Patented Sept. 7, 1954

UNITED STATES PATENT OFFICE

2,688,690

FLUORESCENT LIGHTING UNIT

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Application April 7, 1950, Serial No. 154,493

5 Claims. (Cl. 240—51.12)

This invention relates to lighting fixtures and more particularly to an improved fixture utilizing ring-shaped fluorescent lamps.

Among the principal objects of the present invention is the provision of a fixture in which is employed a unitary construction of a lamp holder having formed therein a pair of sockets for operatively receiving the conventional groups of a pair of circular lamps for electrical connection thereof to auxiliary control apparatus and to a power source.

Another object is to provide in a fixture a twin-socketed lamp holder for a pair of ring-shaped lamps, to thereby obviate the necessity for employing separate sockets or socket adapters for the individual lamps.

A further object is to provide in a fixture improved unitary clamping means which are operative in conjunction with the dual socketed holder aforesaid to resiliently secure in position a pair of circular fluorescent lamps and which permit free and independent movement of the lamps relatively to their common supporting fixture.

A still further object of the invention lies in the provision of an improved fluorescent lighting fixture wherein the lamps may be easily and quickly assembled or dismantled for replacement, maintenance or servicing as may be required.

The foregoing objects, and such other objects and advantages as may hereinafter appear or be pointed out, are attained in the manner illustrated in the appended drawings, wherein:

Figure 1 is a perspective view looking upwardly at a fixture constructed in accordance with the invention;

Figure 2 is a plan view of the fixture looking toward its base;

Figure 3 is a plan view of the fixture when viewed along the line 3—3 of Figure 4;

Figure 4 is an enlarged sectional view as taken on the line 4—4 of Figure 2;

Figure 5 is a fragmentary side elevational view of the fixture showing the dual-socketed lamp holder of the present invention partially broken away to reveal details of the holder construction;

Figure 6 is a longitudinal central sectional view as taken through one of the auxiliary lamp holding clamps;

Figure 7 is a fragmentary sectional view as taken on line 7—7 of Figure 5;

Figure 8 is a partial sectional view as taken along line 8—8 of Figure 7;

Figure 9 is a plan view of a portion of the fixture as taken along line 9—9 of Figure 6;

Figure 10 is a plan view of the retaining clip member for securement of the dual-socketed lamp holder in position;

Figure 11 is an elevational view of the lamp holder as it appears when viewed in the direction of line 11—11 of Figure 5;

Figure 12 is an elevational view of the auxiliary lamp-holding clamp as it appears when viewed along line 12—12 of Figure 6; and

Figure 13 is a schematic wiring diagram of the dual-socketed lamp holder and the auxiliary control apparatus associated therewith for operation of the fluorescent lamp mounted upon the fixture.

The fixture constructed in accordance with the invention is shown in the drawings as comprising an escutcheon plate 10, a pair of axially spaced circular fluorescent lamps 20, a dual-socketed lamp holder 30, and a pair of auxiliary lamp-holding clamps 70 in association with control apparatus, including thermal switches 18 and ballast coils 16, such as are conventionally employed in fluorescent lighting units.

The escutcheon plate 10, which comprises a dish-shaped base of any suitable ornamental configuration which may be suitably supported from a ceiling or other wall, is provided with an opening 12 for passage of a threaded supporting nipple (not shown). The base or support 10 may be formed of metal, plastic or other suitable material and may be enameled, painted or otherwise finished on its exterior to harmonize with the decor of the space to be illuminated. The base is preferably formed with a flat annular portion 11, to which are attached most of the other fixture parts, such as the conventional ballast coils 16 and thermal switches 15.

The fluorescent lamps 20 are also conventional, each consisting of a coated tube bent into circular shape with the ends thereof spaced apart to receive therebetween a suitable connector plug 21. Two pairs of prongs 22—22 (of which one pair of one lamp are shown in Figure 5) project from each lamp plug, each pair of said prongs 22—22 being connected to the opposite terminals of a cathode forming part of the electrode located at each end of the lamp. The plugs are of insulating material and are conventionally formed of two parts held together by a threaded bolt 24.

The dual-socketed lamp holder 30, as constructed in accordance with the present invention, provides a pair of retaining seats and electrical connections for both of the lamps 20. This holder 30 is of insulating material and is
preferably formed by a molding process. To facilitate molding, the dual-socketed holder for the lamps 20 may be fabricated in two separate parts mating along edges 31 (Figure 11), these parts being respectively provided with registering pins and recesses to insure proper alignment of the parts. The lamp holder 20 may be recessed to provide a hollowed interior 32 when assembled, may be secured together by any suitable means, preferably by rivets 33 passing through aligned openings formed in the walls of both parts.

