., where illumination although of recognized importance, cannot be designed without regard to cost both of installation and operation.

Other objects, important features and advantages of the invention to which reference has not hereinabove specifically been made will appear hereinafter when the following description and claims are considered in connection with the accompanying drawings, in which—

Figure 1 is a bottom plan view with some parts broken away, of a coffered arrangement of indirect lighting means for a room ceiling embodying the present invention;

Figure 2 is an enlarged fragmentary section on the line 2—2 of Figure 1;

Figure 2a is a perspective view of one of the spider couplings of the grillage;

Figure 3 is a perspective view of one of the coffer reflectors constituting part of the coffered ceiling, this view showing the approximate curvature of the reflecting surfaces of one of these reflectors;

Figure 4 is an enlarged detail section on the line 4—4 of Figure 1 with certain parts removed for clearness, showing the arrangement of the assembled parts and particularly the suspension of the mullion pieces, the support of the coffer reflectors, the connections between the spider supports and the bracket outlets, etc.;

Figure 5 is a perspective view of one of the bracket outlets;

Figure 6 is an enlarged central section on line 6—6 of Figure 1, with certain parts broken away or omitted for greater clarity;

Figure 7 is a section on the line 7—7 of Figure 6;

Figure 8 is a side perspective view of a cap hanger for the cap covering the bracket outlet and the ends of the approximately meeting mullions;

Figure 9 is a perspective view of the ornamental cap covering the bracket outlet and the approximately meeting mullion ends for those parts of the ceiling where four mullions meet;

Figure 9a shows a modification of the cap shown in Figure 9 for use on bracket outlets located along the room walls;

Figure 10 is a plan view of an ornamental corner cap where only two mullions meet;

Figure 11 is a perspective view of a framing bracket;

Figure 12 shows the framing bracket and the parts connected to and supported thereby in section, this section being taken on the line 12—12 of Figure 1;

Figure 13 is a perspective view of a cover plate such as used to cover those parts of the mullions and the space between the mullions and the side walls of the room which at these points are not covered by the coffer reflectors.

Figures 14 and 15 are respectively vertical and horizontal sections through a coffer reflector showing respectively the dome and corner curvatures of the reflector.

Figure 16 is a plan view showing a typical connection plan for bracket outlets and also showing typical system connections.

Figure 17 is a wiring diagram showing typical outlet connections for one pair of lamps.

In the illustrative embodiment of the invention a coffered ceiling, designed for indirect lighting, is shown as made up of standard sections which can be assembled to provide a ceiling for a room of almost any dimensions, preferably with a border around the coffered part of the ceiling adjacent to the side walls. As shown in Figures 1 to 4 of the drawing, the main support for the coffered ceiling, including its lamps, reflectors,

electrical connections, ornamental caps, mullions, etc., comprises a series of spider couplings each having a central hub portion 2 and a series of four equi-angularly spaced arms 4, these arms being sufficiently offset from the radii of the central hub so that the connecting T-bars 6 will coincide substantially with radii from the center of the hub 2.

The hub 2 of each of the grillage spiders extends below the spider arms and is there provided with horizontally extending lugs 5 which are so arranged that suspension rods 8 screwed into the threaded openings 9 in these lugs may pass up between the spider arms 4 on diametrically opposite sides of the hub 2. These suspension rods 8, of which there are two for each spider, are connected to the original ceiling in any suitable manner as, for example, by lagging to the original ceiling angle irons to the downwardly projecting webs of which the rods are connected in any suitable manner, as for example through yokes 11 carried by chain links 7 anchored by bolt 15.

The T-bars 6, which preferably have their tops lying in a substantially horizontal plane and webs depending vertically therefrom, serve to interconnect the spider couplings to provide a supporting framework or grillage having squared openings therein, the sides of which are constituted for the most part by the T-bars.

