Nov. 10, 1970 M. BOBRICK 3,539,801

LIGHT FIXTURE

Filed April 3, 1967 2 Sheets-Sheet 1

FIG. 1.

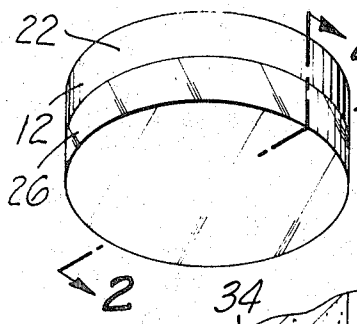


FIG. 2.

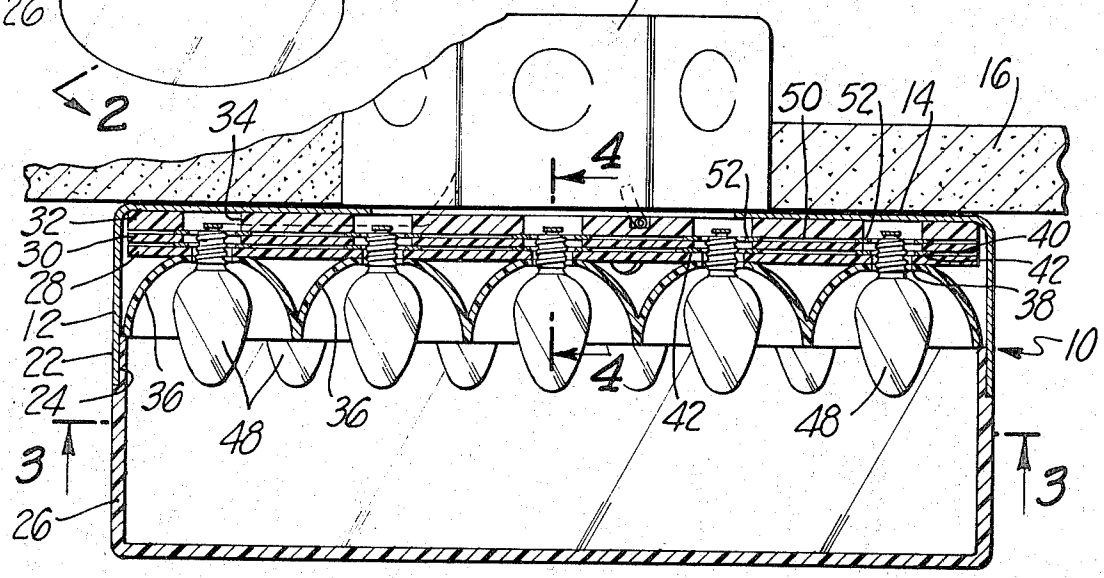
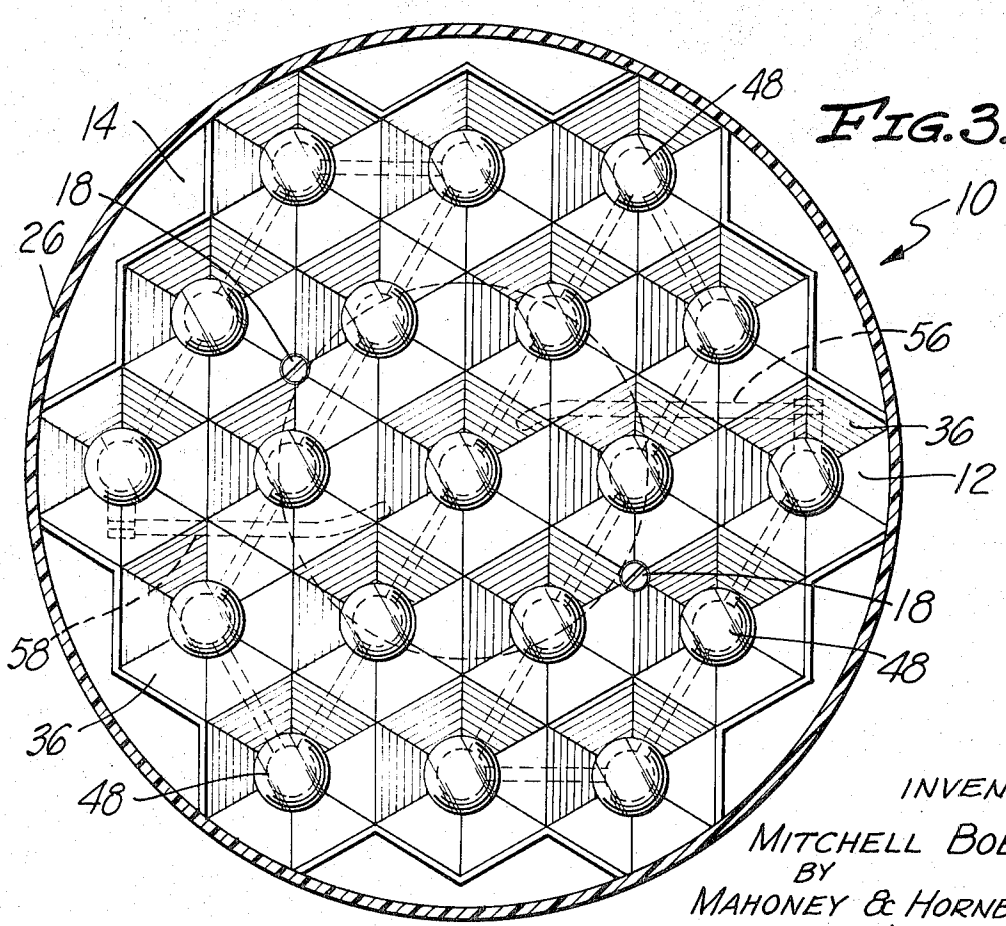


