Oct. 21, 1952 M. E. MACKSOUD 2,615,146

THERMOSTATIC SWITCH

Filed Feb. 11, 1948 4 Sheets-Sheet 1

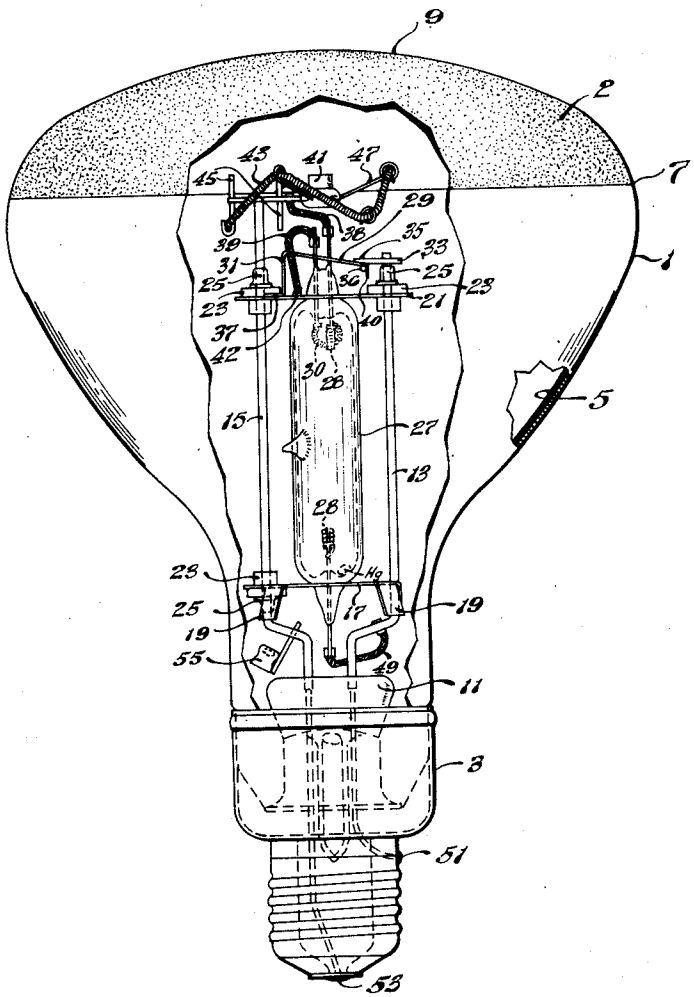


Fig. 1

Inventor
Michel E. Macksoud

Ronsway, Jenney, Witter & Hildreth
Attys.

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THERMOSTATIC SWITCH

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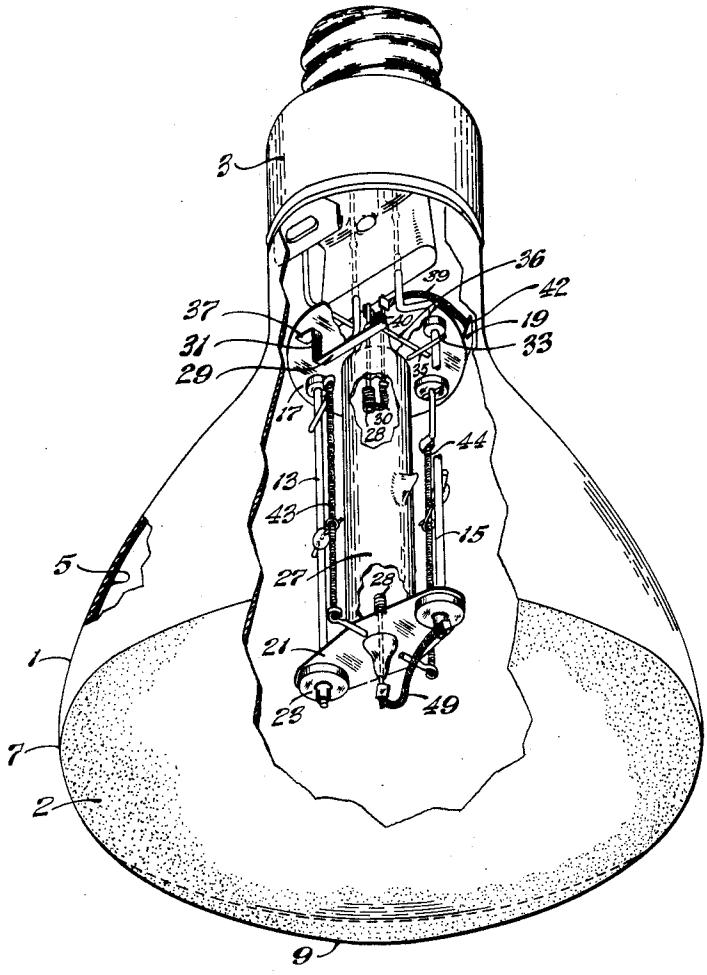


