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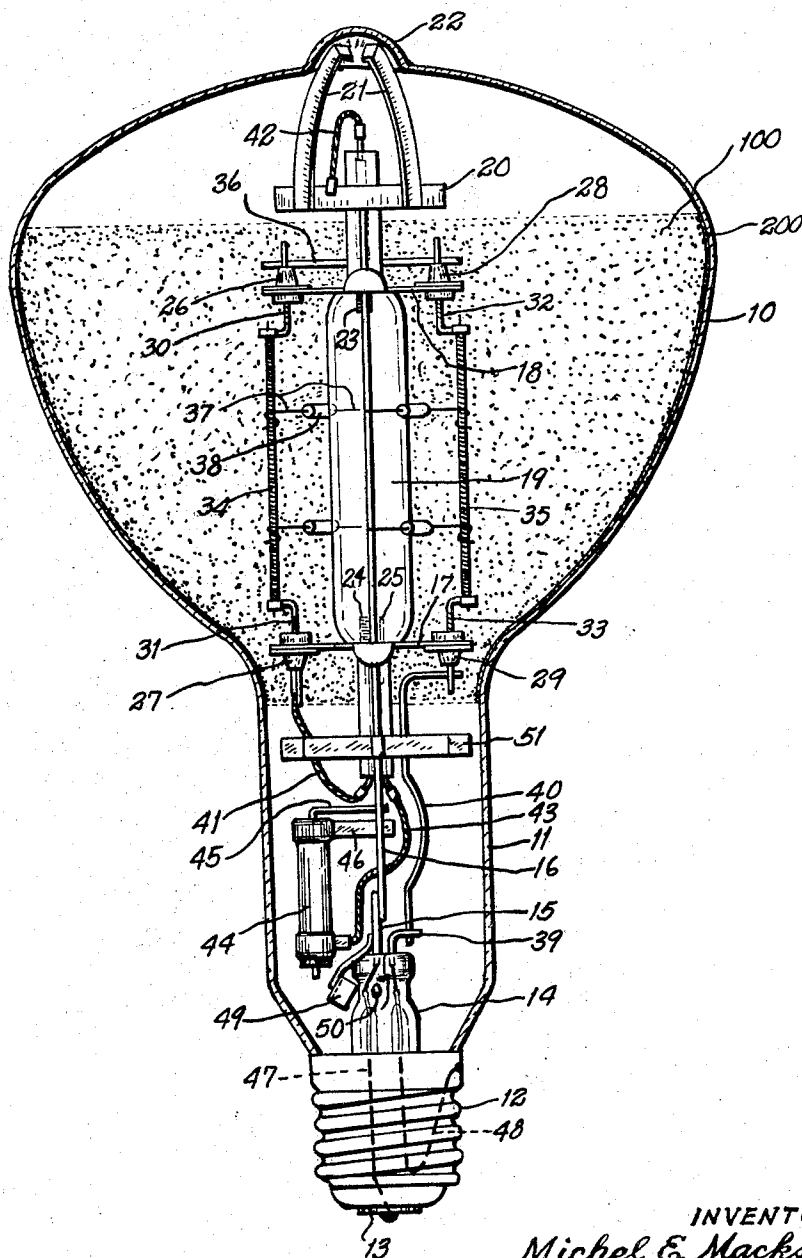
2,879,449

