April 8, 1969 C. INTRATOR 3,437,802

HIGH INTENSITY LIGHTING FIXTURE

Filed Dec. 11, 1967 Sheet 1 of 3

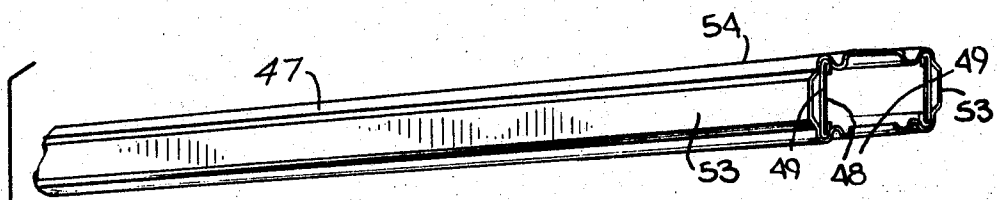


Fig. 1.

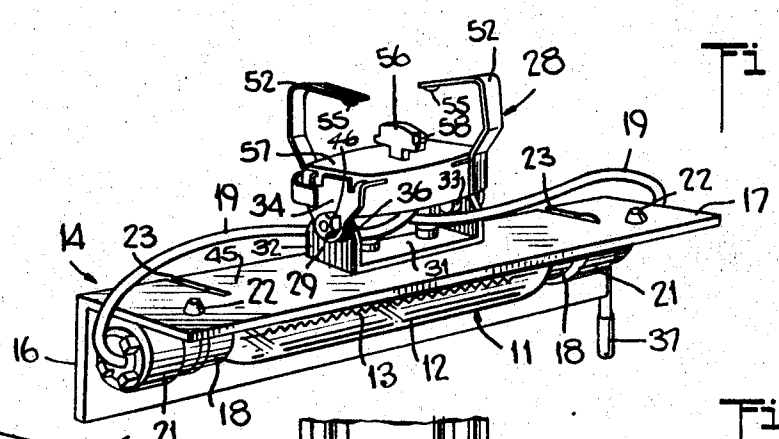


Fig. 3.

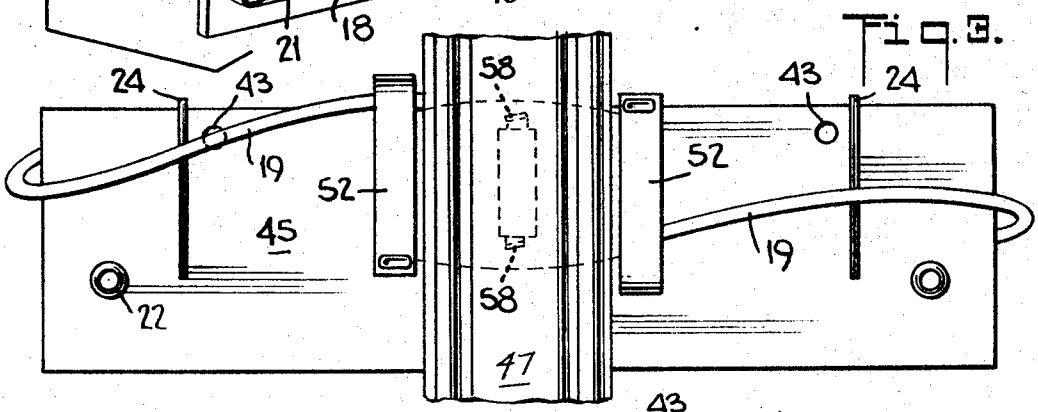
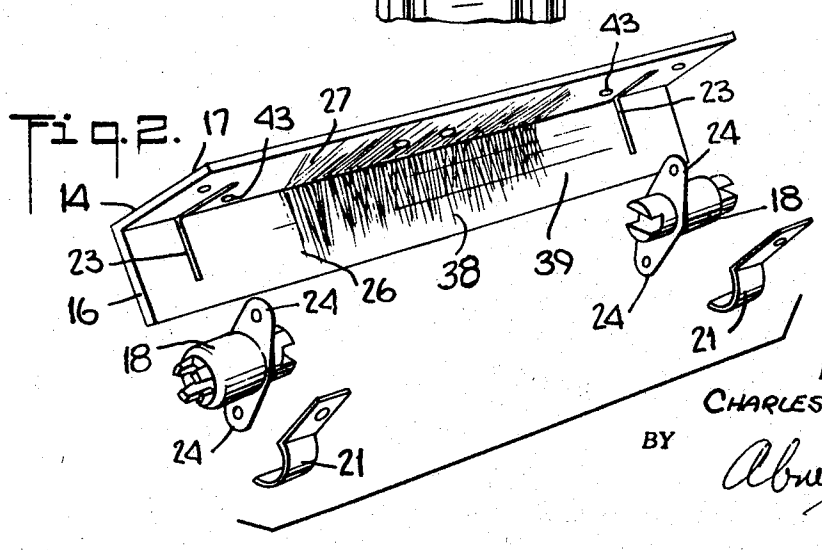


Fig. 2.



