Oct. 13, 1942. M. A. BABB 2,298,336

HOT CATHODE GLOW DISCHARGE LAMP UNIT

Filed Jan. 28, 1939

Fig. 1.

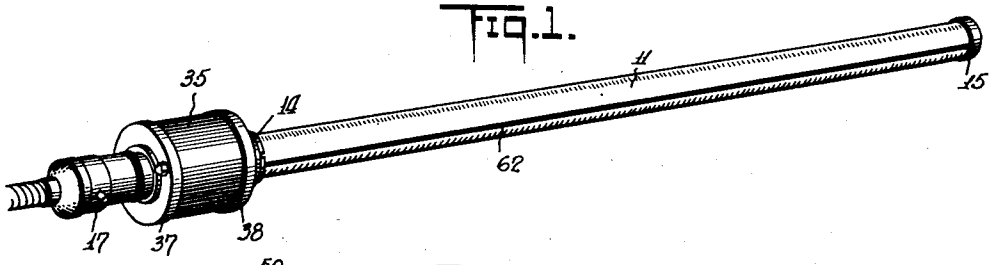


Fig. 2.

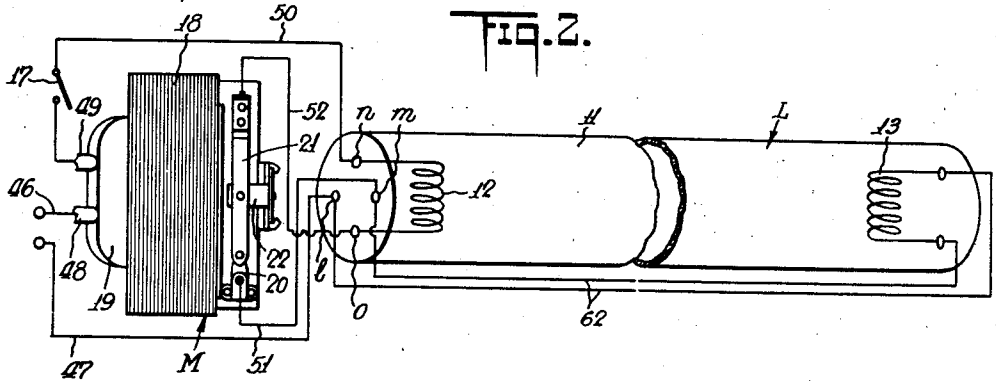


Fig. 3.

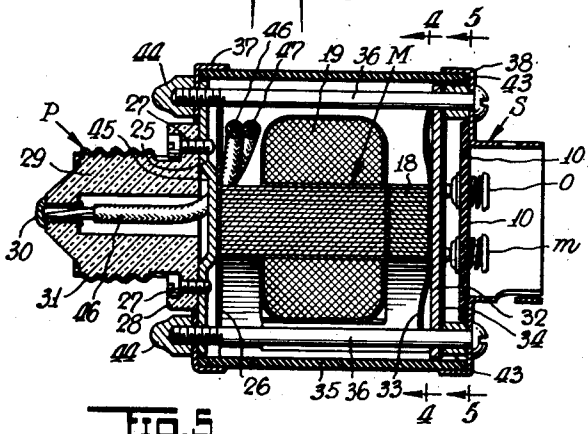


Fig. 4.

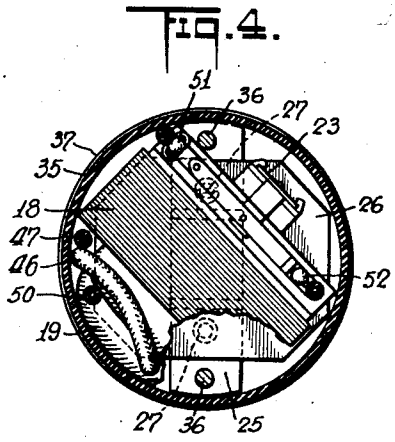


Fig. 5.

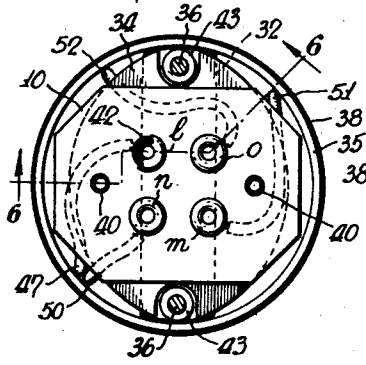


Fig. 6.