LAMP CONSTRUCTION

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2 Sheets-Sheet 1

Fig. 1



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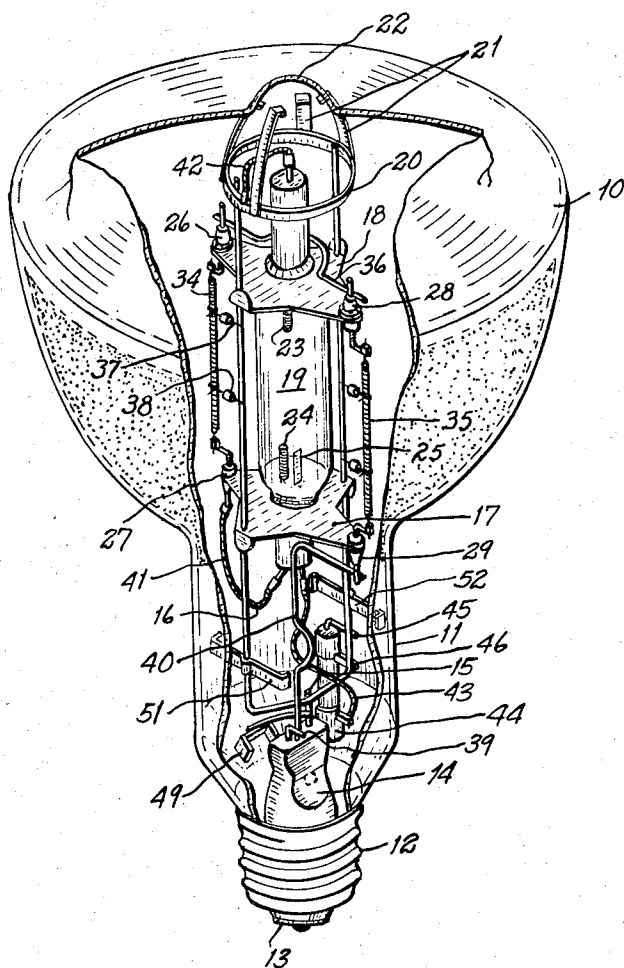
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Fig. 2



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LAMP CONSTRUCTION

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Application September 4, 1956, Serial No. 607,754

4 Claims. (Cl. 315—49)

This invention involves improvements in the construction of electric light sources.

The construction is concerned with the lamp of the type having as the source of illumination an arc discharge tube, an incandescent filament, and a fluorescent coating.

The general object of this invention is to provide a practical and useful commercial form of lamp construction combining three such light sources into a single unitary construction in which the active elements thereof cooperate to produce illumination in an efficient spectrum and of suitable color and density.

The full nature of the invention will best be understood from the following description of the embodiment thereof illustrated in the attached drawings.

In the drawings,

Figure 1 is a vertical, central, cross-sectional view through the envelope of the lamp of this invention, showing all interior parts in elevation;

Figure 2 is a perspective view of the lamp construction of Figure 1 with a portion of the envelope broken away;

Figure 3 is a schematic and diagrammatic illustration of the circuit connections employed in the lamp.

As illustrated in the drawings, the lamp comprises an envelope consisting of a bulbous portion 10 and an integral neck portion 11. This envelope is exhausted to a high vacuum and supplied with an atmosphere of nitrogen or argon, or mixtures thereof, to a pressure of the order of 500 millimeters of mercury. The end of the neck portion is provided with a screw base comprising the threaded shell 12 with the contact button 13 mounted thereon and insulated therefrom. The envelope is provided with the re-entrant stem 14 which terminates in the usual press.

Mounted in the press of the stem is a wire support 15, to which is welded a U-shaped frame 16. Mounted on this frame in longitudinally spaced relation are a pair of suitably shaped metal plates 17 and 18 which are welded to the frame and provided with aligned central openings. Mounted between these plates is an arc discharge lamp 18 having reduced ends to seat in the apertures of the plates.

Welded to the upper free ends of the frame 16 is a supporting and centering gauge consisting of a ring 20 with extending spring arms 21 arranged to seat in a dimple 22 formed in the end wall of the bulbous portion 10 of the lamp. With this arrangement the frame 16 is supported at both ends with minimum relative movement between the frame and the parts supported thereon and the envelope and to align these parts axially of the envelope.

The arc discharge lamp 19 consists of an evacuated envelope having a pair of electron emissive cathodes 23 and 24 sealed in and supported at the respective ends thereof. These cathodes can be of many suitable and known forms, exemplary of which are the cathode constructions disclosed in my issued Patent No. 2,525,262

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and No. 2,525,263, and my copending application Serial No. 607,754, filed September 4, 1956.