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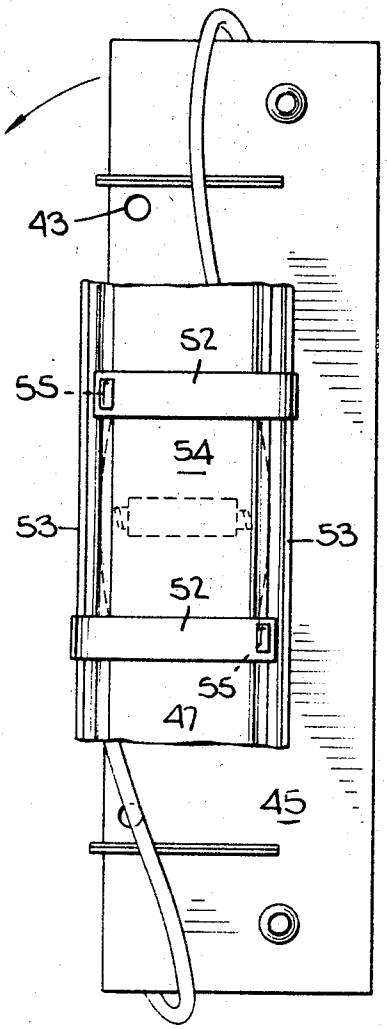


Fig. 4.

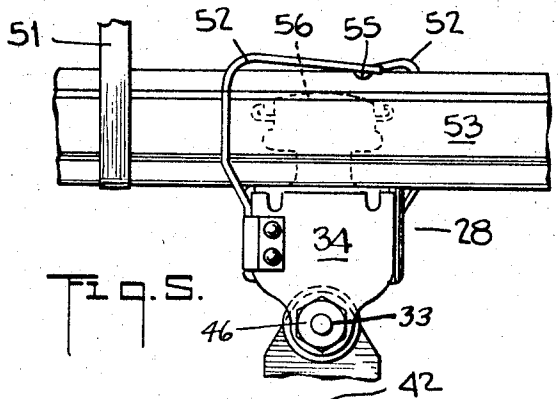


Fig. 5.

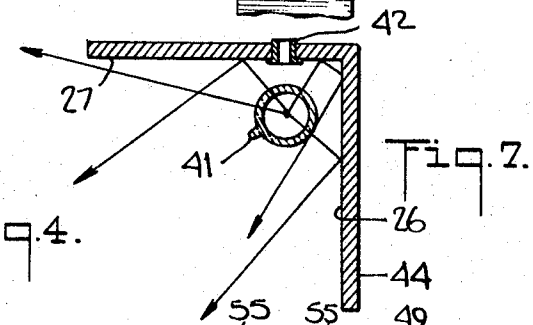


Fig. 7.

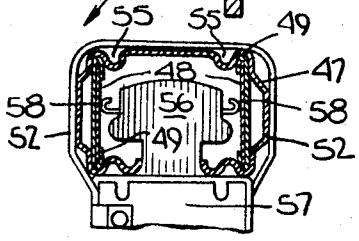


Fig. 6.

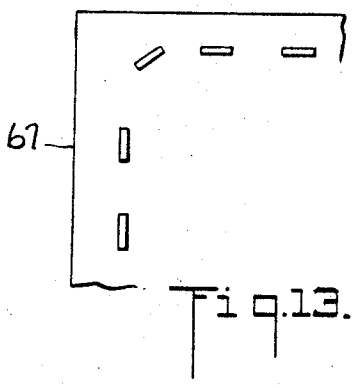


Fig. 13.

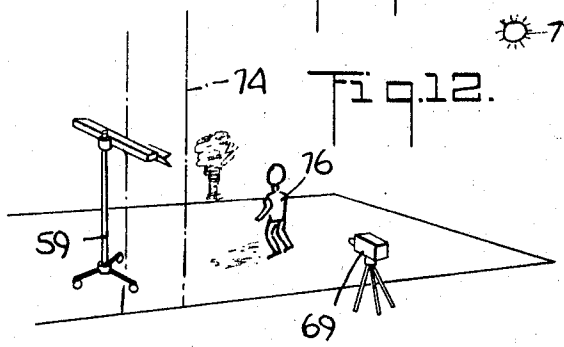


Fig. 12.

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HIGH INTENSITY LIGHTING FIXTURE

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Fig. 11.

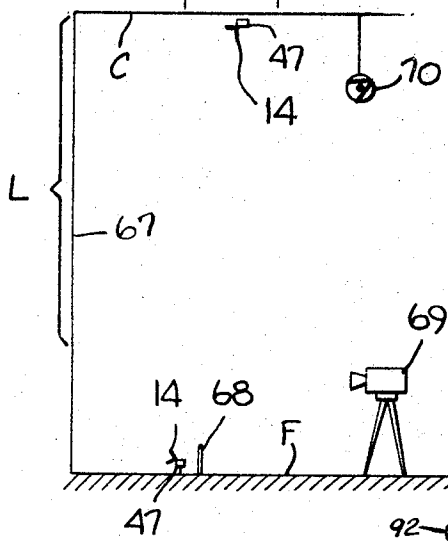


Fig. 14.