As shown more particularly in Figures 1 to 4, each of the arms 4 of the spiders is provided with two tapped holes 10 which coincide with openings 12 in each end of each of the T-bars so that machine screws 13 inserted in the openings 12 may be used to secure the T-bars to the arms 4 of the spider couplings. Both the spider couplings and the T-bars are preferably made of aluminum or an alloy thereof, for the sake of lightness.

The center of the hub 2 of the spider coupling is drilled and tapped to provide a threaded opening 14 to receive a standard conduit nipple 18 threaded at both ends. A bracket outlet 19, preferably also of an aluminum alloy, provided with a hub portion 20 having an internally threaded opening 22 therein, is mounted on the lower threaded end of each nipple 18. The nipple 18, as shown more particularly in Figure 4, is provided with a lock nut engaging the hub 20. The bracket outlet 19 is provided with four arms 28, the bracket being shaped to provide curved ridges or lips 30 between successive arms, the curvature of each lip being such that it fits within and serves to hold in position the curved corner edge of the coffer reflector, each reflector requiring four bracket outlets, such as shown in Figure 5, for its support, and each bracket outlet (except those at the periphery) supporting corners of four reflector pans. Each bracket outlet is also provided on its under side at 32 with fastening means, in this case shown as tapped holes to receive screws which support a suspension clip 34 from which one end of a lamp supporting mullion 44 and associated reflector 46 may be suspended.

The suspension clip 34, which may be made of any suitable spring metal such as Phosphor bronze, is shown in its operative position, Figure 4 of the drawings, and comprises two outwardly flared spring arms having openings 35 therein which spring over studs or pins 36 in the sides of an upwardly projecting part 37 of the mullion support 44, more fully described hereinafter.

Between the hub 20 and the arms 28 the bracket outlet 19 forms an outlet box 39 in which the connections from the electrical wires 38 extending through the conduit 18 and outlet box 39 to the

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outlets 41 for the respective lamps may be made. The box 39 is provided on its under side with a standard box cover secured thereto by screws in tapped holes 40 on the outlet bracket. As herein shown the box cover has mounted thereon two 3-wire "twistlock," single unit receptacles 41.

As above suggested, the lamps 48, which are preferably fluorescent tubes, are carried in supports or mullions 44 which include reflectors 46 for reflecting their light upward into the main coffer reflectors 42, these lamp supporting mullions being removably connected to suspension clips 34 attached to the under sides of the bracket outlet 19 and being more fully described hereinafter. As also above suggested, the main coffer reflector 42 is supported upon four bracket outlets 19, with its bottom edge engaged by a lip 30 of each of the four bracket outlets which are spaced at the four corners of squares corresponding to the squares made up by the spider couplings and the T-bars 6.

The reflector 42 has the general contour shown in Figures 4 and 14, and the peripheral form shown in Figures 1 and 15, as described in greater detail hereinafter, and is designed to effect the desired distribution of the light radiated and reflected into it from lamps extending along the four sides of the squares above mentioned.

As shown more particularly in Figures 4 and 7, there is suspended at its ends from suspension clips 34 a mullion piece 44 which carries within its concave upper side a mullion reflector 46 and a lamp 48 which cooperates with the reflector. The mullion piece 44 carries near its ends the aforementioned studs or pins 36 over which the spring arms of the suspension clips 34 snap into supporting relation.

As shown more particularly in Figures 4, 6 and 7, each mullion piece 44 is either shaped on its under side for the greater part of its length to provide the desired design effect on the ceiling or it is provided with a snap-on ornamental cover 50 and it is stepped back at 54 at each end to receive an ornamental cap 68 secured to a cap hanger 53, to cover the under face of the outlet bracket 19 and the mullion ends at the meeting points of the mullions serving four coffers. In the form of the invention shown in Figures 6 and 7, the mullion piece 44 is of sufficient depth to receive, below the mullion reflector, a conduit 56 through which the conductor 63 leading to the socket 57 at the remote end of the associated lamp 48 may be conducted. This space, if desired, may also be used for the lamp ballast although, preferably, this ballast 53 is located in the space between the original room ceiling and the spider coupling and T-bar framework.