For holding the lamps in axially spaced, parallel relation, the holder 30 is formed with a pair of prong-receiving bosses 35—36 disposed in vertically offset, parallel relation, these bosses being separated from one another by an intermediate body portion 38 having a frontal edge 37 extending at an angle of approximately 45° to the vertical when the holder is mounted in position as shown in Figure 5. The outer surfaces of the bosses 35—38 are respectively disposed in parallel planes extending normal to the frontal edge 37 of the holder and respectively project outwardly from arcuately shaped seats 39—39 of a curvature closely corresponding to the cross-sectional curvature of the fluorescent lamp 20.

The bosses 35 which projects outwardly from each of the arcuate lamp seating surfaces 39 is of a size and shape to fit within the recess Conventionally formed in the plug 21 of the lamp 20 to thereby insure proper alignment and seating of the lamp on the holder and at the same time relieve the plug prongs of untoward strain when inserted into the prong-receiving contacts of the lamp holder. As most clearly appears in Figure 11, each of the prong-receiving bosses 35—36 is provided with four openings 40 therein, respectively in registry with tubular or other suitable contact elements 39 disposed interiorly of the holder and which are respectively engageable with the lamp prongs 22. It will be understood that these contact elements 39 may be of any conventional type, insulated from each other, and supported in a manner which permits slight freedom of movement to accommodate variations in the plug prong alignment. For this purpose the interior of the lamp plug 21 may be provided with recesses for the contact elements ends with suitable insulators, either integral with the holder or separate members for electrically insulating the contact elements from each other.

Soldered to each connector is a wire conductor 43 which passes through the socket and is insulated along its length. In all, there are eight separate conductor wires connected to the contact elements 39, four for each of the lamp socket bosses 35—36, which wires extend along the inner surface of the holder for emergence through an end opening 51 for conventional connection with the auxiliary control apparatus, in a manner to be shortly described.

The dual-socketed holder 30 is detachably secured to the fixture base. For this purpose the holder is provided at 70 with an endwise-projecting tubular neck 52 the lateral walls of which define the wiring exit passage 51, previously described. Preferably, this neck is of polygonal shape, usually square, so that upon insertion thereof in the corresponding shaped opening 17 in the base a tight fitting connection is made, both presenting outwardly the fixture base as do the curved seats 38—39 of the lamp holder 30.

The tubular neck 52 is perimetrically grooved, as at 54, this groove being so arranged that upon insertion of the tubular neck in the opening 17 it is disposed interiorly of the fixture base 10.

For securing the holder to the base a quick-detachable clip member 55 is employed, this clip member being preferably mounted on the base portion 56—56, the corresponding ends of which are interconnected by an end portion 57. The inner edges of the wing portions 58—59 and the end portions 60 are respectively bent at angle to the plane of the clip member and define therebetween a notch 58 for reception of the grooved tubular neck 52 of the lamp holder. The entrance to the notch 58 is restricted by a pair of inwardly projecting projections 59—59. When the clip member is slidably engaged with the grooved neck 52 of the lamp holder, as best shown in Figure 8, with the angularly bent marginal edges of the notch seated in the groove 54, the said edges serve as wedge elements to resiliently press the bottom of the lamp holder against the supporting base plate 10 of the fixture. The clip member is restrained against ready removal from its latching engagement with the lamp holder by the projections 59—59, which are so arranged to releasely embrace that portion of the grooved neck which extends freely beyond the open end of the notch 58. The requisite spreadability and resilience of the oppositely disposed parts of the clip are preferably attained by notching the clip as at 60—60. In order to facilitate attachment and detachment of the clip member 55, it may be provided with an upturned tail piece 61 which may be engaged by the fingers to pull or pull the clip into or out of engagement with the neck 52 of the lamp holder 30.

In order to hold the lamps 20 in axially spaced, parallel relation, as shown in Figures 1 and 4, the fixture is provided with a pair of auxiliary spring metal clamps 70—70, each of the form best shown in Figures 1, 6 and 12. It will be observed that each auxiliary spring clamp 70 is provided with a flat base portion 71 which is perforated, as at 72, for registry with the aperture 73 in the base plate 10 of the fixture. A single bolt 74 projecting through the registering openings 72 and 73 secures the clamp to the base plate 10. To prevent rotation of the clamp about the axis of the bolt 74, the base portion 71 of the clamp is provided with a struck-out tab 75 for projection into an opening 76 in the fixture base plate 10 spaced from the securing bolt 74.