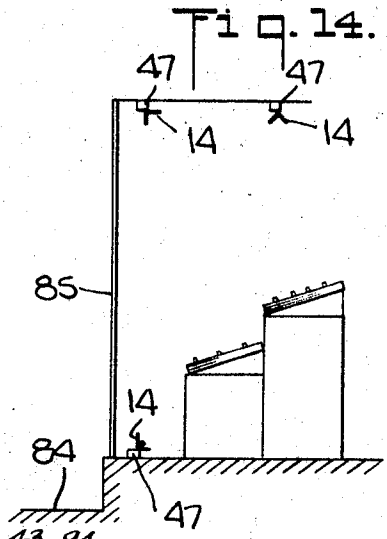


Fig. 8

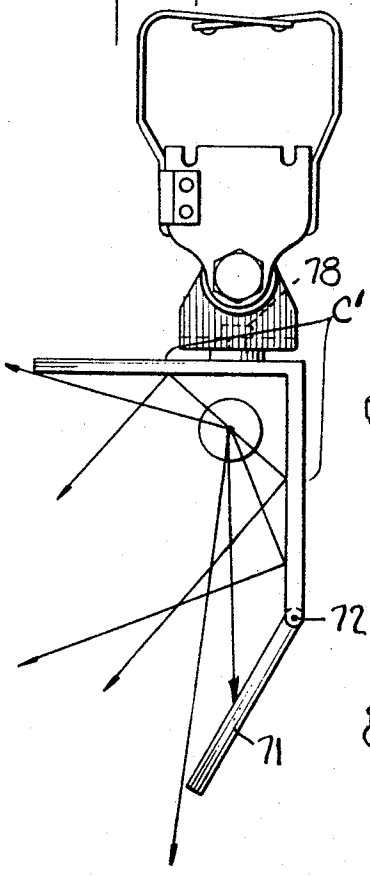


Fig. 15

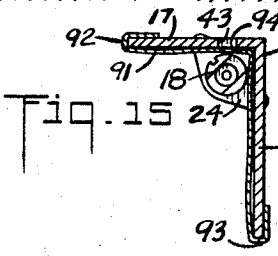


Fig. 9.

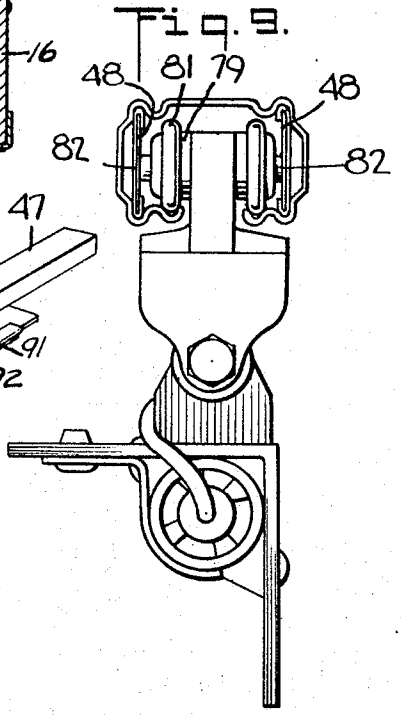
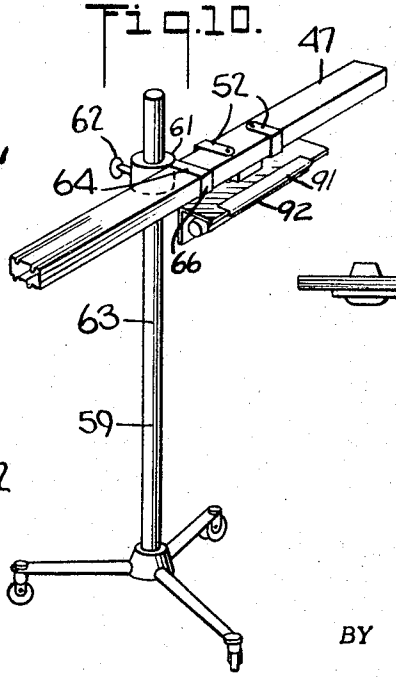


Fig. 10.



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Patented Apr. 8, 1969

3,437,802

HIGH INTENSITY LIGHTING FIXTURE

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Continuation-in-part of application Ser. No. 556,130, June 8, 1966. This application Dec. 11, 1967, Ser. No. 691,683

Int. Cl. G03b 15/02

U.S. Cl. 240—1.3 14 Claims

ABSTRACT OF THE DISCLOSURE

A lamp having a high intensity linear light bulb (e.g. having a color temperature of over 3100° K.) mounted in the open angle of an L-shaped reflector whose planes are substantially parallel to the bulb. The sides of the reflectors which face the bulb have satin surfaces thereon. The reflector is carried on a support structure which is adjustably mounted on a channel having parallel bus bars. The parallel bus bars cooperate with the support structure to electrically connect the light bulb to a source of potential.

This application is a continuation-in-part of my application Ser. No. 556,130 filed June 8, 1966, now abandoned and incorporates the entire disclosure thereof.

This invention relates to high intensity lighting.