From the foregoing description it will be seen that each mullion 44 is supported at each end by a suspension clip 34 engaging studs or pins 36 and that when the ornamental bracket outlet cap, hereinafter to be described, is removed these clips may readily be moved into their open position and the mullion itself removed for replacement of the lamp 48 or cleaning of reflectors 46 or for any other purpose. It will also be seen that the reflector 46, located in each mullion, is so shaped and arranged that one-half of the light falls or is reflected into the main coffer reflector 42 on one side of the mullion and that the other half of the light falls or is reflected into the main coffer reflector 42 on the other side of the mullion, thus insuring even distribution of the indirect lighting.

In order that the mullion 44 and the lamp 48

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carried thereby may be removed bodily from the assembled structure for replacement of the lamp or cleaning of the reflector or for any other purpose, provision is made for quickly and easily effecting a disconnection of the lamp socket from its connections to the main source of current at the outlet box 39. To this end there is provided between the sockets 57 for each fluorescent tube 43 and one of the receptacles 41 on the cover of the outlet box 39 suitable disconnectible connections including a flexible cable 61 having therein conductors 59, 63 and 65 to the sockets 57 at the respective ends of the tube 43 and a three prong plug 67 to be received in a receptacle 41.

To provide for the support of ornamental caps for covering the approximate meeting points of four mullions of different squares and also for covering the bracket outlets 19 and the parts connected thereto, there is attached to each bracket outlet 19 a cap hanger 53 having four arms each provided with a screw-receiving opening 60 into which a screw 52 may be inserted and screwed into tapped openings 64 in the bracket outlet 19 to connect the cap hanger with the bracket outlet. The cap hanger 53 is provided at the meeting of its four arms with a hub having an opening 66 tapped therethrough into which may be screwed a screw for connecting to the hanger 53 the ornamental cap 68 now to be described.

As shown in Figure 9 the ornamental cap 68, for covering the meeting points of four mullions and also for covering the 4-branched bracket outlet, 19, has four arms extending radially a sufficient distance beyond the screw-receiving opening 70 not only to cover the four arms of the bracket outlet 19 but also to cover the stepped-back part 54 of each mullion, the sectional contour of each of these arms being such that at their outer ends they substantially fit the contour of the stepped-back part 54 on their inner faces and that their outer face corresponds substantially to the contour of the main extent of the mullion 44 or of its ornamental cover 50.

A screw 72 inserted through the screw opening 60 and screwed into the opening 66 in the cap hanger 53 secures the cap removably in its covering relation to the meeting mullion ends and to the bracket outlet 19.

Where the bracket outlets 19 are located along the side walls of the room to be illuminated and each supports the rounded corners of only two of the coffer reflectors 42 extending along the side wall, it will be apparent that a cap 68a such as shown in Figure 9a will be required to cover these side wall bracket outlets, this cap having a straight section 73 extending parallel to the side wall.

At the outer corners of the coffered ceiling where only two mullions extend away from the corner at right angles to each other and the bracket outlet supports one corner of a single coffer only, the cap 68b will have the modified construction shown in Figure 10. In other words, it will have only two arms for the two mullions which are supported from only two of the arms of the bracket outlet 19 at this point and the arms of the cap will be shaped to provide a substantially square or slightly rounded corner 74.

To provide a suitable ornamental border for a coffered ceiling of the construction hereinabove set forth and to insure covering of the unused parts of the bracket outlets 19 and of those parts of the mullions which would not otherwise be protected at the sides of the room, the

structural elements shown in Figures 1 and 11 to 13 may be provided. Framing brackets 76 such as shown in Figures 11 to 13, which may be suspended from the supporting framework in any suitable manner as for example by screw eyes 78 adjustably threaded into the tops of said brackets, may be used to provide support for the covering elements and for ornamental mouldings. These brackets, which may be spaced apart distances equal to half the distance between the centers of the bracket outlets 18 are designed to carry a furring T-strip 80, attached to their back faces by screws 82, and a cover plate 84 shaped to fit the space between those arms 28 of the successive bracket outlets 19 along a room wall which extend toward the room wall and which have no mullions connected thereto, the cover being provided with mitered corners at its ends as shown in Figure 13.

