Aug. 4, 1942. F. C. DE REAMER ET AL 2,292,060

OPERATING MECHANISM FOR FLUORESCENT LAMPS

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Fig. 1.

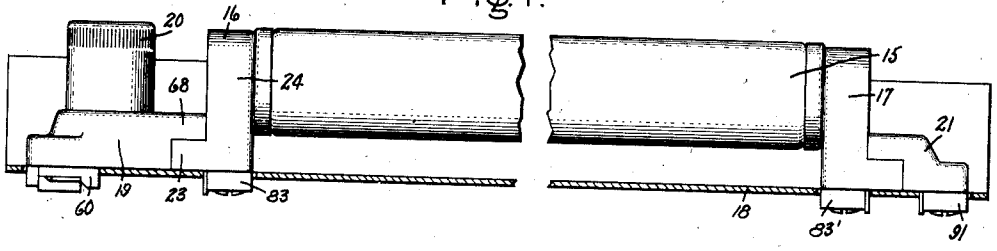


Fig. 2.

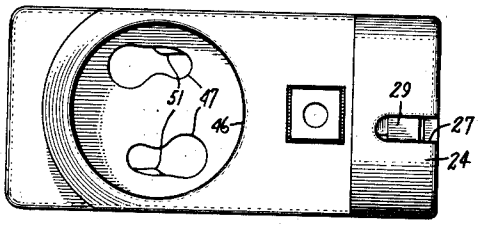


Fig. 6.

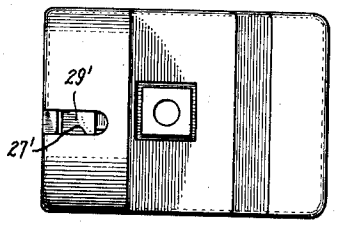


Fig. 3.

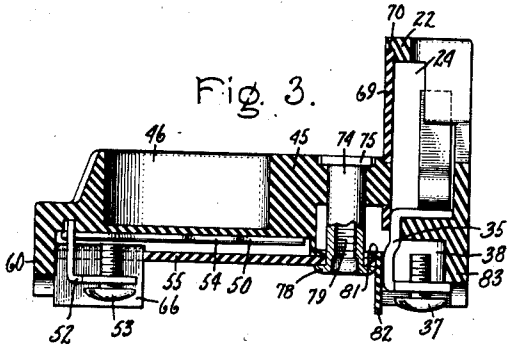


Fig. 7.

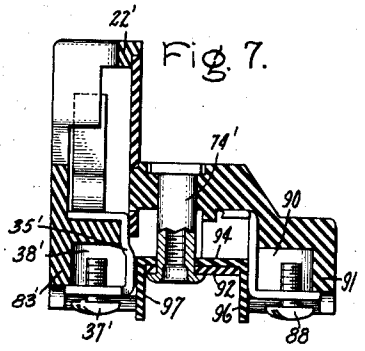


Fig. 4.

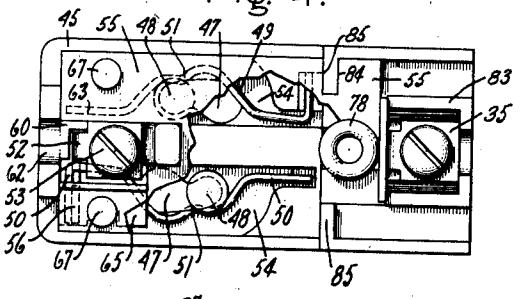


Fig. 8.

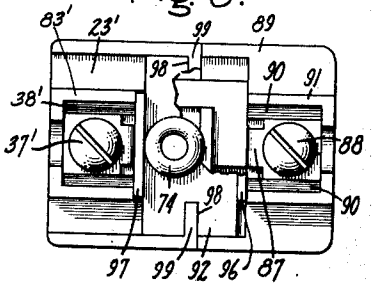
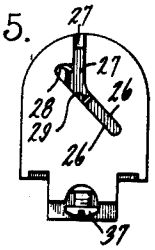


Fig. 5.



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Fig. 9.