In the lighting of motion picture and color television studios, extremely even lighting of the set is often required. At present, the industry uses large dished reflector lamp units for this purpose, usually mounting a series of such units (e.g. circular, concave, "M.R. Skypans" 30 inches in diameter and dished about 4 inches) spaced 6 feet on centers, mounted on correspondingly large supporting yokes. Because these units are too big to be hidden by a conventional low ground row they cannot be used in the most desirable manner on the set, but are placed where they can be hidden by the scenery. This, of course, has made it necessary to use a much higher wattage in order to produce the required level of light on the set and to make compromises with the amount of desirable backlighting employed. Also, the electric cables cluttering the studio floor have been very troublesome, and color television and motion picture studios have tried hanging all their lights from the ceiling; as a result, there is a mass of tangled cables overhead, and expensive balancing rigs are needed to keep the lights in the proper position.

Another defect in present-day studio lighting is the fact that the lights suitable for this purpose decrease in color temperature (by as much as 300–400° Kelvin in the course of a full shooting day). Such a decrease seriously affects the color rendition of scenes shot out of continuity but which require matching later on.

One aspect of this invention relates to a new and improved lamp and lighting system which is suitable for lighting large areas to the desired high intensity and at a color temperature required in color motion picture and color TV studios.

One embodiment of the invention is illustrated in the accompanying drawing in which:

FIGURE 1 is a perspective view of a lamp and of a channel which serves as a support and as a source of electric power;

FIGURE 2 is an exploded perspective view of the lamp, without its bulb;

FIGURE 3 is a top view showing the transitory position of the lamp when its conductive head is first inserted into the channel;

FIGURE 4 is a top view showing the final position of the lamp clamped to the channel;

FIGURE 5 is a fragmentary side view taken with the parts in the position shown in FIG. 3;

FIGURE 6 is a side view, with the channel shown in cross-section, with the parts in the position illustrated in FIG. 4;

FIGURE 7 is a cross-section side view of the bulb and reflecting portion of the lamp showing the paths of light rays from the filament;

FIGURE 8 is a side view of a lamp having a modified form of mounting and also fitted with a movable light shield or "barndoor";

FIGURE 9 is a side view of a lamp showing a construction for mounting the lamp on the channel so that it can be rolled along the channel;

FIGURE 10 is a perspective view showing the channel and lamp mounted on a movable stand;

FIGURE 11 is a side view illustrating the use of the lamps for lighting an indoor cyclorama;

FIGURE 12 is a perspective view illustrating the use of the lamps outdoors, in sunshine;

FIGURE 13 is a plan view showing the placement of the lamps for a two-wall cyclorama; and

FIGURE 14 is a view in elevation illustrating the use of the lamps of lighting a show window.

FIGURE 15 is a cross-section side view of a modified form of the lamp.

Turning now to FIG. 1 of the drawing, reference numeral **11** designates a high intensity light bulb, which preferably comprises an elongated quartz envelope **12** within which there is a tungsten filament **13** surrounded by an iodine atmosphere which prevents the blackening inherent in many types of filament lamps. Such light bulbs are currently manufactured by the General Electric Company under the name "Quartzline," and by other manufacturers, and are discussed, for example, in U.S. Patent 2,997,574, of Aug. 22, 1961, of W. J. Miskella. The bulbs I prefer to use are tubular bulbs operating under "overvolted" conditions at a color temperature of over 3100° K., e.g. 3150° or 3200° to 3450° K. For example, I have used bulbs whose quartz envelope has an external diameter of about ⅜ inch and an overall length of about 4 to 10 inches, the lighted length (i.e. the length of the lighted filament which is centered longitudinally and radially in the bulb) being correspondingly about 3½ to 9 inches and the wattage ranging from about 250 to 4000 watts. Typically, the temperature of the quartz envelope should be at about 700–900° F. during operation, to promote the tungsten filament-rebuilding effect of the iodine atmosphere in the bulb so as to prevent blackening of the envelope. The quartz envelope may be externally sandblasted and may have a milky appearance.

In the illustrated embodiment, the bulb **11** is mounted at the open angle of a short section of extruded aluminum angle rod stock **14** having arms **16** and **17** of equal length and about ⅛ inch thick, made of high purity aluminum. This aluminum angle rod serves both to support the bulb and as a reflector.

The bulb holders **18** for the Quartzline bulb **11** may be of the usual commercial spring loaded construction generally illustrated in the previously mentioned Miskella patent and may be supplied with electric power through cables **19** (the electrical connections should be of a heat resistant type, e.g. welded, in view of the high temperatures prevailing in my lamp). These bulb holders may be fixed to the angle rod **14** in any suitable manner; as illustrated, they are held by a pair of curved clamps **21** each having its lower end riveted at **22** to the angle rod and its arcuate upper portion receiving the correspondingly shaped cylindrical bulb holder **18**. Two spaced kerfs **23** are cut across the apex of the angle rod **14**; each kerf receives a pair of supporting ears **24** of one of the

bulb holders **18**. In one construction, the bulb **11** is supported with its center less than ¾ inch, preferably about ½ inch, from the nearest inner wall **26**, **27** of the angle rod **14**, these inner walls are each about 2 inches wide (e.g. 1⅞" wide), and the angle rod extends about 1¾ inches past each end of the bulb so as to accommodate the holders **18**. An angle rod whose arms are more than about 1/16 inch thick, preferably about ⅛ inch thick, has given especially good results.