Also carried by the bracket 76 is an L-shaped sealing strip carrier 86, the long side of the L of which is attached to the under side of the bracket 76 by countersunk screws 88 as shown in Figure 12 and the short side of which has connected thereto a sealing strip 90 of rubber or other suitable resilient material which directly engages the mullion cover 50 extending along that side of the room. As shown the sealing strip 90 is connected to the short or narrow arm of the L-shaped strip 86 by a screw 92 also holding in position a clamping strip 94.

Also carried by the framing bracket 76 on its under side is a clip 96 over which may be snapped an ornamental molding 98, this moulding preferably having an effective edge at least as thick as the thickness of the crossbar of the furring T.

As hereinabove suggested, an important feature of the invention is the method of developing the reflecting surfaces of the coffers whereby, in a vaulted coffer having cylindrical sides and rounded corners, tangential with the sides, the radius of curvature of the corners is carried into the vault up to an apex or dome section where the cylindrical sides disappear and the corner arcs merge into a circle of like radius of curvature. From an inspection of Figures 3, 14 and 15 it will be seen that the illustrative coffers are substantially square, that is, they have sides of equal length connected by rounded corners and that the radius of curvature of these rounded corners is carried up into the vault or dome of the coffer until the corners merge in the dome section 43 which has the same radius of curvature as the corners. Thus, for example, if the cross dimensions at the rim of the coffer are 45.13 inches in each direction and the corners have a radius of curvature of 4.75 inches in the plane of the rim, the radius of curvature of the corners and of the spherical section 43 taken in any plane parallel to that of the rim will also be 4.75 inches; but the radius of the spherical curvature is of course much longer.

From the foregoing description it will be seen that the present invention provides a coffered ceiling for indirect room illumination that may be quickly installed from below in existing rooms such as art galleries, museums, assembly halls, sales rooms, etc., and easily fitted to the room dimensions. In a commercial installation, for example, for a room approximately 16 feet by 23 feet 3 inches, a coffered ceiling having rows of six coffers in one direction and four coffers in the other direction would need for its installation spider couplings of a 2-arm spread of 7 inches, T-bars 6 of a length each of 43 3/4 inches,

overlapping the spider coupling arms at each end, these parts when assembled providing the supporting frame for the coffered ceiling. Suspended from the hub 2 of each of the spider couplings would be a bracket outlet 19 having four arms 28 which may have a dimension from the end of one arm to the end of the opposite arm of 9 5/8 inches. Suspended from opposed arms of succeeding bracket outlets 19 would be mullions 44 having an overall length, including the ends engaged by the suspension clips 34, of 42 inches. These bracket outlets and the connecting mullions support coffer reflectors 42 which may have transverse dimensions of 45.13 inches.

Figure 16 shows one way of wiring the lamps of the coffered ceiling arrangement to avoid stroboscopic effects from the alternating current. In the wiring diagram illustrated in Figure 16, the circuits are designed for three phase distribution service and the connections to the coffers are interlaced so as to excite successively, from the three phases, at least three lamps in each coffer, thereby diminishing the stroboscopic effect. As shown, the outlet receptacles 41 at the corners of the coffers are preferably so connected to different phase circuits I, II and III that a diagonal row of these outlets 41, which have each been labeled "I," will be excited from circuit I of the three phase circuit, a second diagonal row of these outlets, each labeled "II," will be excited from circuit II of the three phase circuit and a third diagonal row of these outlets, each labeled "III," will be excited from circuit III of the three phase circuit.