Each auxiliary spring clamp 70 is provided with a pair of arms 77 and 78 rising, respectively, from opposite ends of the base portion 71 thereof, one arm 78 being considerably longer than the other and having its outer end bent to a position in which it is in vertically spaced alignment with the shorter arm 77. Each of the arms 77 and 78 is arcutively curved at its outer free end to provide a seat 79 for accommodating therein the outer end thereof with an edge thereof with an endwise-projecting tubular neck 52 the lateral walls of which define the wiring exit passage 51, previously described. Preferably, this neck is of polygonal shape, usually square, so that upon insertion thereof in the corresponding shaped opening 17 in the base a tight fitting connection is made, both presenting outwardly the fixture base as do the curved seats 38—39 of the lamp holder 30.

It will be apparent that by reason of the fact that the arms 77 and 78 rise individually from opposite ends of the supporting base portion 71 of each 18 of the fixture base 10, the lamp holders will be disposed in such a manner as to be equally spaced, the fixture being so arranged as to be readily maintained in a flexible and so either arm is free to shift relatively to the fixture without effecting corresponding shift of the other arm. Consequently, each arm engages the lamp in contact therewith.
with a degree of resiliency not affected by the resiliency of the other arm and thus the resilient mounting and support of one lamp is not disturbed by the other so as to be of a somewhat different overall diameter, as is frequently the case. Preferably, the longer arm 76 of each clamp is provided with a stiffening rib 78a along the length thereof immediately adjoining the supporting base portion 71 of the clamp.

Referring to Figure 13 wherein the fixture wiring is shown, the electrical circuit may be traced as follows: one side of the alternating current power source is connected by the conductor 30 to one of the conductor wires 43 of the lamp holder 30 leading from one of a pair of the prong-receiving contact elements 39—39. When a lamp 20 is plugged into a prong-receiving boss 35 of the lamp holder, the cathode element (designated 20c in Figure 13) at one end of the lamp bridges the paired contact elements 39—39 and continues the circuit by way of a conductor lead 43s to one terminal of the starter switch 15, the remaining terminal of which is connected by the conductor lead 43s to one of the second pair of prong-receiving contact elements 39—39 of the socket for the plugged-in lamp. The cathode element (designated 20c in Figure 13) at the opposite end of the lamp is connected to the second pair of contact elements, the circuit being then continued through the conductor lead 43s to one terminal of the ballast coil 16, the remaining terminal of the latter being connected by the conductor wire 81 to the opposite side of the power supply lines 80 and 81 so as to complete the circuit, which is identical with that of the first lamp, both circuits being connected in parallel so as to form a main power supply line 80 and 81. It is thus apparent that the dual-socketed lamp holder 30 enables the independent connection of a pair of lamps, each with its own auxiliary apparatus, in a conventional manner wherein the lamp electrodes, starter switch and ballast coil for each lamp are in series until the thermally-operated starter switch opens for passage of current directly between the opposed electrodes of a lamp. The fixture is preferably provided with a pair of the auxiliary clamps 70 and, of course, with only one dual-socketed holder 30 to mechanically hold in place and operatively connect in the electrical circuit the pair of axially spaced circular lamps 20, the two clamps 70 and the holder 30 being preferably spaced 120° apart around the peripheral edge of the fixture base plate 10. The arcuate seats formed in the clamps and holder for reception of the lamp all present outwardly of the fixture, one set of these seats being disposed in one common plane for acceptance of one lamp and the other set being commonly disposed in a separate plane for acceptance of the other lamp.

The lamps may be mounted in position in the manner now to be described with reference to the view shown in Figure 1. Assuming the fixture to be mounted as shown, the upper lamp is first inserted at an angle with the plug side down so as to engage the lamp in the seats 70 formed in the arms 77 of the two circumferentially spaced spring clamps 70. The lamp is then shifted toward the holder 30 sufficiently to clear the lower end of the latter, with the clamp arms 77 being meanwhile flexing toward the socket to provide the requisite clearance. The lamp plug 21 is then lifted onto the frontal edge 37 of the holder and pushed along this edge to mate the plug prongs with the prong-receiving contact elements of the holder. The clamp arms 77 are resiliently biased away from the socket and, therefore, exert pressure on the lamp, firstly, to aid its insertion into the socket base 35 and, secondly, to securely retain it therein. The slope of the edge 37 of the holder with the pressure exerted on the lamp by the arms 77 of the clamps 70 serves to cam the plug into its proper seating engagement with the socket.