It is preferred, as shown, to use a prop or supporting electrode 25, also mounted and sealed in one end of the arc tube and positioned adjacent one end of the cathodes, in this case the cathode 24, in accordance with principles disclosed in my issued Patent No. 2,517,126. The envelope of the arc tube 19 is evacuated and provided with a precisely measured amount of mercury in accordance with well known practice in this art, to provide an arc discharge in the highly ultra-violet range.

Mounted at one side of each of the plates 17 and 18 are a pair of insulators 27 and 26, and at the other side a pair of insulators 29 and 28. Supported in these insulators in aligned pairs, are the metallic hooks 31 and 30 and 33 and 32. The ends of an incandescent filament 34 are secured in the hooks 30 and 31, and similarly the ends of an incandescent filament 35 are secured in the hooks 32 and 33. The filament ends can be attached to the hooks by welding or by means of clamping the hook around the filament ends. These filaments can be of the coiled type and are preferably made of thoriated tungsten and are known as no sag filaments.

Extending between the hooks 26 and 32 is a jumper connection 36 welded thereto. The filament sections are physically braced by means of a cross bracing structure consisting of wires sealed in the insulating rods 38 and welded to the adjacent arms of the frame 16 and mechanically attached at the other ends to the filaments.

Sealed in the press of the stem 14 is another wire support 39 which is electrically connected by a jumper wire 40 welded thereto at one end, to the hook 33, to which it is welded at the other end. The hook 31 is connected by a flexible lead 41 to the cathode 24. Cathode 23 is connected by the flexible lead 42 to the ring 20 and hence to the frame 16. The prop electrode 25 is connected by the flexible lead 43 to one end of a current limiting resistor 44. The other terminal 45 of the resistor is welded to the frame 16. The resistor has a built in support 46 which is also welded to the frame 16.

Wire support 15 is connected by a lead 47 to the contact button 13, and wire support 39 is connected by the lead 48 to the threaded shell 12.

The re-entrant stem 14 is provided with an opening 50 formed at the end of the tubulation tube by means of which the main envelope is evacuated and filled with the gaseous atmosphere referred to above.

Welded to the support wire 15 is a shield 49 which is positioned opposite the opening 15 so that during the manufacture of the lamp the rush of gases and vapors into and out of the lamp will not be destructive of the fluorescent coating 100. This fluorescent coating is applied to the inner surface of the bulbous portion 10 of the envelope but preferably terminates short of the end so as to leave the end clear. It may cover the entire end wall of the envelope.

Before the fluorescent coating is applied to the envelope it is preferable to apply over the area to be covered by the fluorescent coating, a thin reflecting layer 200 which may be magnesium oxide, titanium dioxide, silver or aluminum. The fluorescent coating is then applied thereover. The reflector 200 serves the function of reflecting the ultra-violet light from the source 19 and thereby tending to excite the crystals of the fluorescent coating from the rear as well as from the face of the coating directed towards the arc tube. The magnesium oxide and titanium dioxide coating are particularly effective in reflecting the ultra-violet light to excite the crystals that are coated from the rear.

The frame 16 is provided with a pair of spring projections 51 and 52 towards the lower end thereof positioned, shaped and dimensioned to engage the inner sur-

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face of neck portion 11 to provide further support for the active elements of the lamp against vibration and to provide accurate centering thereof.

Referring to Figure 3, it will be seen that the lead 47 is directly connected to the cathode 23 of the arc discharge lamp 19. The prop electrode 25 is connected to the same lead through the high resistance current limiting resistor 44. Lead 48 is connected in series with the filament sections 34 and 35 and the cathode 24.