FIG. 3.



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FIG. 4.

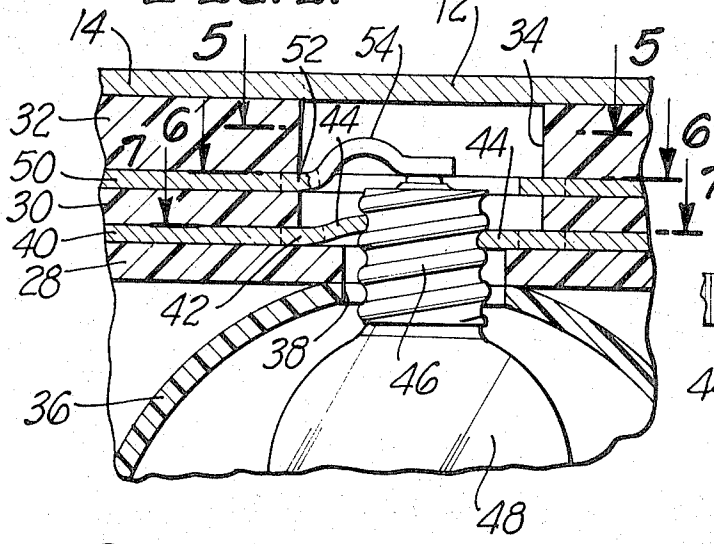


FIG. 5.

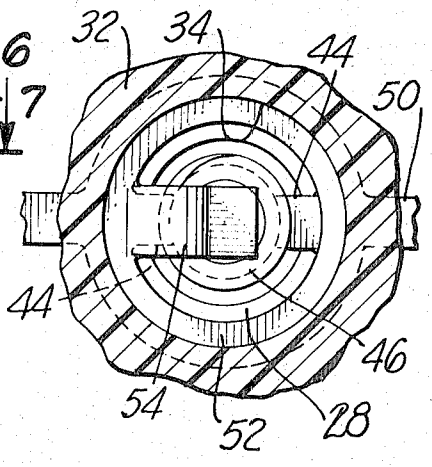


FIG. 6.

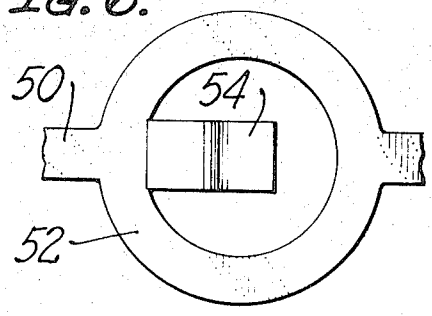


FIG. 7.