The lower lamp is applied to the fixture in a similar manner, this lamp being received in the seats 70 of the arms 78 of the spring clamps and in the lower seat 38 of the holder 30 with the lamp prongs respectively projecting into the openings 40 formed in the lower socket boss 35. Once assembled, the lamps are securely held by the holder and spring clamps, with each lamp being free to contract, expand or otherwise move independently of the other by reason of the independent flexing capability of the clamp arms 77 and 78. This feature is of particular value in removing the lamps, the lowermost may be removed without the need for grasping the uppermost to prevent its falling from the fixture as frequently occurs when single arm clamps are employed.

To remove the lamps the procedure of assembly as above described is merely reversed, that is, the plug of the lower lamp being disengaged first, the lamp tilted downwardly on the plug side sufficiently to clear the holder 30 with the lamp rotating in its spring clamp seats 70. The lamp is then moved to the left to disengage it from the other clamps and the same procedure is then followed in removing the upper lamp. Should it become necessary to also remove the socket or clamps for maintenance or repair purposes, these may be quickly and easily detached from the base in the manner previously described.

It will be understood that various changes may be made without departing from the spirit of the invention. For example, the escutcheon plate may be formed as, or provided with, a reflector; the clamps and socket may be positioned so as to grasp the outer rather than the inner peripheries of the lamps; the wiring may be modified for use with different auxiliary control equipment or a different power source; the number of lamps may be increased or differently spaced and positioned; and various other changes may be made in the form, size and details of the fixture or its components. It is, therefore, desired that the invention not be restricted to the specific construction shown in the drawings but be limited only by the scope and spirit of the appended claims.

What is claimed to be new and useful is:

1. In a fluorescent lighting fixture, a pair of annular fluorescent lamps and an escutcheon plate, said lamps being disposed in axially spaced parallel planes below said escutcheon plate, and a plurality of holders for the lamps secured to said escutcheon plate and circumferentially spaced about said lamps, said holders projecting downwardly from the escutcheon plate a distance sufficient to intersect the planes of said lamps, one of said holders being in the form of an inflexible member provided with a pair of outwardly presenting arcuate seats spaced axially of the fixture for respectively accommodating therein corresponding portions of said lamps, the others of said holders being each in the form of a clamp having a pair of radially spaced independently flexible arms of unequal length depending from said escutcheon plate and termi-
nating in outwardly presenting arcuate seats spaced axially of the fixture for respectively accommodating therein corresponding portions of said lamps, the longer of said arms being inwardly disposed relative to the shorter of said arms and being adapted for flexing to shift its arcuate seat inwardly to permit securement in working position and removal from said working position of the lamp most remote from said escutcheon plate without disturbance of the lamp proximate said escutcheon plate.

2. In a fluorescent lighting fixture of the character defined in claim 1 wherein the inflexible one of said holders is in the form of an electrical socket having contact members in the region of each arcuate seat thereof, which contact members are adapted for electrical connection with the conventional contact prongs of said lamps.

3. In a fluorescent lighting fixture of the character defined in claim 1 wherein the inflexible one of said holders is in the form of a duplex socket having separate sets of tubular contact elements in the regions of the spaced arcuate lamp-receiving seats aforesaid, each set of contact elements being adapted to receive and electrically engage the conventional contact prongs of one of said annular lamps to complete the electrical circuit thereto.

4. In a fluorescent lighting fixture of the character defined in claim 1 wherein the inflexible one of said holders is in the form of a hollow body member formed of electrical insulating material to provide a duplex electrical socket for said annular lamps, said hollow body member being provided with openings in the regions of the aforesaid spaced arcuate seats for the lamps and with tubular contact elements respectively in registry with said openings for receiving the conventional contact prongs of the lamps positioned in said seats.

5. In a fluorescent lighting fixture, a pair of annular fluorescent lamps and an escutcheon plate, said lamps being disposed in axially spaced parallel planes below said escutcheon plate, and a plurality of holder means for the lamps secured to said escutcheon plate and circumferen-

tially spaced about said lamps, said holder means projecting downwardly from the escutcheon plate to a distance sufficient to intersect the planes of said lamps, said holder means including inflexible electrical socket members respectively provided with outwardly presenting arcuate seats spaced axially of the fixture for respectively accommodating therein corresponding portions of said lamps, each socket member having contact elements in the region of its arcuate seat for electrical connection with the conventional contact prongs of the lamp associated therewith, said holder means also including clamps each having a pair of radially spaced independently flexible arms of unequal length depending from said escutcheon plate and terminating in outwardly presenting arcuate seats spaced axially of the fixture for respectively accommodating therein corresponding portions of said lamps, the longer of said arms being inwardly disposed relative to the shorter of said arms and being adapted for flexing to shift its arcuate seat inwardly to permit securement in working position and removal from said working position of the lamp most remote from said escutcheon plate without disturbance of the lamp proximate said escutcheon plate.

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