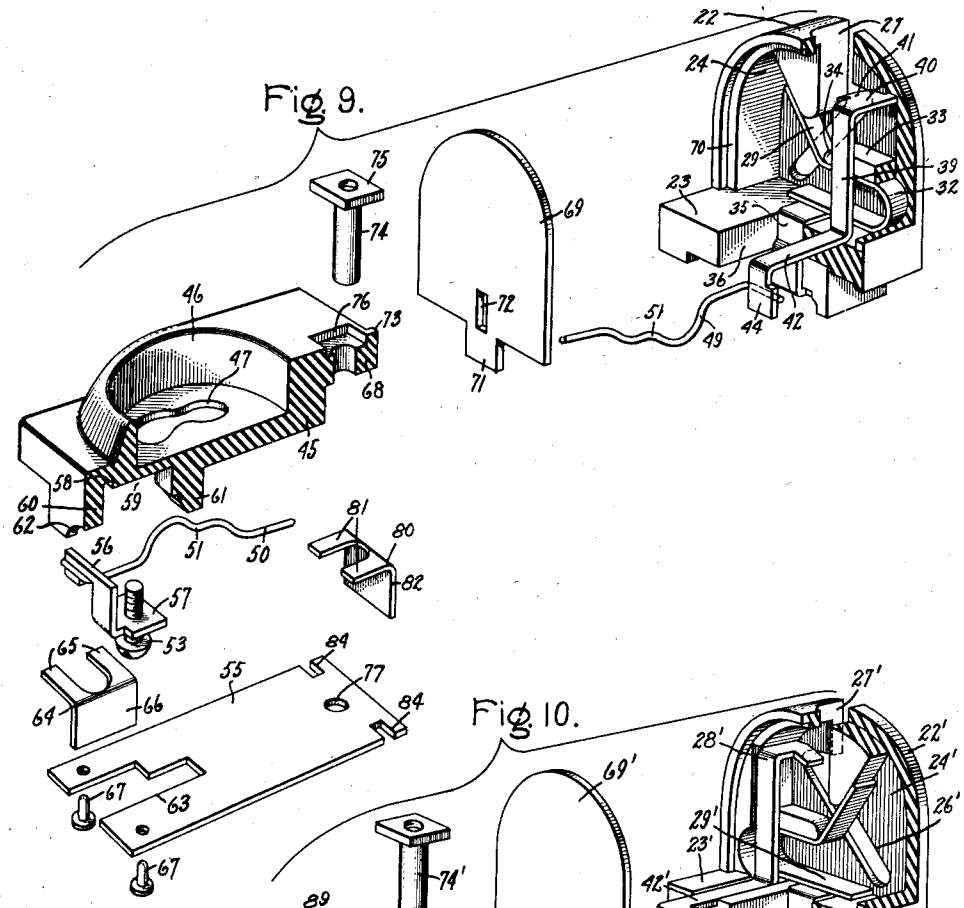


Fig. 10.

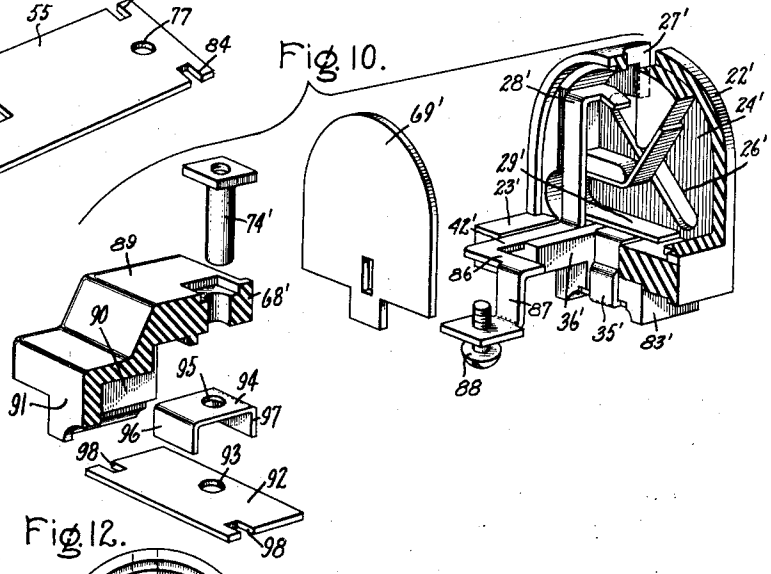


Fig. 11.