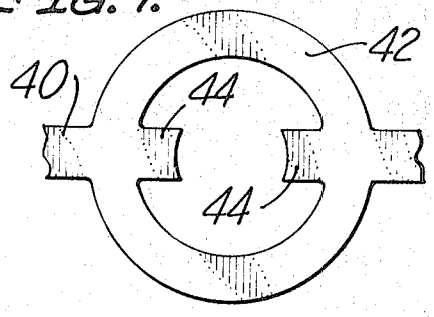


FIG. 8.

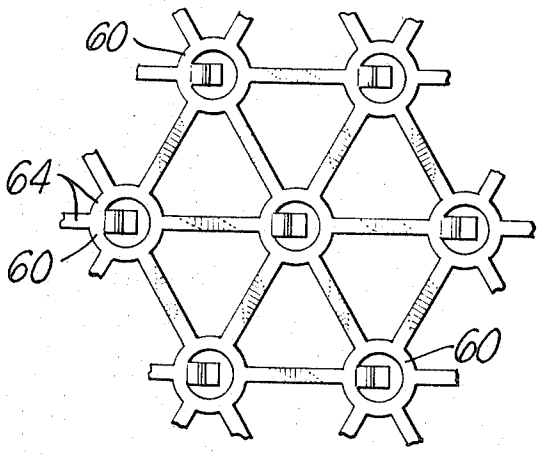
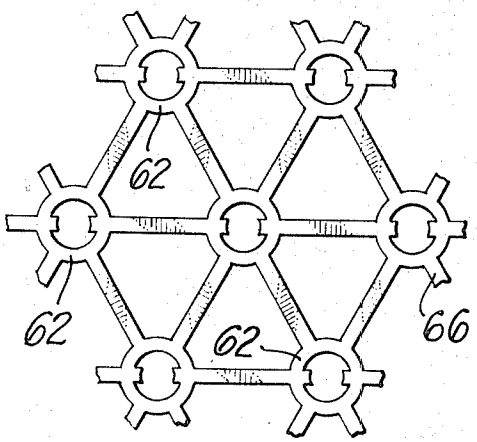


FIG. 9.



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3,539,801

LIGHT FIXTURE

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Int. Cl. F21s 1/06
U.S. Cl. 240—78 7 Claims

ABSTRACT OF THE DISCLOSURE

A ceiling mounted light fixture is formed by a pan having overlying insulating sheets forming a cluster of juxtaposed light socket openings, the sheets mounting an individual reflector aligned with each socket opening and the reflectors may be integral. Each socket opening has electrical contacts extending into interference therewith. A pair of networks of electrical conducting material are mounted between the insulating sheets, each network extending integrally between and electrically connecting the multiple sockets and electrical contacts thereof for supplying electrical power to bulbs in the sockets retained by the contacts.

This invention relates to a light fixture and, more particularly, to a light fixture forming what may be termed a cluster light wherein a plurality of individual light bulbs are operably mounted in a single light fixture housing, said light fixture being particularly adaptable for surface mounting on room ceilings and the like. Even more particularly, this invention relates to a light fixture of the foregoing character incorporating a unique form of electrical distribution means therein and a unique form of multiple bulb receiving sockets therein, all integrated to provide a highly efficient light fixture construction.

Various prior forms of light fixtures have been provided wherein two and sometimes three light bulb receptacles are mounted in a single fixture for the simultaneous lighting of bulbs received in said receptacles upon the transmission of electrical power to said fixtures. Each of the prior fixtures will normally include some form of housing having a single reflector means associated therewith and with the multiple receptacles for the transmission of light generated by the bulbs from one face of the fixture. Furthermore, such one face of the fixture will usually be covered by a translucent or transparent diffuser in an attempt to soften the brightness of the individual bulbs.