There being two receptacles in each bracket outlet, only two lamps are connected to each outlet. By arranging the receptacles in the diagonal circuits above referred to, this makes possible convenient connections of three of the lamps on three sides of each coffer to the different circuits I, II and III of the three phase circuit, as shown. There being only three phases, of course, one lamp in each coffer will be connected to the same phase as one other lamp in such coffer; and in order to balance the electrical load and avoid flicker from the double intensity on one phase, adjoining coffers have the double intensity occur on different phases. This problem, of course, results from the use of square coffers with three phase current. If triangular or hexagonal coffers are used, the light will be balanced between phases within each coffer.

Figures 16 and 17 together give a more detailed circuit diagram. The line current, e. g., three phase 120/208 volt current, is fed in on the four wire line 100 (the ground wire is omitted for clarity in Figure 16). Each wire of the three, 101, 102, 103, is separately connected to an auto transformer 105 by which the 120 volt line voltage is stepped up to that of the lamp, e. g. 500 volts for standard "Slimline" fluorescent hot cathode gas tubes. This voltage is connected to the lamps by lines 106, 107, 108 through ballast reactors 58 including a capacitance 110 connected across both the lamp and the reactor coil to assure minimum wave distortion and high power factor. The opposite electrode of each lamp is grounded to the fourth wire 109 by connections 65, 59 (not shown in the diagram Figure 16). In order that the transformer 105 will not have to operate with less than its full complement of lamps the connections 65, 59 are arranged in series and in open circuit until the lamp is inserted between them. The lamps themselves

thus complete the circuit between 65 and 59 and the removal of any lamp opens the circuit so that the entire bank of lamps will then be inoperative. As shown at Figure 16, there are eight lamps in each such group but for simplicity only four lamps are shown in Figure 17.

Referring to Figures 2 and 4, ballast 58 is connected to the outlet receptacle 41 by the cable 33 which includes a portion of the connection between the ballast 58 and the lamp designated 63 on Figure 17 and the portion of the connection designated 114 on Figure 17 between the capacitance 110 and the outlet 41 where it connects with 59 and a portion of the connection 106 by which the voltage is supplied to the reactor. The conduit 18 shown on Figures 2, 4 and 6 carries the wires 63, 59, while the wires 106, 109, 101 from the auto transformer 105 (see Figure 17) are carried in suitable overhead conduits between the junction boxes 116 in the overhead grillage.

As shown in Figure 16 the lamps may be divided in groups for lighting control. Thus, two three-phase circuits are shown in Figure 16, each controlled by a relay 118. These, as will appear from Figure 16, are connected to alternate diagonal lines of junction boxes and thus opening either of the relays 118 will reduce the illumination of the room by one-half. However, since alternate diagonal lines of junction boxes are connected to the lamps extending in the same direction, this will cut out the lamps on two opposite sides of each coffer pan, leaving the lamps on the other two opposite sides in operation. Since each lamp illuminates substantially the entire surface of the coffer, the result will be the uniformly illuminated ceiling with the intensity cut down but without apparent spottiness on the ceiling.

In the panel 120 shown in Figure 16, individual switches 122 are provided for each of the groups of eight lamps on the same phase. Thus, it is possible to obtain further localized control.

As hereinabove suggested, not only is the novel coffered ceiling construction of the present invention of such a nature that it may readily be assembled and installed from standard parts over existing room ceilings, but it can be as easily partially disassembled for service and repair or replacement of parts.

I claim:

1. A light-distributing ceiling for providing diffuse indirect room illumination, which comprises in combination, inverted pan reflectors arranged in rows along each of transverse directions to form a coffered ceiling and each of substantially polygonal form, supports at intersections of lines intermediate between said rows of pan reflectors and each constructed and arranged to support the adjacent portions of other pan reflectors, lamps located beneath the respective polygon-defining edges of the pan reflectors, reflectors under said lamps throwing their light upward into the reflector pans, and means for suspending said supports from above said ceiling.