The angle rod **14** is supported by a clip structure indicated generally as **28**, to which it is pivotally attached through a bracket **29**. Thus, the bracket **29** may be U-shaped with its center portion **31** riveted to the angle rod and its legs **32** apertured to receive aligned bolts **33** which pass through depending ears **34** of the clip structure **28**, the bracket legs **32** and the ears **34** being separated by washers **36** to permit tilting of the angle rod about a horizontal axis. An insulated handle **37** fixed to one leg **16** or **17** may be used for tilting the angle rod manually against the friction at the washers **36**.

The inner walls **26**, **27** of the angle rod **14** are close to the high intensity bulb **11**, and become very hot, despite the high thermal conductivity of the aluminum. I have obtained best results in avoiding undesired hot spots, pitting and burning of the aluminum surface, and in obtaining an extremely even light pattern, by making the angle rod of high purity aluminum and etching the aluminum surface (as with dilute aqueous chromic acid for a short time, e.g. a minute) to remove impurities and produce a very finely etched satin surface and wire brushing the etched aluminum surface of the inner walls in a direction transverse to the length of the bulb **11** (as with a rotary brush having fine, crimped, stainless steel bristles). On such brushing, there are formed a series of more or less straight overlapping and intersecting fine shallow scratches and depressions (shown schematically at **38**) extending in a direction generally transverse to the filament. I have found that a surface so treated, which has a soft, silky, satin appearance, performs better than a highly polished surface, or a commercially available lenticular or specular surface. The scratches transverse to the filament appear to serve to break up the linear light pattern. The angle rod **14**, having been made by extrusion in conventional manner, may also have some shallow scratches or extrusion lines **39** running lengthwise of the bulb on its inner walls **26**, **27**. For best results, the inner walls should be free of organic material which will carbonize and darken under the intense heat of the bulb.

The quartz envelopes **12** of the linear Quartzline bulbs currently manufactured usually have a thickened portion or projection **41**, at about the middle of the envelope. For best results, the bulb should be mounted so that this projection, which can act as a heat-concentrating focussing lens, faces outward away from the angle between the walls **26**, **27** (as indicated in FIG. 7).

The mass of the angle rod **14** is effective as a heat reservoir, which helps to stabilize the temperature of the quartz envelope of the bulb at a desirable level during use. The weight of a suitable angle rod, having arms 1⅞ inches wide and ⅛ inch thick is about 1/20 lb. per inch of length and its heat capacity at high temperatures in the neighborhood of 500–600° C. is about 6 calories per inch of length. To help keep the angle rod from becoming too hot, there may be small vents in its upper surface; for example, the rivets **42** used for attaching the angle rod to the U-shaped bracket **29** may be hollow (see FIG. 7) and there may be a pair of holes **43** in the upper arm **17**, preferably directly above the bulb holders **18**, to promote heat dissipation through convection. The holes **43** may, for example, be about ½ inch in diameter and so positioned as to have little, if any, effect on the reflecting ability of the surface **27**. The substantial absence of side enclosures helps dissipate the excess heat through air circulation. The outer surfaces **44**, **45** of the angle rod **14** may be blackened to increase the radiation of heat therefrom.

Tests on the lamps of this invention indicate that Quartzline bulbs can be used therein effectively for periods well in excess of their rated life; in one test, the bulb was used in such a lamp for a period greater than twice the rated life and still gave a good high intensity light of high color temperature.

In view of the high temperatures generated by the high intensity bulb **11**, special provision is made to prevent spalling at the washers **36**. I have found it effective to treat copper washers with iodine, as by immersing the washers for 5 minutes in a dilute solution of iodine crystals in CCl_4 in an iron vessel. I have found that when such surface-treated washers are used, there is sufficient friction (when the nuts **46** on the bolts **33** are tightened) to hold the lamp at any desired tilt to permit the lamp to be tilted manually, and to maintain the lamp in the new tilted position (without the need of loosening and retightening the nuts **46**). Cadmium plated washers are also effective for this purpose. The nuts **46** may be of well known heat-resistant type, having multiply-split necks (e.g. of the Flexlock type), and designed to operate without annealing at high temperatures.

In use, the lamps of this invention are adjustably supported on a rigid conductive structure comprising a grounded channel **47** (FIG. 1), made of high strength steel and open at the bottom, encasing two full-length solid electrically conducting copper bus bars **48** (FIG. 6) electrically insulated from the steel channel by insulating strips **49**. The channels are made in, for example, 5-foot lengths or 10-foot lengths, and longer channels may be built up by connecting several lengths together. The channels may be supported in any suitable manner, as by means of hangers **51**, from the ceiling of the studio.