One of the major difficulties with the prior multiple bulb fixtures has been the inefficiency of light production thereof for a particular bulb wattage. This light production inefficiency is occasioned by the fact that where two or three relatively large size bulbs are involved in a single fixture, it is difficult to provide efficient light reflection means therefor, while still maintaining the overall cost of the fixture at a reasonable level. As previously stated, the light reflection means has usually been of a singular form and not properly concentrated in association with each of the individual light bulbs so that it is necessary to use bulbs of increased wattage in order to provide the desired intensity of light from a particular fixture.

The foregoing difficulty with the prior light fixtures of the type herein involved and the manner of solution thereof by the provision of light bulbs of higher wattage has still further magnified an additional major problem with the prior fixtures and that is one of providing sufficient illumination from the fixture, while still maintaining such illumination of a soft and glare-free nature. The necessity of using light bulbs of relatively large wattage has resulted in the light fixtures being required

to have a diffuser of major light shielding qualities in order to eliminate individual bright spots created by the individual bulbs, or to have a diffuser of lesser light shielding qualities and provide a fixture having apparent bright spots from the individual bulbs. Also, where bulbs of relatively large wattage are required in order to produce the illumination desired from a single fixture, problems of heat concentration at the individual bulbs are encountered with the consequent difficulties thereof.

It is an object of my invention, thereof, to provide a light fixture constructed for receiving a relatively large number of light bulbs therein, said number far exceeding that of the usual two or three light bulbs of the prior light fixtures of similar type. Each of the light bulbs of a single fixture may be of reduced wattage and each may have an individual reflector so as to more evenly distribute the light source throughout the extent of an individual fixture, while still providing the capacity of illumination desired. Such not only eliminates the problem of bright spots of the fixture and permits the use of a diffuser of less light shielding qualities, but also reduces the problem of heat concentration within the fixture presented previously in the prior constructions by the higher bulb wattage.

It is another object of my invention to provide a light fixture of the foregoing type having a unique bulb socket construction therein and a unique electrical distribution arrangement between said sockets. The electrical distribution may be accomplished by several, individually integrated, planar circuits spaced apart by insulating sheet means, said circuits preferably being of a stamped or printed form. Furthermore, the sockets may be formed by simple openings in the insulating sheet means, having tab-like contacts projecting into interference with the socket openings and forming both the bulb threadable reception means necessary in each socket, as well as the single contact in said sockets.

It is still a further object of my invention to provide a light fixture having a unique simplicity of construction, economical to fabricate on a production line basis. The foregoing multiple light bulb reflectors may be formed integral from a single stamped sheet, permitting a multiple choice of fabrication materials. The unique socket constructions and electrical distribution arrangement are obviously adapted to mass production fabrication so that the overall light fixture construction makes possible the provision of a unique and advantageous light fixture far superior over the prior constructions, yet at a reduced unit cost.

Other objects and advantages of the invention will be apparent from the following specification and the accompanying drawings which are for the purpose of illustration only, and in which:

FIG. 1 is a perspective view showing a light fixture embodying the principles of the present invention;

FIG. 2 is an enlarged, vertical, sectional view taken along the broken line 2—2 in FIG. 1 and showing the light fixture surface mounted on the ceiling of a building structure;

FIG. 3 is a horizontal, sectional view taken along the broken line 3—3 in FIG. 2;

FIG. 4 is an enlarged, fragmentary sectional view taken along the broken line 4—4 in FIG. 2;

FIG. 5 is a fragmentary, sectional view taken along the broken line 5—5 in FIG. 4;

FIG. 6 is a fragmentary, sectional view taken along the broken line 6—6 in FIG. 4 and showing the end contact of an individual light bulb socket;

FIG. 7 is a fragmentary, sectional view taken along the broken line 7—7 in FIG. 4 and showing the combination bulb base receiving means and side contacts for an individual bulb socket;

FIG. 8 is a reduced, fragmentary, sectional view similar to FIG. 6, but showing another form of end contact integrated in a network of said end contacts for a series of bulb sockets; and

FIG. 9 is a reduced, fragmentary, sectional view similar to FIG. 7, but showing the side bulb base contacts of a single bulb socket integrated in a network of said bulb sockets.