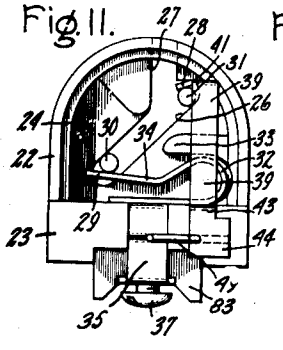
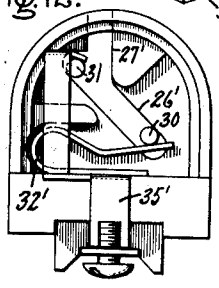


Fig. 12.



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UNITED STATES PATENT OFFICE

2,292,060

OPERATING MECHANISM FOR FLUORESCENT LAMPS

Frank C. De Reamer, and Arthur W. Clauder, Bridgeport, Conn., assignors to General Electric Company, a corporation of New York

Application June 20, 1941, Serial No. 398,888

3 Claims. (Cl. 173—328)

Our invention relates to an operating mechanism for electric discharge lamps and more particularly to an operating mechanism for fluorescent lamps of the type now in commercial use.

It is an object of our invention to provide an improved operating mechanism for fluorescent lamps in which a lamp holder for the lamp is provided with an associated socket for mounting the lamp starting switch in juxtaposition with the lamp.

It is a further object of our invention to provide an improved lamp holder which may or may not be employed with a starting switch socket for fluorescent lamps but which is compact in size and which may be used in confined space.

In the accompanying drawings, Fig. 1 illustrates a fluorescent lamp mounted at each end in lamp holders constructed in accordance with our invention; Fig. 2 is a plan view of our lamp holder combined with a socket; Fig. 3 is a sectional view through the device of Fig. 2; Fig. 4 is a view partly in section, looking at the bottom of the device of Fig. 3; Fig. 5 is a front view of our lamp holder showing the contact arrangement; Fig. 6 is a plan view of our lamp holder for the other end of the lamp in which the starter socket has been omitted; Fig. 7 is a sectional view of the lamp holder of Fig. 5; Fig. 8 is a view of the underside of the lamp holder of Figs. 5 and 6; Fig. 9 is an exploded view of the combined lamp holder and starter socket shown by Figs. 2 to 4, inclusive; Fig. 10 is an exploded view of the lamp holder shown by Figs. 5 to 7, inclusive; Fig. 11 is a view of the interior of the lamp holder of Fig. 2, and Fig. 12 is a view of the interior of the lamp holder of Fig. 5.

Referring to the drawings, we have shown a fluorescent lamp 15 mounted by means of contact pins at opposite ends in lamp holders 16 and 17, respectively, which are of the general type disclosed in Patent 2,223,166, issued November 26, 1940, to Frederick C. Dazley and assigned to the same assignee as the instant application. Both of the lamp holders 16 and 17 are mounted on a supporting surface 18 which may form part of the reflecting surface of a lighting fixture. The left hand lamp holder 16 is provided with a socket 19 for a starting switch 20 which is used to initiate an electric discharge between the cathodes of the lamp in a manner well known in the art. The general arrangement of a lamp holder provided with a socket for mounting a starting switch is disclosed in the copending application of Ward Harrison, Serial No. 309,712, filed December 18, 1939, and assigned to the same assignee as the instant application. Since only one starting switch is required for each lamp, the right hand lamp holder 17 is not provided with a socket for a starting switch but instead is provided with an extending portion 21 which cooperates with the reflecting surface 18 in a manner to be described later. The left hand lamp holder 16 and starting socket will now be described particularly with reference to Figs. 2 to 4, inclusive, 9 and 11.