The clip structure **28** comprises a pair of opposed, offset, springy clips **52** adapted to be snapped over the opposite sides **53** and top **54** of the channel and having beads **55** for engagement in spaced longitudinal troughs in the top **54** of the channel. Rigidly mounted between the clips is the T-shaped head **56** of a casing **57** of strong electrical insulation (e.g. phenolic plastic) carrying a pair of spaced electrical contacts **58** (which may be of silver-plated Phosphor bronze), which can be placed in contact with the bus bars **48** in a manner to be described below. The depending spaced ears **34**, previously mentioned, are fixed to the clips **52** and the cables **19** are electrically connected, within the casing **57**, to the contacts **58**.

To engage the clip structure **28** with a channel **47**, the top of the T-shaped head **56** is inserted into the opening at the bottom of the channel at the desired point along the length of the latter. The parts are now in the position shown in FIGS. 3 and 5 with the contacts **58** aligned longitudinally of the channel within the channel and the clips **52** extending parallel to the channel in opposite directions at the sides of the channel. The clip structure is then given a 90° turn (about a vertical axis); as shown in FIGS. 4 and 6, this compresses the contacts against the bus bars **48** and brings the clips firmly around the channel with the beads **55** in the troughs thereof, so that the lamp is securely locked to the channel and firmly supported in the desired position.

The channel **47** may also be mounted on a standard ⅝" stud lamp stand **59** (FIG. 10) by the use of an adapter comprising a sleeve **61** (having a set screw **62** to fix it to a stud **63**), which sleeve has welded or brazed thereto a spring steel hanger **64** whose two arms **66** are adapted to snap around, and hold, the channel **47**.

The lamp illustrated herein projects the light evenly over a large area with a fall-off in light intensity only at the outer sides. This fall-off in light level is desirable especially for lighting large flat areas. It enables the lighting director to overlap his units to achieve an even distribution of light without the customary "hot spots" usually found where the outputs of the two units overlap. The

provision for tilting the reflector about a horizontal axis makes it possible to direct the light at that point of the set where it will give the most desirable lighting quality. At the same time, the light pattern has a sharp edge at the top and bottom, cutting off all "spill" as illustrated in FIG. 7 (which also shows the path of some of the reflected rays) and there is no need for the back baffles or "teasers" conventionally hung overhead to prevent light flares from adversely affecting photography or view.

The reflectors described herein have also been found to be extremely efficient. Thus, they have given an increase in light (measured in foot candles at a fixed distance from the bulb) of some 20% or more when compared to commercially available reflectors (such as the oval reflectors with lenticular surfaces) using the same bulb and same wattage.

FIG. 11 illustrates the use of the device in lighting a cyclorama **67** or other set in a studio. A cyclorama is a vertical background, usually light-colored and having a dull or matte surface, which when properly lit gives to the viewer of the motion picture or TV image an endless effect, that is, an effect of a deep background going off into the sky without a horizon. With a typical cyclorama 14 feet high and 60 feet long, a continuous channel **47** was mounted at a height of 14 feet, suspended from the ceiling C four feet away from the surface of the cyclorama and the lamps (having a 1000 watt Quartzline bulb in each lamp) were attached 3 feet apart along the channel with the bulbs facing the cyclorama. This gave a flat light evenly distributed at a level of 500 foot-candles, without "hot spots," over the upper four-fifths L of the cyclorama **67**. When, in addition, the same number of lamps were installed on a channel **47** on the floor F (and hidden by a ground row **68**) it was possible to achieve extremely flat light distribution from top to bottom and end to end at an intensity of 700 foot-candles. The wattage used was only half the wattage required for producing "acceptable" light of much less even distribution by the presently accepted practices in the industry and there was no "spill" to interfere with the camera **69**.

It will be appreciated that the most intense light is reflected from the corner portion of the reflector, indicated on the drawing by the brackets at C' (FIG. 8) and that the middle part of the cyclorama, which receives this more intense light in the arrangement shown in FIG. 11, is more distant from the reflector than the upper portion of the cyclorama which receives the less intense light.

The ground row **68** may be a low barrier (e.g. about 6 inches high) having a wavy, irregular upper edge to make it less visible in the final picture and usually painted to blend with the scenery, as is well known in the art.

For a cyclorama **67** made up of two vertical walls at right angles, the lamps may be mounted overhead as indicated, in plan view, in FIGURE 13.

The entire unit including channel and lamp occupies less than 5 inches (e.g. 4⅝ inches) measured vertically. This leaves a great deal of room for any other lighting units **70** the lighting director may wish to use. With present-day systems which are much more bulky there is often a problem because the presence of one lighting unit interferes with the light pattern cast by another unit.

In order to control further the light pattern given off by the lamp, an adjustable baffle or "barndoor" **71** (FIG. 8) may be attached to one or both legs of angle rod **14**, as by means of suitable friction hinges **72**; this enables the lighting director to mask any portion of the output of the light deemed superfluous (as indicated by the paths of light rays in FIG. 8). The barndoor may be made of aluminum, whose surface may be painted black. It may be of thin non-reflective sheet material.