In the operation of this lamp, when current is applied to the terminals 47 and 48 through the contacts 13 and 12, a voltage will be applied across the cathodes 23 and 24 and the prop 25. The arc will first strike between the prop 25, which is preferably pointed, and the cathode 23, and will then transfer so as to be between the cathodes 23 and 24. The resistor 44 will then limit the flow of current to the prop 25 and prevent arcing across between it and the cathode 24. As soon as the arc strikes in the tube 19 it will be placed in circuit in series with the incandescent filaments 34 and 35, which in addition to providing visible light, will act as current limiting ballasts for the arc discharge tube whose resistance is relatively low when it becomes conductive. The resistance of the filaments 34 and 35 is considerably lower than that of the resistance 44.

Activation of the arc discharge tube 19 will provide a rich source of ultra-violet light, as well as more useful visible light. The ultra-violet light will impinge upon the fluorescent coating 100 to cause it to fluoresce and produce useful light. The reflector layer 200 when used will serve to intensify the excitation of the fluorescent coating and increase its lumen efficiency. Thus, when the lamp is fully operative, visible light will be produced by the arc discharge tube 19, the incandescent filament 34 and 35, and the fluorescent coating 100.

In order to increase the overall light output efficiency of the lamp, it is preferable to make the fluorescent coating 100 of the magnesium fluo germinate type, which is a high efficiency light source when operated in the presence of heat. This heat is provided by the incandescent filament sections 34 and 35 so that they in addition to providing a ballast for the arc tube and visible useful light, supply heat which is useful in increasing the light given off by the coating 100. This type of coating is also further excited by the presence of infra-red energy which is also supplied by the glowing filament sections 34 and 35.

From the above description it will be seen that there has been brought together in a single unit a plurality of co-acting elements which cooperate to increase the amount of overall light given off by the lamp with the various light giving elements all cooperating each to increase the efficiency of operation of the other. Incidentally, the heated filaments 34 and 35 warm the arc tube 19 and aid in stabilizing its operation.

It is also possible in producing a commercial lamp of this type to provide a getter material within the envelope 10-11. From experience it has been found that a lamp of this kind should have the getter material applied in a particular manner. Thus the insulating bush-

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ings 26, 27, 28 and 29 are preferably coated with the getter, as for example a potassium containing compound. In addition, the hook members 30, 31, 32 and 33 are also coated with the getter, such as for example a compound containing zirconium. Disposition of the getter materials in a construction of this type is calculated so as to insure efficient getter action whether the lamp is burned in an upright position as shown in Figure 1, or in an inverted position. The subject matter of getter materials and use is not per se a part of this invention but is disclosed in a copending application Serial No. 586,701, filed May 23, 1956 in the name of Herbert S. Strauss, for Light Source Employing An Incandescent Filament and Method of Processing It.

From the above description it will be apparent to those skilled in the art that the lamp construction herein disclosed contains novel features, some or all of which are subject to some variation in details. It is preferred, therefore, not to be limited by the illustrative example herein set forth, but only as required by the appended claims.

What is claimed is:

1. An electric lamp of the type described comprising an evacuated envelope having an interior fluorescent coating overlying and in direct contact with an ultra-violet light reflecting coating on the inner face of the envelope consisting of one of the group consisting of titanium dioxide and magnesium oxide, an arc discharge ultraviolet light source, means for supporting said light source on the axis of said envelope, an incandescent filament mounted on said support adjacent said source, and series connections for said source and filament.

2. In the combination of claim 1, said envelope having a re-entrant stem, a tubulation tube within the stem opening into said envelope, and a baffle member supported on said stem opposite said opening.

3. In the combination of claim 1, said source comprising an evacuated envelope containing mercury, a pair of spaced cathodes and a starting electrode, said cathodes being in said series circuit and a connection including a resistor between said starting electrode and said circuit.

4. In the combination of claim 1, said source comprising an evacuated envelope containing mercury, a pair of spaced cathodes and a starting electrode, said cathodes being in said series circuit and a connection including a resistor between said starting electrode and said circuit, said resistor being mounted on said support.

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