As aforementioned, the lamp holders are constructed similar in certain respects to the one described in the Dazley Patent 2,223,166. The lamp holder 16 comprises a casing of any suitable insulating material such as a molded plastic, provided with an extending portion 22 and a base portion 23 extending at right angles thereto. The rear face of the extension 22 is provided with a recess 24. In the opposite front face of the housing a groove 26 is formed which extends at an angle to the vertical axis of the lamp holder. This groove merges with a vertical slot 27 extending to the upper edge of the body of the lamp holder. As shown most clearly by Fig. 11, spaced contact members 28 and 29 are mounted in recess 24 and extend to points adjacent the groove 26 where they cooperate with the spaced contact pins 30 and 31 of a fluorescent lamp. One of the spaced contact members 28 and 29 is made flexible, in this case the contact member 29, so that the spaced contact pins of the fluorescent lamp may be moved in a straight line at right angles to the axis of the lamp through the slot 27 into the groove 26 where the contact blade 29 is moved downwardly by engagement with the lamp pin 30 to permit the other contact pin to slip into engagement with the fixed contact member 28. The resiliency of the contact blade 29 now holds the lamp pins in seated engagement with the lamp holder contacts.

The movable contact member or blade 29 is formed of any suitable spring material, such as spring bronze; it is provided with a U-shaped portion 32 which is located in the recess 24 between the base 23 of the housing and an abutment 33. A portion of the flexible blade extends outwardly at an angle to the U-shaped portion, as shown at 34, for engaging the contact pin 30 of the lamp in the manner aforementioned. At its other end, the contact blade is secured in any suitable manner, such as by spot welding, to a U-shaped terminal clip 35. This terminal clip is located in a slot 36 extending inwardly from the rear face of the housing base 23. The arm of the U-shaped clip secured to the contact blade 29 is positioned within the recess 24 while the other arm of the U extends around the bottom of the housing and is provided with a terminal screw 37 for connection to an electric circuit. The terminal screw extends into a recess 38 in the base of the housing.

The fixed contact member or blade 28 is formed of relatively heavy sheet material, generally in the form of an L, as shown by Fig. 9.

The vertical arm 39 of the L is formed with an offset portion 40 at one end which in turn is provided with a contact surface 41 for engaging the lamp contact pin 31. The offset portion 40 of the L-shaped contact member is spaced from the contact blade 29 so that an air gap separates these two contact members. A horizontal portion 42 of the L-shaped member extends outwardly in a recess 43 formed in the base 23 and at its outer end is bent downwardly, as shown at 44 for engagement with a contact member of the starter socket in a manner now to be described.

The starter socket 19 comprises a base 45 of any suitable insulating material, such as a molded plastic, in which is provided receptacle means for receiving the starting switch. The receptacle means includes an annular recess 46 in the upper surface of the base, the bottom of the recess being provided with concentrically arranged keyhole slots 47 for receiving the spaced contact pins 48 of the starting switch. Cooperating with the keyhole slots in engaging the starter contact pins are flexible contact members 49 and 40. These contact members are formed of any suitable spring material, for example, spring bronze wire. They are provided with projections 51 which extend into the planes of the keyhole slots and maintain the starter contact pins in locked position in the narrower portions of the slots, in the manner shown by Fig. 4. The starter switch 20 is mounted on the socket simply by inserting the contact pins 48 into the enlarged portions of the keyhole slots and rotating the starter to snap the pins past the projections 51 into the narrower portions of the slots.

The socket contact member 49 is connected at one end in any suitable manner, as by spot welding, to the bent extension 44 of the lamp holder contact 29 while the contact member 50 is connected in a similar manner to an angular terminal plate 52 provided with a terminal screw 53 for connection to an electric circuit. In this manner, the starting switch is placed in series with one of the lamp holders for connection into the lamp operating circuit in a manner well known in the art. Each of the contact members 49 and 50 rests in recesses 54 formed in the bottom of the socket housing, the recesses being closed by a cover plate 55 of insulating material, such as sheet fiber.