FIG. 12 illustrates the use of the lamps of this invention for making color movies in an outdoor location An important and recurrent problem in photographing exteriors, in sunlight, is the need for extremely high levels of light on the order of 1000 to 4000 foot candles to balance shadowed areas. Current practice is to use arc lights of up to 225 amperes, and/or 2000–10,000 watt incandescent spotlights. Through the use of the channel-mounted lamps supported on stud lamp stands **59** and judiciously spaced or hidden behind available props such as pillars, railings, etc., (indicated in dotted lines at **74**) or even rigged overhead, it becomes possible to get an adequate amount of fill light even on a bright sunny day, so that the shadows, cast by the subject **76** in the light of the sun **77**, are lightened. The actual amount of power required under these conditions is reduced enormously by the use of the lamps of this invention.

FIGS. 8 and 9 illustrate variations in the mounting bracket. In FIG. 8 there is an additional pivot point **78** permitting rotation of the lamp about a vertical axis. In FIG. 9 the clip structure is replaced by a structure including an insulated housing **79** having two sets of spaced wheels **81** which ride in grooves formed in the channel **47**; the housing also carries a pair of spring-loaded silver-plated Phosphor bronze contact shoes **82** which are pressed against the bus bars **48**. This wheeled structure may be inserted into the channel at one end thereof and can be moved freely along the length of the channel.

FIG. 14 illustrates the use of the lamps for lighting of shop windows. Here there may be used three channels **47** carrying lamps turned at such an angle that the bulbs would not be visible, at least at eye level, from the street **84** through the glass front **85**. As illustrated, two channels are mounted near the glass front **85**, one near the ceiling and one on the floor, while a third channel is supported on the ceiling. It will be understood that channels may also extend vertically along the side of the glass front **85** to support additional lamps. My lighting system is particularly suitable for jewelry window displays since the light gives an extremely specular, glittering effect on jewelry even though the lamps are several feet away; this eliminates the need for lights close to the objects, as now used in jewelry window displays. In addition, the use of my lighting system makes it possible to make great variations in the lighting pattern when the display is changed, without the need for special electrical installations to reposition the lights, since (as previously explained) it is extremely simple to move the lamps from point to point on a channel or to remove, or add to, the number of lamps on a channel. Ordinary clear Quartzline bulbs (not overvolted) are preferably used in this form of the invention.

In the improved version of the lamp shown in FIG. 15 the portion of angle rod **14** which is most directly exposed to the radiant heat of the bulb **11** is covered with a thin layer of aluminum reflective sheeting **91** having a diffuse reflective surface, preferably a layer of etched and anodized high purity aluminum sheeting which may, for example, be about 0.02 inch thick. As illustrated in FIG. 15, this layer may be bent easily to approximately the same configuration as the rod **14** and (being thin and ductile), may be folded over the edges of the rod, as indicated at **92**, **93** to keep it in place. I have found that this version of the lamp yields improved performance. The reflector surface is better; it it not adversely affected by normal manual handling; fingerprints do not show and the handled areas do not change their reflective characteristics significantly on exposure to the heat of the bulb. The reflective surface is readily and quickly repaired, at low cost, if it should become damaged or contaminated by simply replacing the sheet **91** by a new one. Also, with this modification it becomes practical to have the reflective surface closer to the bulb; I find that having that surface even 1/16 inch closer gives superior lighting.

In the version shown in FIG. 15, the rod **14** continues to serve as a heat sink. The sheet **91** preferably has vent holes **94** which are generally aligned with the vent holes **43** of rod **14** to help keep the rod and sheet from becoming too hot.

To replace the sheet **91** one need merely push back the spring-loaded bulb holders **18** so as to provide a free path for the manual removal of the sheet, and then place a flat unfolded sheet of the reflective material of desired length and width across the rod **14** and (while the holders **18** are in retracted position) and fold the sheet manually against the rod. It will be understood that a prefolded sheet may also be used. As indicated in FIG. 15, the sheet need not conform precisely to the surface of the rod.

It has been found most convenient to use a sheet **91** whose width (i.e. whose dimension normal to the plane of the paper in FIG. 15) is slightly less than the distance between the supporting ears **24** (see also FIG. 10). The holders **18**, when permitted to return to their extended positions, overlap the edges of the folded sheet and help to hold it in place.

For many purposes it is best to have the vertical reflective surface extend from the line of intersection of the reflective planes for a greater distance than the horizontal reflective surface to give a better cutoff of the lighted area while supplying more reflected light; for example, in FIG. 15 the horizontal dimension may be about 3 inches. This may be accomplished, as illustrated, by using a rod **14** whose vertical arm **16** is three inches long and whose horizontal arm **17** is two inches long (both arms being about ⅛ inch thick), but one may also use lighter gauge material for the portion which is further from the bulb.

Except as described above, the version shown in FIG. 15 may be identical in its construction and use with the embodiments described previously. It will be understood that the surfaces of the rod itself need not be etched and brushed.

One suitable material for the sheet **91** is an "Alzak" finished sheet such as the grade sold as Alcoa "Type 1 Diffuse," having a satin finish, made by etching an aluminum alloy sheet, removing impurities from the surface of the sheet to give a so-called "superpurity" surface (of e.g. 99.9999% purity) and anodically oxidizing the surface to form a clear aluminum oxide coating (e.g. 0.1 mil thick) thereon.