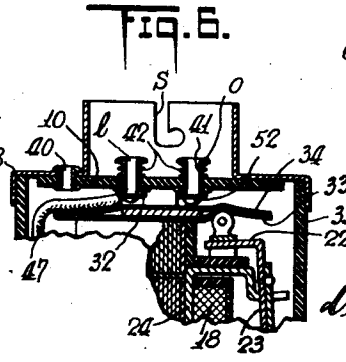
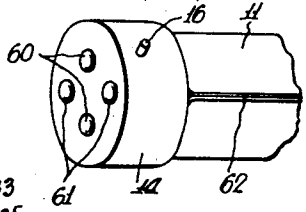


Fig. 7.



INVENTOR
Maynard A. Babb
BY
Dean Fairbank & Hirsch
ATTORNEYS

Patented Oct. 13, 1942

2,298,336

UNITED STATES PATENT OFFICE

2,298,336

HOT CATHODE GLOW DISCHARGE LAMP UNIT

Maynard A. Babb, North Bergen, N. J., assignor to Duro Test Corporation, North Bergen, N. J., a corporation of New York

Application January 28, 1939, Serial No. 253,254

8 Claims. (Cl. 176—124)

An object of the present invention is to provide a hot cathode glow discharge lamp installation that is rendered compact and economical by the elimination of complicated wiring involved in the connection to terminal clips that must be precisely located for engaging the opposite ends of the tubular lamp unit and by the further elimination of such automatic starting controls for the lamp as have to be mounted at available places remote therefrom.

More specifically, it is an object to provide a hot cathode glow discharge lamp unit which lends itself readily for direct application to an ordinary lamp socket or other conventional outlet and incorporates in a self-contained unit all of the automatic control instrumentalities required for starting and operating the lamp.

Another object is to provide a unit of the above type which admits of ready replacement of the glow tube element thereof with respect to the control element therefor.

Another object is to provide a combined control unit and adaptor of compact and inexpensive construction which coacts with the conventional bayonet pin terminal of the glow lamp and affords a mount for the lamp in the conventional lamp socket and at the same time affords an enclosure for the automatic control unit of the lamp.

A feature of the invention is the construction of the glow lamp with both pairs of the terminals for the thermionic filaments thereof located at one end the same end cap thereof, which cap is equipped with bayonet pins for mounting the lamp in the bayonet socket of an adaptor which has the conventional electric plug for mounting in an ordinary lamp socket, the adaptor constituting the casing for the electro-magnetic control unit by which the circuit connections to the glow lamp unit are automatically established and controlled.

In the accompanying drawing in which is shown one of various possible embodiments of the several features of the invention,

Fig. 1 is a perspective view of the complete installation affixed in a conventional electric lamp switch socket,

Fig. 2 is a wiring diagram of the unit showing the parts in their general structural relationship,

Fig. 3 is a view in longitudinal cross-section through the combined adaptor and control unit,

Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 3,

Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 3,

Fig. 6 is a fragmentary sectional view taken on line 6—6 of Fig. 5, and

Fig. 7 is a perspective view, with parts broken away, of the mounting end of the glow lamp.

Referring now to the drawing, the adaptor unit comprises an electrical plug P with conventional central and screw shell terminals, an electro-magnetic starting control and ballast unit M mounted in a casing, at the outer end of which there is a bayonet socket S, the base plate 10 of which has two pairs of contacts.

The glow lamp L has the usual glass casing 11 with thermionic electrodes in the form of filaments 12 and 13 affixed to the opposite insulating end caps 14 and 15 respectively thereof and coated with barium or strontium carbonate or the like to give off ions. The terminals 60 of filament 12, as well as terminals 61 of filament 13 both are in one and the same end cap 14, which cap also has bayonet pins 16 for mounting in the bayonet socket S. The connection between the ends of the remote filament 13 and its terminals 61 are a pair of conductors 62 extending longitudinally of the glass tube, desirably at the outside, and may be held in place by water glass or equivalent cementing means.

Except for the structural features above described, whereby the terminals for both of the cathodes are disposed at one and the same end of the unit, the same may be conventional. It may be filled with rarified noble gas such as argon, krypton, neon or xenon, together with a small amount of mercury. Under relatively low voltage operation, the electrons given off by the incandescent cathodes will start glow discharge of the noble gas, resulting in ionizing and vaporizing the mercury to produce ultra-violet light. Appropriate fluorescent paint on the inner wall of the glass tube renders such light visible and depending on the character of such paint, light of any desired color may be obtained.