Referring to Fig. 9, the angularly shaped terminal plate 52 is formed of relatively heavy sheet metal and is provided with a laterally extending arm 56 to which the contact member 50 is fastened in the manner aforementioned. That portion of the plate in which the terminal screw 53 is mounted is bent at right angles, as shown at 57, so that the terminal screw is accessible from beneath the socket housing. The arm 56 rests in a groove 58 formed in the upper wall of a recess 59 shaped by two opposed extensions 60 and 61 which depend from the bottom of the housing. In order to facilitate wiring to the terminal screw 53, the extension 60 is provided with a groove 62 for receiving a circuit wire. In addition to closing the recesses 54, the cover plate 55 holds the terminal plate 52 in assembled position by bearing on the lateral arm 56, as shown in Fig. 4. The plate is formed with a slot 63 which receives the extensions 60 and 61. An angularly shaped piece of insulating material 64 is disposed between the arm 56 and the cover plate for the purpose of protecting the electrical connection at the terminal plate. To this end, the insulating piece is formed with opposed arms 65 held in position between the cover plate and the arm 56 and an upstanding lip 66 which extends along side the terminal screw 53. The arms 65 straddle one of the drive pins 67 which secure the cover plate to the socket base.

The socket housing 45 is provided at one end with a lateral extension 68 which is adapted to overlie the base 23 of the lampholder. In this way, the starter socket and lamp holder are joined into a unitary device. A closure plate 69 of insulating material, such as sheet fiber, is provided for the recess 24 in the body of the lamp holder; the closure plate is fastened between the starter socket and the lamp holder and is designed to fit into a rabbeted edge 70 of the wall of the recess 24. For holding the closure plate securely in position, it is formed with a tongue 71 which extends into the slot 36 in assembled position and also with an opening 72 which receives a boss 73 projecting from the extension 68.

The socket housing and lamp holder are held together in assembled relationship by a suitable fastening means, in this case, a hollow rivet 74. At one end, the rivet is provided with a polygonally shaped head 75 seated in a corresponding recess 76 in the upper face of the extension 68 while at the other end it extends through an opening 77 in the cover plate and is peened over thereon, as shown at 78. In order to receive a fastening screw the rivet is internally threaded as shown at 79.

An angularly shaped piece of insulating material 80, such as sheet fiber, is used to protect the terminal connection at the screw 37. To this end, the insulating piece is formed with lateral arms 81 which span the rivet 74 and which are clamped between the cover plate 55 and the base; it is also formed with an upstanding lip 82 which extends along side the screw 37. The terminal 37 extends into the aforementioned recess 38 which is formed by a downwardly extending projection 83 of generally rectangular form, as shown by Fig. 4. Three sides of the projection enclose the head of the terminal screw while the fourth side is formed by the lip 82. To assist in holding the starter socket and lamp holder in assembled relationship, the cover plate 55 is provided with notches 84 in its opposite edges which receive an edge bead 85 formed on the base of the lamp holder; this prevents the holding rivet 74 from sliding laterally out of the slot 36 in the lamp holder base.

The structure thus far described provides a combined lamp holder and starter socket for supporting one end of the lamp. Since only a single starting switch is required for each lamp, the starter socket has been omitted from the right hand lamp holder 17 and has been replaced with a terminal housing which is of the same general contour as the starter socket and which gives the lamp holder a pleasing appearance.

Since the contact pins of the lamp are in alignment at opposite ends, and since the lamp holder 17 faces the lamp holder 16, the arrangement of the contacts and guide slot in the lamp holder 17 will be reversed from the arrangement in the lampholder 16. This is necessary so that the grooves 26 will slope in the same direction when the lamp holders face each other. Except for the reversed arrangement of the parts, the lamp holder 17 is the same as the lamp holder 16 so that corresponding elements will be referred to by the same reference numerals with the addition of a prime and only so much of the arrangement will be described as is necessary to complete the structure.

The lamp holder 17 comprises a housing having an extension 22' and a base 23', the extension being provided with a recess 24' extending inwardly from a rear face thereof. In the opposite face, the extension is formed with an angularly arranged groove 26' which merges with a slot 27' extending to an edge of the housing. The lamp contact pins are inserted in the groove in the manner aforementioned and cooperate with spaced contact members 28' and 29'.

The contact member 29' is formed of flexible spring material the same as the member 29 and is shaped with a U-bend at 32', one end of which is secured in any suitable manner to a U-shaped terminal plate 35'. The terminal plate 35' rests in the slot 36' and is provided with a terminal screw 37' extending into a recess 38'. This recess is formed by an extension of the housing 83' the same as in the left hand lamp holder 16. The other contact member 28' while provided with the lateral extension 42' is not connected to a starter socket contact; rather it is provided with a separate terminal means. To this end, the arm 42' is formed with an offset portion 86 the end of which extends downwardly at an angle, as shown at 87, to provide a terminal plate for receiving a terminal screw 88. By this arrangement, the terminal screws 88 and 37' are in alignment.