For convenience, the terms "photographing" and "camera" have been used herein to apply not only to photography in which a latent image is produced on a film (for later development) but also to the production of electronic or magnetic images for live or taped television as by the well known use of an image orthicon, plumbicon, etc. tube.

In the preferred use of the lamps, they are mounted so that the filaments **13** are maintained substantially horizontal.

It is understood that the foregoing detailed description is merely given by way of illustration and that many variations may be made therein without departing from the spirit of the invention.

What is claimed is:

1. A high intensity lamp comprising a high intensity linear light bulb having a color temperature of 3100° K. to 3450° K. and having an electrically heated light-producing filament enclosed in a light-transmitting envelope, said bulb being mounted in the open angle between two substantially plane metal reflectors of large heat capacity arranged in intersecting planes substantially at right angles to each other and substantially parallel to said bulb, said reflectors having satin aluminum surfaces and having a thickness of at least 1/16 of an inch, and being spaced less than about ¾ of an inch from the central axis of said bulb, and means mounted on the rear side of the reflector for electrically connecting the bulb to a power source and for mechanically supporting the lamp.

2. A lamp as set forth in claim **1** in which said reflectors and said bulb are mounted, in fixed relation, said means for connecting and supporting including a support structure having electrical contacts for engaging a pair of elongated parallel bus bars, mounted in an elongated channel, to provide electric current to energize said lamp, said support structure having means for engaging said channel to support said lamp on said channel, said channel-engaging means being constructed and arranged for adjustable positioning along the length of said bars and channel whereby the position of said lamp may be readily shifted along said channel.

3. A lamp as set forth in claim **1**, in which said aluminum reflector comprises two substantially plane etched reflecting surfaces substantially at right angles to each other to form a linear corner with said bulb being mounted in the open angle of said corner with its filament about ½ inch from each of said surfaces.

4. A lamp as in claim **3**, in which the reflector comprises an extruded aluminum bar of L shaped cross section having a reflective surface sheet folded to generally conform to the interior angle of the L, the edges of the sheet being folded over the ends of the arms of the L.

5. A high intensity lamp comprising a high intensity linear light bulb having an electrically heated light-producing tungsten filament enclosed in a tubular quartz envelope containing iodine, said bulb being adapted to be operated at a color temperature of 3100° K. to 3450° K. said bulb being mounted in the open angle between two substantially plane metal reflectors of large heat capacity arranged in intersecting planes substantially at right angles to each other and substantially parallel to said bulb, said reflectors having satin aluminum surfaces and having a thickness of at least 1/16 of an inch, and being spaced less than about ¾ of an inch from the central axis of said bulb, and means mounted on the rear side of the reflector for electrically connecting the bulb to a power source and for mechanically supporting the lamp.

6. A lamp as set forth in claim **5**, in which said bulb is mounted at the open angle of an extruded aluminum angle bar whose bulb-facing walls have said satin surfaces.

7. A lamp as set forth in claim **6**, in which said bulb-facing satin walls are of thin reflective surface sheet material attached to the bar.

8. A lamp as in claim **5**, in which said reflectors are of thick metal having a thin reflective surface sheet material on the sides which face said bulb.

9. A lamp as in claim **5**, in which the aluminum reflectors comprise a thin reflective surface sheet in contact with a heavy aluminum backing, said aluminum backing weighing at least about 1/20 pound per inch of length.

10. A high intensity lamp comprising a high intensity linear light bulb having a color temperature of 3100° K. to 3450° K. and having an electrically heated-light producing filament enclosed in a light-transmitting envelope, said bulb being mounted in the open angle between two substantially plane metal reflectors of large heat capacity arranged in intersecting planes substantially at right angles to each other and substantially parallel to said bulb, said reflectors having satin aluminum surfaces and having a thickness of at least 1/16 of an inch, and being spaced less than about ¾ of an inch from the central axis of said bulb, and an adjustable non-reflective baffle on at least one of said reflectors to mask off a portion of the light supplied by said lamp.

11. A high intensity lamp comprising a high intensity linear light bulb, having an electrically heated light-producing tungsten filament enclosed in a tubular quartz envelope containing iodine, said bulb being adapted to be operated at a color temperature of 3100° K. to 3450° K., said bulb being mounted in the open angle between two substantially plane metal reflectors of large heat capacity arranged in intersecting planes substantially at right angles to each other and substantially parallel to said bulb, said reflectors having satin aluminum surfaces and having a thickness of at least 1/16 of an inch, and being spaced less than about ¾ of an inch from the central axis of said bulb, and an adjustable nonreflective baffle on at least one of said reflectors to mask off a portion of the light supplied by said lamp.

12. A lamp as in claim 11 in which said bulb is mounted at the open angle of an extruded aluminum angle bar whose bulb-facing walls have said satin surfaces.

13. A lamp as in claim 12, in which said bulb-facing satin walls are of thin reflective surface sheet material attached to the bar.

14. A lamp as in claim 13 in which said baffle is pivotally mounted at the outer edge of one of said reflectors, the construction and arrangement being such that the lamp provides an unfocussed path for the light transmitted directly from said bulb and the light reflected by said plane reflectors, said lamp being free of side enclosures that interfere with heat dissipation by convection and having a vent in at least one of said reflectors.

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