The unit made up of the adaptor and the lamp tube can be mounted as such in the lamp socket. Upon closing the switch 17 the electro-magnetic control M will control the starting and operation of the lamp in the desired manner.

A desirable form of starting, control and ballast unit is that more fully described and claimed in my copending application jointly with Samuel Bagno, Serial No. 247,404, filed December 23, 1938. For present purposes it need be but briefly indicated, that that unit comprises an electro-magnetic field structure 18 with an electro-magnetic coil 19 encircling the central leg thereof, and a contact make and break device including

a fixed contact 20 and a movable spring contact 21 is under control of the heel 22 of an armature 23 in an auxiliary magnetic circuit the yoke 24 of which extends through coil 18.

The self-contained control unit is mounted in an adaptor which includes a metallic cross bar 25 upon which the field structure 18 rests, there being an intervening sheet 26 of paper or other insulation, the cross bar 25 being attached by screws 27 to the flange 28 of a porcelain or other insulating electrical plug 29 of conventional construction, which has a central contact 30 and a screw shell contact 31. Resting upon the field structure 18 is another metal cross bar member 32 with an intervening paper sheet 33 and preferably also a superposed paper sheet 34. A cylindrical tube 35 of "Bakelite" or equivalent insulating material serves as a casing for the starting and control unit, which is clamped in place therein between the cross bar members 25 and 32 by a pair of bolts 36 extending longitudinally through the tube 35 and through corresponding apertures in the respective ends of the cross bars 25 and 32, and through a pair of cap rings 37 and 38 telescoped over the respective ends of the tube 35. Cap ring 37 embraces the periphery of the flange 28 on the insulating terminal plug 29 and cap ring 38 has unitary therewith a coaxial bayonet socket S. The apertures in cross bar 25 are tapped for accommodating bolts 36, so that the control unit M may be clamped in place between plates 25 and 32 prior to application of cap ring 37 and the threading of cap nuts 44 over the ends of bolts 36.

The under face of cap ring 38 carries a rigid fibrous contact plate 10 attached thereto as for instance by rivets 40 and carrying two pairs of contacts *l* and *m*, *n* and *o*, which are in the form of elongated rivet members 41 that are urged outward by encircling coil springs 42 reacting against the fibre plate 10. To afford clearance for conductors to be hereinafter referred to, the cross plate 32 is spaced from the end cap 38 by intervening spacer collars 43 through which the bolts 36 extend. The lower cross bar 25 is preferably formed with an upwardly offset mid-portion 45 to afford clearance for the conductors 46 and 47 respectively from the center contact 30 and the shell contact 31 of the plug. Said conductors, as shown, are connected one to terminal 48 of electromagnetic coil 18 and the other to the lower end of contact *l* on the plate 10. The other terminal 49 of coil 18 is connected by way of switch 17 through conductor 50 to contact *n'*. The other two terminals *m* and *o* are connected to the contact breaker, the former, by conductor 51 leading to the fixed contact 20 and the latter by conductor 52 leading to the movable contact 21 of the contact breaker. The space afforded by the spacer collars 43 provides clearance to permit the ends of such conductors to be accommodated under insulating plate 10.

The adaptor thus affords a neat and compact generally cylindrical unit with an axial plug at one end to fit into a lamp socket and an axial bayonet at the other end for accommodating the lamp. It is of course understood that instead of the screw plug P a conventional prong connector could be used for plugging into an outlet box or instead of the unitary screw plug the same may be of the familiar two-part construction with a screw shell element which is detachable to expose a pair of prongs.

The adaptor may be removably mounted as a unit in an ordinary lamp socket and removably mounts the hot cathode glow discharge lamp, so that the need for special wiring is obviated. The starter and adaptor unit may be continued in use indefinitely and lamps that are spent may be readily replaced in the bayonet socket thereof.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A hot cathode glow discharge unit adapted to be plugged in a socket on the conventional house lighting circuit comprising an electromagnetic control unit, a casing therefor having a plug at one end adapted for mounting in a conventional electric outlet, a bayonet socket at the other end having an insulating base, two pairs of contacts extending through said base, automatic electro-magnetic control means in said case, and connected to the terminals of said plug and to said two pairs of terminals, and a tubular hot cathode glow discharge lamp having a bayonet plug end for coaction with said bayonet socket, hot cathodes at opposite ends of said tube, the terminals of said two cathodes being connected to corresponding pairs of terminals in the bayonet plug end of said lamp.