Referring to FIGS. 1 through 7 of the drawings, an embodiment of the light fixture of the present invention is generally indicated at **10** and includes a housing or pan **12**, hollow cylindrical in configuration and having a circular base portion **14** surface mounted on a ceiling **16** through securement by mounting screws **18** to a typical electrical outlet box **20** recessed within said ceiling in the usual manner. The pan **12** may be of any usual rigid material, such as metal or plastic, and is provided with an annular side flange **22** preferably integral with the base portion **14** and laterally peripherally enclosing the pan. Furthermore, the pan **12** in the mounted position shown, opens downwardly and telescopically receives a shouldered end portion **24** of a similarly peripherally flanged light diffuser **26** formed of the usual translucent or transparent plastic or glass, said diffuser in assembled position downwardly closing the pan **12** and being removably secured thereto in any usual manner.

A series of overlying sheets of electrical insulating material, including a lower sheet **28**, an intermediate sheet **30** and an upper sheet **32**, are mounted within the pan **12**, said sheets substantially conforming to the circular configuration of the pan base portion **14**. The upper sheet **32** abuts the interior surface of the pan base portion **14** and the lower sheet **28** faces downwardly well recessed within the pan **12** and the side flange **22** thereof. Also, the multiple sheet **28** through **32** are formed with a series of preferably equally spaced socket openings **34** preferably completely therethrough, said openings at the lower sheet **28** being of reduced size and increasing in size through the intermediate and upper sheets **30** and **32**, as shown.

A series of laterally adjacent light reflectors **36**, equal in number to the socket openings **34**, are mounted against the lower face of the lower sheet **28**, said reflectors being substantially identical of dished configuration and having central bulb openings **38** aligned with the socket openings **34** so that there is on reflector for each socket opening. In fabrication the reflectors **36** for an individual light fixture **10**, it is prefererd to form all of said reflectors from a single sheet, with all of said reflectors being integrally connected, as best seen in FIG. 2, for economy of fabrication, handling and assembly, with the face configurations of the individual reflectors being hexagonal, as best seen in FIG. 3, or other usual shapes, depending on the effect desired.

In the preferred form shown in FIG. 3, however, the hexagonal shape of the individual reflectors 36 permits the straight perimetrical edges of the hexagonal perimeters thereof to be positioned mating similar edges of adjacent reflectors forming an integral cluster of individual reflectors separated by straight joining lanes. The reflectors **36** may be formed of any usual materials, such as drawn and polished steel or aluminum, metalized plastic, or aluminum foil covered plastic or metal.

As best seen in FIGS. 2 and 4 through 7, for electric distribution and supply to and from the individual socket openings **34**, a first network layer **40** of conducting material is sandwiched between the lower and intermediate sheets **28** and **30**, extending linearly between the socket openings **34** and having a contact ring **42** at and surrounding each of said socket openings. A plurality, preferably a pair of oppositely depending, tab-like contacts **44** are secured to each of the first network contact rings **42** projecting laterally into and into interference with each of the socket openings **34**. Said contacts **44** terminates laterally spaced apart within the socket openings **34** and form lateral contact and receiving means for threadably

receiving bases **46** of electric light bulbs **48**, said bulb bases being retained within said socket openings by said contacts, with the remainder of said bulbs projecting downwardly through the reflectors **36**.

A second network layer **50** of electrical conducting material is sandwiched between the intermediate and upper sheets **30** and **32**, extending linearly between said socket openings **34** and similarly having contact rings **52** surrounding each of said socket openings. The second conducting network **50** is, therefore, electrically insulated from the first conducting network **40** by the intermediate sheet **30**. Furthermore, preferably a single, tab-like, spring contact **54** is secured to each of the second network contact rings **52**, projecting laterally into interference with the socket openings **34**, said contacts **54** being located for providing the end electrical contact with the bulb bases **46** when said bases are threadably engaged by the first network contacts **44**, as previously described.

The first and second conducting networks **40** and **50** are preferably integrated, stamped metal, such as copper, but could be of the usual printed form, with each extending in the single plane, as shown. In the configuration of the embodiment of the light fixture just described and as best seen in FIG. 3, each of said first and second conducting networks **40** and **50** have the respective contact rings **42** and **52** linearly connected to one other of said contact rings of said network, with one side of the first conducting network **40** being connected through a usual insulated lead **56** and the opposite side of the second conducting network **40** being connected through usual insulated lead **58** into the electrical outlet box **20** for connection thereof to a usual source of electricity.