Fig. 2

Inventor

Michel E. Macksoud

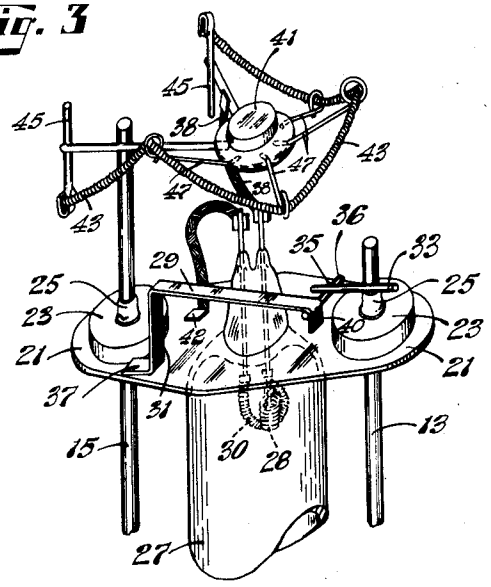
Renway, Jenney, Witter + Hildreth
Attys.

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THERMOSTATIC SWITCH

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Fig. 3



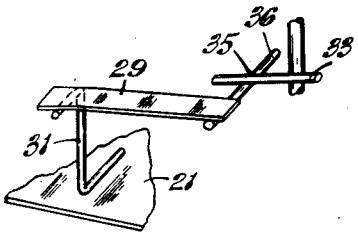


Fig. 4

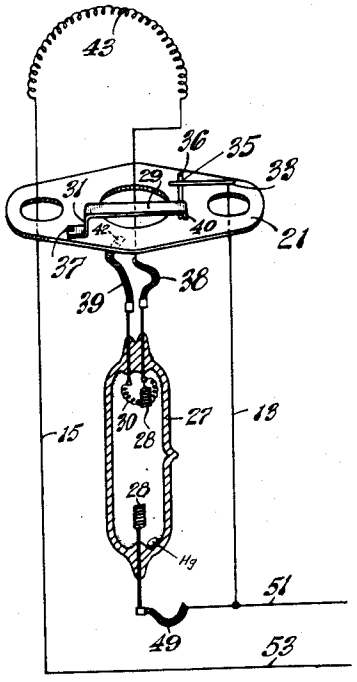


Fig. 5

Inventor

Michael E. Macksoud

Kenway, Jenney, Witter & Hildreth

Attys.