2. A light-distributing ceiling as defined in claim 1 which further includes a poly-phase energizing circuit for said lamps and in which the lamps on adjacent sides of the pan reflectors are connected to different phases, whereby to commingle the light reflected from successively energized lamps and thereby minimize flicker effects.

3. A ceiling according to claim 1 in which the corners of the polygonal pans are rounded to provide spaces between otherwise meeting corners for access to the suspending means and the edges of said pans between the rounded corners are ap-

proximately the same length as the lamps therebeneath, and said lamps are tubular lamps.

4. A ceiling according to claim 1 in which each lamp and reflector extends between, and has readily detachable connections at its ends to said supports and each said support has an electrical conduit therethrough terminating in an electrical outlet into which flexible wire connections for the lamp are removably connected.

5. A ceiling according to claim 1 in which the pan reflectors have rounded corners and the supports are provided with ribs engaging the pan reflectors at said rounded corners, and between said rounded corners the edges of adjacent pans meet in a narrow line located centrally above the lamp and its reflector.

6. A ceiling according to claim 1 in which each support carries electrical lamp connections and an ornamental cap covering the ends of the lamp reflectors which extend radially from said support and lie beneath the edges of the polygons grouped about said support and the connections to the lamps.

7. A ceiling according to claim 1 in which a supporting grillage is suspended from the room above said ceiling and comprises a spider coupling for each of said supports, bars connecting the spider couplings, each of said supports having an electrical conduit connected to each spider coupling and electrical outlet box at its lower end.

8. An indirect room-lighting device which comprises, in combination, inverted pan reflectors of generally polygonal form, electrical outlet brackets suspended from above and positioned under the respective corners of said pan reflectors, and mullions extending between and suspended from the outlet brackets beneath the several edges of said reflectors, each mullion having a lamp and a reflector throwing its light into said pan reflectors and shielding the lamp from direct exposure to the room below.

9. An indirect lighting device according to claim 8 in which suspension clips, carried by one part and springable into interlocking relation to the other, removably connect the mullion ends to the outlet brackets.

10. An indirect room-lighting device according to claim 8 in which some of the mullions are adjacent to but slightly spaced from the sides of the room and framing brackets located along the room side walls support cover plates extending to those parts of the mullions adjacent to the sides of the room and the spaces between the said mullions and the sides.

11. A light-distributing ceiling which comprises a plurality of concave light-distributing reflectors, each approximately of polygonal form, a plurality of flickering lamps arranged along the respective bottom edges of each of the reflectors, lamp reflectors under said lamps reflecting their light into the light-distributing reflectors, whereby the light from the several lamps at the base of each light-distributing reflector is mingled before being distributed to the room below, and a polyphase energizing circuit for energizing said lamps, the several lamps at the base of each light-distributing reflector being respectively connected into different phases of said polyphase circuit.

12. A light distributing ceiling for providing diffused indirect room illumination, which comprises, in combination, inverted pan reflectors, each of approximately rectangular edge contour but with rounded corners, arranged in substan-

tially contiguous rows extending in each of transverse directions, supports at intersections of the lines between said rows adapted to support the rounded corners of the pan reflectors there coming into approximate juxtaposition, lamps so connected to said supports that each pan reflector has a lamp extending along and located beneath each edge thereof, reflectors under said lamps throwing their light upward into the reflector pans, and means for suspending said supports from above said ceiling.

13. A light distributing ceiling according to claim 12 in which laterally adjacent pan reflectors have a lamp, common to said adjacent pan reflectors, which is located beneath their adjacent edges and have a common reflector beneath the lamp designed to reflect the light from the lamp in equal proportions to the two reflector pans.

14. A light distributing ceiling according to claim 12 in which the reflecting surface of each pan reflector is of such symmetrical reflector contour in each of its transverse dimensions that, with lamps of uniform character beneath its four edges, the light reflections from said lamps will be of substantially uniform character except for direction.

15. A ceiling according to claim 12 in which the edges of the pans between the rounded corners are approximately the same length as the lamps therebeneath and said lamps are tubular lamps.

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