Thus, due to the unique formation of the light reflectors **36**, preferably from a single sheet, and the unique composite formation of the light bulb sockets by the combination of the bulb openings **38** in the sheets **28** through **32** and the first and second network contacts **44** and **54**, as well as the electrical distribution by said networks, the light fixture of the present invention readily lends itself to efficient mass production fabrication. After the unitized fabrication of each of the various components, the first and second conducting networks **40** and **50** are assembled as layers between the various lower, intermediate and upper sheets **28**, **30** and **32**, the sheet of the reflectors **36** assembled therewith and the entire assembly inserted into the pan **12**. All of said components may be retained in said assembled position within the pan **12** by the same mounting screws **18** previously pointed out and securing the pan **12** to the electrical outlet box **20**.

A modified form of the first and second conducting networks is illustrated in FIGS. 8 and 9, wherein said networks are similarly formed, but each of contact rings **60** and **62** of respective conducting networks **64** and **66** are linearly connected laterally to all surrounding of said contact rings. As a result, the respective conducting networks **64** and **66** are more completely connected and more stable for production handling, although requiring a greater amount of conducting material for the fabrication thereof. Said conducting networks **64** and **66** will function substantially the same and serve the same purpose as previously described.

The light bulbs **48**, due to the relatively large plurality or cluster thereof may be of relatively low wattage, for instance, in the order of **10** watts, with the total number capable of providing a major intensity of light emission. At the same time, due to the low wattage of the individual light bulbs **48**, the heat concentrations may be maintained at a minimum. Where conditions warrant, however, and the size of the particular light fixture is adequate, the light bulbs **48** may be of relatively large wattage and the construction will still provide the consequent advantages of heat distribution.

Thus, I have provided, according to the principles of the present invention, a unique form of cluster light fixture wherein the light emission thereof is evenly distributed throughout said fixture, as is the heat resulting from the

light bulbs supplying said light emission. In addition, I have provided a light fixture having a unique form of reflector, bulb socket and electrical distribution fabrication and assembly, having maximum simplicity and lending said fabrication and assembly to production line procedures and equipment.

I claim:

1. In a light figure, the combination of: a pan having a perimetrical side flange defining the lateral extremities thereof; a series of juxtaposed light reflectors laterally within said pan side flange; bulb socket means including an electric bulb socket at each reflector for the reception of an electric light bulb therein and the direction of electric power therethrough; electric supply means operably connected to said sockets, said electric supply means including at least two layers of electrical conducting material with one overlying and spaced from the other, each of said layers being an integral layer and extending between each of said bulb sockets, each of said sockets being connected to at least one other of said sockets by both of said conducting layers; and said bulb socket means including insulating sheet means having a certain part thereof between said conducting layers of said electric supply means, an opening in said sheet means at each of said reflectors, tab-like contact means operably connected to and extending from each of said conducting layers of said electric supply means into interference with each of said sheet means openings, one of said contact means at each of said sheet means openings threadably receiving said light bulbs and the other of said contact means contacting said light bulbs, said sheet means openings and contact means cooperating to form said bulb sockets.

2. A light fixture as defined in claim 1 in which said electric supply means includes two networks of said electrical conducting material, each of said networks being a coplanar, integral network extending linearly between said sockets, each of said sockets being electrically connected to at least one other of said sockets by each of said conducting material networks; and in which said bulb socket means includes said tab-like contact means being at least two tab-like contacts operably connected to and extending laterally from one of said conducting networks into interference with each of said sheet means openings for the threadable reception of said light bulbs and at least one tab-like contact operably connected to and extending laterally from the other of said conducting networks into interference with each of said sheet means openings for contacting said light bulbs.