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THERMOSTATIC SWITCH

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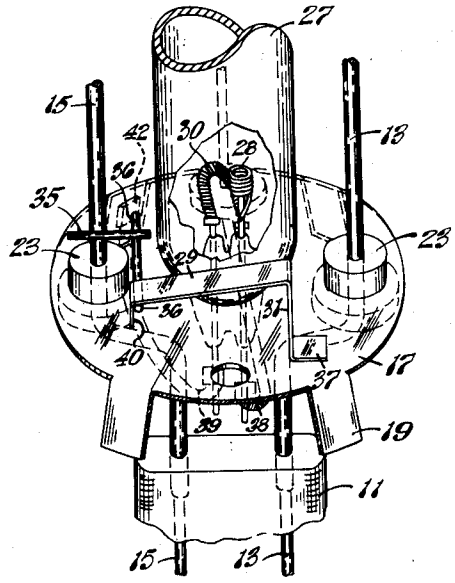


Fig. 6

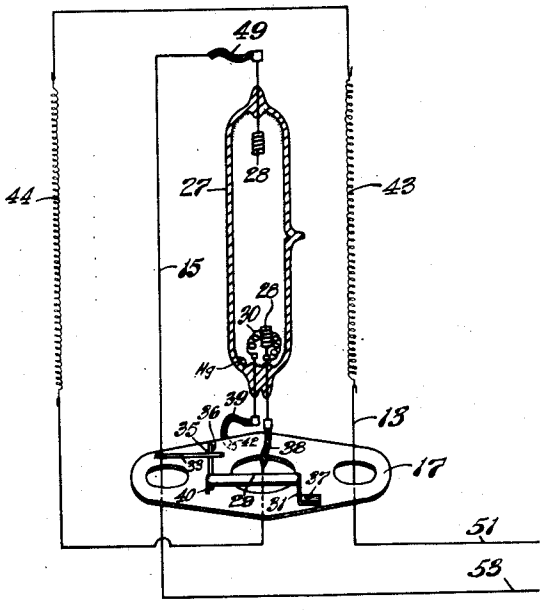


Fig. 7

Inventor

Michael E. Macksoud

Kenway, Jenney, Witter & Hildreth
Attys.

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UNITED STATES PATENT OFFICE

2,615,146

THERMOSTATIC SWITCH

Michel E. Macksoud, Newburyport, Mass., assignor to Cooper-Hewitt Electric Company, Hoboken, N. J.

Application February 11, 1948, Serial No. 7,601

1 Claim. (Cl. 315—56)

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This invention relates to a thermostatic switch unit, and in particular to a unitary thermostatic switch assembly that may be utilized in sun lamps. In this aspect it consists of improvements in the switch assembly as well as an improvement in the time function of the switch, resulting in a switch assembly that not only reduces to a minimum the mechanical failures inherent with such devices, but also improves the operation of any device with which it may be utilized.

One of the objects of the invention is to reduce to a minimum the mechanical parts, components of the switch assembly, contacting surfaces, and supporting elements.

Another object of this invention is to utilize one of the supporting platforms of a mercury arc discharge tube which is one of the elements of a sun lamp, so that this platform serves a dual function of supporting the switch assembly and also completes the electrical circuit between the tube electrodes and the ballast filament connections to the main leads of the sun lamp.

A conventional type of thermostatic switch utilized within a sun lamp assembly generally includes several component parts and particularly a glass bead insulator with support leads upon which the entire switch assembly is mounted and supported. The thermostatic switch in such an assembly consists of a bi-metallic element with supporting arms and contacting surfaces welded thereon. The defects inherent with this type of switch assembly are several. One defect with this type of switch assembly is the weakness inherent in a support made with a glass bead in proximity to the considerable heat developed by the ballast filament; the glass bead support is subjected to considerable variations in temperature, and unless the glass bead is very carefully annealed it develops cracks. Another defect inherent with the conventional type of switch assembly is the lack of uniformity of switch time factors due to the irregularity of welded parts and supporting arm elements.

As has been pointed out above the defects of the conventional type of thermostatic switch are eliminated by the use of a thermostatic element consisting of bi-metallic ribbon formed into one integral unit including its supporting elements. The glass bead support is eliminated altogether and flexible lead connections to the switch are dispensed with and connected directly to the fixed platform upon which the integral switch unit is now welded and supported. By this construction it was found that the fixed position of the switch eliminated not only the breaking of glass bead supports and the loosening or breaking of flexible lead connections thereto but also eliminated the irregularity of the time element factor in the switch function.