2. A hot cathode glow discharge lamp unit adapted to be plugged in a socket on the conventional house lighting circuit comprising a tubular lamp having thermionic filaments at opposite ends thereof, two pairs of terminals for said filaments at one and the same end of said tubular lamp, a combined adaptor and electromagnetic control unit for said lamp detachably mounting the same, said adaptor having a plug for coaction with a conventional lamp outlet and having a bayonet socket at the other end thereof for detachably mounting the tube, and two pairs of contacts in the base of said bayonet socket coacting with those of said lamp, the electro-magnetic unit having a contact breaker therein for making and breaking a series connection of said filaments in lamp operation.

3. A hot cathode glow discharge lamp comprising a tubular casing having insulating closures at opposite ends thereof, thermionic filaments carried by said end closures, two pairs of terminals in one of said closure caps; one pair connected to the contiguous filament, the other pair to the filament at the opposite end of said bulb and conductors longitudinally of said tube joining the ends of said latter filament to said other pair of terminals.

4. A hot cathode glow discharge lamp comprising a glass tube having insulating end caps, thermionic filaments mounted in the respective caps, the cap at one end of said tube having the terminals for both of said filaments, the connection from the remote filament to the terminals thereof including a pair of insulated conductors extending longitudinally at the exterior of said tubular lamp, said tubular lamp having bayonet pins protruding from the contact bearing cap thereof.

5. A combined adaptor and control unit for a hot cathode glow discharge lamp comprising a casing having an insulating wall and metallic end cap rings, a cross bar in said casing near

the base thereof, an electrical contact plug affixed to said cross bar and extending into the opening of one of said caps, the other cap having a bayonet socket, an insulating plate carried by the latter cap, bolts disposed within the inner periphery of said casing extending longitudinally therethrough and through the end caps thereof, and clamping the same together and an electromagnetic control unit within said casing and means engaging the end of said unit and serving in the assembled structure to clamp said unit against said cross bar.

6. A combined adaptor and control unit for a hot cathode glow discharge lamp including an electro-magnetic control unit having a magnetic field structure, a pair of metallic cross bars extending transversely across opposite ends of said field structure, an insulating casing wall encircling said control units and the cross bars, metal caps telescoped over the ends of said insulating casing, an electric mounting plug extending through the opening in one of said caps and attached by screws to the corresponding cross bar, the other of said caps having unitary therewith a bayonet socket, spacers intervening between the outer metal cap and the corresponding cross bar, and bolts extending longitudinally through said caps and said spacers disposed within the inner periphery of the casing wall, and clamping the control unit between said cross bars, the outer cap having an insulating plate secured to the inside thereof, contacts mounted thereon and accessible through the bayonet socket, and electrical connections between said plug, said control unit and said contacts.

7. A combined adaptor and control unit for a hot cathode glow discharge lamp comprising an electro-magnetic unit, a casing therefor, an electric plug coaxial with and at the base of said casing, a bayonet socket coaxial with and at the outer end of said casing, and having a flange, an insulating plate lodged against the back of said flange and riveted thereto and having two pairs of contacts, an electro-magnetic control unit within said casing including a magnetically controlled contact breaker, one terminal of the electro-magnetic coil unit being connected to one of the plug terminals and the other to one of the socket terminals, the other plug terminal being connected to a second one of said socket terminals and the remaining two of said socket terminals being connected to the terminals of the contact breaker.

8. A combined adaptor and control unit for a hot cathode glow discharge lamp, comprising a casing, an electric plug coaxial with and at the base of said casing, a socket unit for a glow discharge lamp coaxial with and at the outer end of said casing, an electromagnetic control unit within said casing, a pair of metallic cross bars extending transversely across the opposite ends of the control unit, spacer collars between said socket unit and one of said cross bars, a pair of bolts longitudinally of said casing extending through said socket unit and within the inner periphery of said casing, the respective spacers and the contiguous cross bar and threaded near their opposite ends into the opposite cross bar to clamp the control unit in position therebetween, a metallic cap ring encircling said plug and telescoped over the end of said casing and nuts threaded upon the free ends of said bolts and engaging said cap.

MAYNARD A. BABB.