3. In a light fixture, the combination of: insulating sheet means including a series of overlying sheets of insulating material; a cluster of laterally adjacent light reflectors mounted at one side of said insulating sheet means; a series of light bulb sockets formed in said insulating sheet means including an opening formed in each of said insulating sheets for each of said sockets, one of said sockets being aligned with and opening into each of said reflectors; each of said sockets including electric contact means for receiving and retaining the base of an electric light bulb therein with said bulb extending into the associated reflector, said electric contact means being adapted for transmitting electric power through said light bulb base and said light bulb, said electrical contact means of each of said sockets including a plurality of spaced tab-like contacts extending laterally from between certain of said insulating sheets into interference with said socket opening and forming thread engaging members for threadably receiving anl retaining said light bulb base and at least a single tab-like contact extending laterally into interference with said socket opening for contacting said light bulb base; and electric supply means operably connected to said contact means of each of said sockets for supplying electrical power thereto.

4. A light fixture as defined in claim 3 in which said at least single tab-like contacts of said electrical contact means at each of said sockets are spaced from said plurality of contacts by at least one of said insulating sheets and extending laterally into interference with said socket opening adapted for contact with said light bulb bases; in which said electric supply means includes two coplanar, integrated networks of electrically conducting material extending linearly between each of said sockets, one of said conducting networks extending between said certain insulating sheets and being electrically connected to each of said plurality of contacts of each of said sockets, the other of said conducting networks being spaced from said one conducting network by said at least one insulating sheet and being electrically connected to each of said at least one tabs at each of said sockets, each of said sockets being electrically connected to at least one other of said sockets by each of said conducting networks.

5. A light fixture as defined in claim 3 in which all of said reflectors are formed integral as a single sheet, each of said reflectors having a hexagonal perimeter with straight perimetrical edges mating with straight perimetrical edges of adjacent reflectors forming an integral cluster of individual reflectors separated by straight joining lines.

6. In a light fixture, the combination of: a pan having a parametrical side flange defining the lateral extremities thereof; a series of juxtaposed dished light reflectors laterally within said pan side flange, all of said reflectors being formed integral as a single sheet, each of said reflectors having a hexagonal perimeter with straight parametrical edges of adjacent reflectors forming an integral cluster of individual reflectors separated by straight joining lines; bulb socket means including an electric bulb socket at each reflector for the reception of an electric light bulb therein and the direction of electric power therethrough; electric supply means operably connected to said bulb socket means for the direction of said electric power to each of said sockets including two networks of electrical conducting material, each of said networks being a coplanar, integral network extending linearly between said sockets, each of said sockets being electrically connected to at least one other of said sockets by each of said conducting material networks; said bulb socket means including insulating sheet means, an opening in said sheet means at each of said reflectors, at least two tab-like contacts operably connected to and extending laterally from one of said conducting networks into interference with each of said sheet means openings for the threadable reception of said light bulbs, at least one tab-like contact operably connected to and extending laterally from the other of said conducting networks into interference with each of said sheet means openings for contacting said light bulbs, said sheet means openings and said contacts cooperating to form said bulb sockets.

7. In a light fixture, the combination of: a pan having a parametrical side flange defining the lateral extremities thereof; a series of juxtaposed dished light reflectors laterally within said pan side flange, all of said reflectors being formed integral as a single sheet, each of said reflectors having a hexagonal perimeter with straight parametrical edges mating with straight parametrical edges of adjacent reflectors forming an integral cluster of individual reflectors separated by straight joining lines; bulb socket means including an electric bulb socket at each reflector for the reception of an electric light bulb therein and the direction of electric power therethrough; electric supply means operably connected to said bulb socket means for the direction of said electrical power to each of said sockets including at least two layers of electrical conducting material, with one overlying and spaced from the other, each of said layers being an integral layer and extending between each of said bulb sockets, each of said sockets being connected to at least

one other of said sockets by both of said conducting layers; said bulb socket means including insulated sheet means having a certain part thereof between said conducting layers of said electrical supply means, an opening in said sheet means at each of said reflectors, tab-like contact means operably connected to and extending from each of said conducting layers of said electric supply means into interference with each of said sheet means openings, one of said contact means at each of said sheet means openings threadably receiving said light bulbs and the other of said contact means contacting said light bulb, said sheet means openings and said contact means cooperating to form said bulb sockets.

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U.S. Cl. X.R.

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