These and other features of the invention will be best understood and appreciated from the description of the two preferred embodiments there-

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of selected for purposes of illustration and shown in the accompanying drawings, in which:

Fig. 1 is a view in elevation of a complete sun lamp, portions of the bulb of the lamp being shown as broken away to more clearly illustrate the internal elements of the lamp which includes the thermostatic switch assembly. In this figure the thermostatic switch assembly is shown as an integral part of the platform supporting the mercury arc tube adjacent to the ballast filament.

Fig. 2 is a view in perspective of a complete sun lamp with portions of the bulb being shown as broken away to more clearly illustrate the internal elements of the lamp including the thermostatic switch assembly being mounted upon and forming an integral unit with the platform supporting the mercury arc tube adjacent to the base of the lamp. This view also illustrates a novel construction for the mounting of the ballast filament closely adjacent to the mercury arc tube.

Fig. 3 is a fragmentary view on an enlarged scale of the portion of the arc tube adjacent to the ballast filament which includes the support platform and its thermostatic switch assembly.

Fig. 4 is a fragmentary view on an enlarged scale of a modification of a thermostatic switch assembly.

Fig. 5 is a circuit diagram showing the connections for completing the electrical circuit of the lamp of Fig. 1.

Fig. 6 is a fragmentary view on an enlarged scale of the portion of the mercury arc tube adjacent to the base of the lamp and includes the supporting platform upon which the thermostatic switch forms a part thereof; and

Fig. 7 is a circuit diagram showing the electrical connections of the lamp of Fig. 2.

The lamp of Fig. 1 is shown as comprising a glass bulb 1 of a conventional shape provided internally with a metallic coating 5 preferably of aluminum and having a cut-off portion ending in the line 7 so that the open face of the bulb 9 permits the radiations of ultra-violet and infrared energy to penetrate therefrom upon an exposed object. The inner surface of the bulb is preferably etched 2, the reflector 5 serving to reflect and direct the visible and invisible rays of radiant energy produced by a mercury arc tube 27 and an incandescent ballast filament 43. The lamp is cemented to a standard screw base 3 having flexible lead connections at 51 and 53 which are connected through a glass press 11 to supporting lead wires 13 and 15, supporting metallic platforms 17 and 21 which are insulated from the leads of the lamp by insulators 23 and affixed thereto by eyelets 25. The mercury arc tube 27 which is the source of ultra-violet radiations is supported by these metallic platforms, and placed adjacent thereto is a ballast filament 43 supported by a glass bead assembly 41 with supporting pigtails 47, the terminals of which are mounted on hooks 45 and connected to the en-

trant lead wires of the lamp. The platform 21 which is adjacent the ballast filament 43 supports the thermostatic switch assembly and serves as the medium for completing the electrical circuit between the starting coil 30 of the arc tube 27, and the ballast filament 43 including the flexible connection 39 which is welded to the platform at the junction 42. The mercury arc tube utilized in this type of lamp includes electrodes 28 which serve as the main electrodes of the arc discharge tube which is filled with an inert gas such as argon and which has a predetermined amount of mercury therein shown as a droplet Hg.

Fig. 2 shows essentially the same elements of a sun lamp as is illustrated in Fig. 1 with the exception that the thermostatic switch assembly is mounted as an integral part of the platform adjacent the base of the lamp. Another modification illustrated in this figure is the positioning of the ballast filament in two separate sections adjacent to the mercury arc tube.

Fig. 3 is a fragmentary view on an enlarged scale of the thermostatic switch assembly adjacent to the ballast filament. This is shown as a switch assembly consisting of a thermostatic element 29 formed into a unitary bi-metallic switch element having a supporting arm 31 and a flange 37 for welding to the platform 21. A portion of the bi-metallic element 29 is continued to form an extension 40 which serves as a stop for the switch unit so that when it opens its contacting surfaces at 35, (established by the contacting arms 36 and 33) its motion will be limited, thereby preventing distortion of the bi-metallic section. The ballast filament 43 supported by the glass button 41 and pigtails 47 is fixed in spaced relation to the thermostatic switch assembly thereby as well serving as a heat source for the functioning of the thermostatic switch.