The housing for the terminal comprises a member 89 of insulating material, the member being provided at one end with a lateral extension 68' corresponding to the extension on the starter socket. The extension overlies the base 23' of the lamp holder and is secured in position by a suitable fastening means such as the rivet 74'. This assembly holds a closure plate 69' over the recess 24'. In assembled position the terminal portion of the contact member 28' and the terminal screw 88 rest in a recess 90 in the housing 89, the recess being formed by a projection 91 extending from the bottom of the housing. A cover plate 92 is provided to close the interior of the assembly and is held in position by the rivet 74' which passes through an opening 93. Disposed between the cover plate 92 and the wall of the terminal housing is a U-shaped insulating member 94 of sheet fiber, or the like. The insulating member is provided with an opening 95 for receiving the fastening rivet 74' and opposite arms of the U form downwardly extending lips 96 and 97, one being disposed on each of opposite sides of the cover plate 92, as shown by Figs. 7 and 8. Three sides of the recess 90, which receives the terminal screw 88, are formed by the walls of the extension 91 while the fourth side is formed by the lip 96. Similarly, the lip 97 forms the fourth closing wall of the recess 38', the remaining walls being formed by depending projection 83'. In order to prevent the fastening rivet 74' from being pulled laterally out of the slot 36', the cover plate 92 is formed in opposite sides with notches 98 which receive a bead 99 upstanding from the lamp holder base. Since this bead is locked in the notches 98 and since the rivet 74' is fastened to the extension 68', the base of the lamp holder cannot be pulled away from these elements.

To mount the combined lamp holder 16 and socket 19, the reflector base is provided with spaced openings for receiving the projections 60 and 83, as shown by Fig. 1. The assembly may be fastened in position by a screw (not shown) threaded into the hollow rivet 74. The projections serve to position the assembly on the base and prevent it from turning out of alignment with the other lamp holder. Similarly, the other lamp holder 16 and terminal housing 21 are mounted on the base by inserting the projections 83' and 91 in suitable openings in the base and fastening the assembly in position.

Our lamp holder is one in which the overall size of the housing has been reduced and in which provision has been made to directly connect the starter socket to the lamp holder. This means that the assembly is well adapted for use in lighting fixtures where there is a minimum of available space.

What we claim as new and desire to secure by Letters Patent of the United States, is:

1. A socket for use with a lamp having spaced contact pins comprising, in combination, a housing of insulating material having an extension provided with a recess and a base extending at an angle thereto provided with a groove, spaced contact members in the recess for engaging the lamp pins, one of said contact members having a terminal seated in said groove, the other contact member having a portion extending beyond the confines of said base, a housing of insulating material for said last-mentioned portion having a projection overlying said base and groove, a closure plate for said recess, said projection engaging said closure plate to hold it in position and fastening means extending through the projection and groove for securing the projection to said base.

2. A socket for use with a lamp having spaced contact pins comprising, in combination, a housing of insulating material having an extension provided with a recess and a base extending at an angle thereto provided with a groove, spaced contact members in the recess for engaging the lamp pins, one of the contact members having a terminal seated in the groove, the other contact member having a portion extending beyond the confines of said base, a housing of insulating material for said last-mentioned portion having a projection overlying said base and groove, a closure plate for said recess having a tongue seated in said groove, said projection engaging said closure plate to hold it in position, and a fastening pin extending through the projection and groove for securing the projection to said base.

3. In a socket for use with a lamp having spaced contact pins, a housing of insulating material having a recess therein and a groove merging with said recess and extending to an edge of the housing for receiving the lamp contact pins, a flexible U-shaped contact member seated in said recess and having a portion adjacent the groove for engaging one of the lamp pins, an angular contact member, one arm of the angle being disposed in said recess and having an offset portion adjacent the groove for engaging the other lamp pin, the other arm of the angle extending outside the recess and a closure plate for said recess.

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