Fig. 4 is a fragmentary view on an enlarged scale of a thermostatic switch assembly but is not a complete unitary structure inasmuch as the arm 31 is a separate wire which is welded to the bi-metallic strip 29. However, the platform 21 is utilized as a conductor in the circuit.

Fig. 5 is a circuit diagram of the lamp of Fig. 1 showing the circuitous connections of the lamp. The lead connections of the lamp permit 60 cycle A. C. current to be applied to the lead wires 13 and 15 of the lamp. The potentials of the A. C. line are impressed upon the electrodes 28 of the arc tube 27 and this circuit is initially completed in series with the ballast filament 43, and includes the thermostatic switch through the contacting arms 33 and 36 at the contacting junction 35, the bi-metallic switch section 29 through the support arm 31 and through the supporting platform 21 united at the weld junctions 37 and 42 thereby including in the circuit the starting coil 30. The heat radiated by the ballast filament 43 in close proximity to the bi-metallic switch unit causes the bi-metallic surface of the switch to change its relative position, the bi-metallic switch element being assembled in such a manner that the radiant heat from the ballast filament causes it to move away from the contacting surfaces, thereby breaking the electrical circuit. Prior to breaking the electrical circuit, the starting coil 30 in the arc tube 27 causes initial heating of the mercury in the tube and also ionization of the inner gas content of the tube which subsequently facilitates arcing of this tube. When the thermostatic switch breaks the electrical circuit the current surges across the electrodes 28 in series with the ballast filament 43, thereby producing within the arc tube a continuous arc having as its conducting medium mercury vapor. The opening of the thermostatic switch is limited by the stop arm 40 so that its motion is fixed. This serves to maintain the uniformity of the time factor of the switch.

Fig. 6 is a fragmentary view on an enlarged scale of the section of the mercury arc tube and supporting platform upon which a thermostatic switch is mounted adjacent to the base of the lamp illustrated in Fig. 2. This switch assembly is similar in function and scope to the switch assembly illustrated in Fig. 3 excepting that its positioning on the platform adjacent the base facilitates the wiring of the sun lamp elements as illustrated in Fig. 2 wherein the ballast filament is shown as having two sections placed adjacent to the mercury arc tube.

Fig. 7 is a circuit diagram showing connections including the mercury arc tube 27 having spaced electrodes 28, a starting coil 30, and lead connections thereto 38, 39 and 49, ballast filaments 43 and 44, interconnected in series with the mercury arc tube 27 through the thermostatic switch assembly including supporting platforms 17, bi-metallic element 29 having support arm 31, the platform 37 and the stop arm 40 and with contacting arms 36 and 33 meeting at the contacting points 35 and interconnected with the starting coil lead 39 at points 37 and 42 on platform 17. In this particular circuit the ballast filaments produce heat radiation adjacent to the arc tube and the convection currents within the tube are sufficient to facilitate the proper functioning of the thermostatic switch assembly.

Having thus disclosed my invention and described two embodiments thereof, particularly applicable to a sun lamp assembly, but without intending to limit it to the details of the construction shown, I claim and desire to secure by Letters Patent:

In a lamp including an electrically operated radiating device, the combination of a metal platform supporting said device and electrically connected thereto, a terminal post supported adjacent and insulated from said platform, a bi-metal strip bent to form a base flange secured directly to said platform and thereby electrically connected to said radiating device, said bi-metal strip also having an integral long arm disposed in spaced relation to said platform and normally in contact with said post, and a depending flange at the end of said arm for limiting heat-responsive movement of said arm toward said platform.

MICHEL E. MACKSOUD.

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