

Aug. 25, 1959

W. E. KOTSCH ET AL
FLASHING INCANDESCENT LAMP

2,901,667

Filed Feb. 4, 1957

2 Sheets-Sheet 1

FIG. 1.

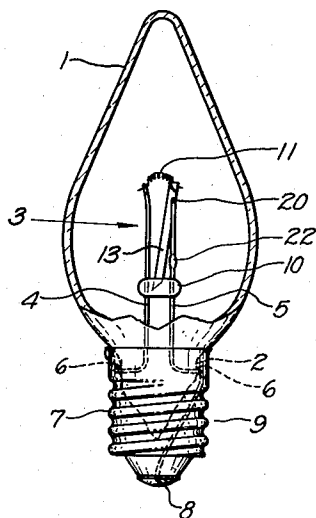


FIG. 5.

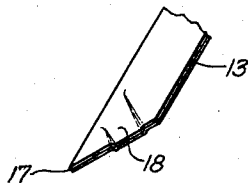


FIG. 4.

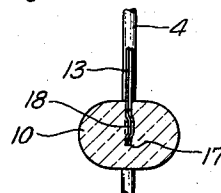


FIG. 2.

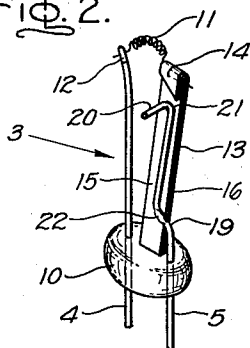
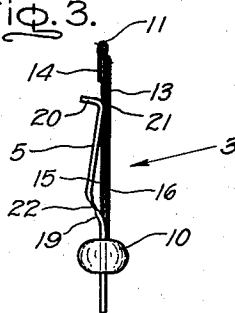


FIG. 3.



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2 Sheets-Sheet 2

FIG. 6.

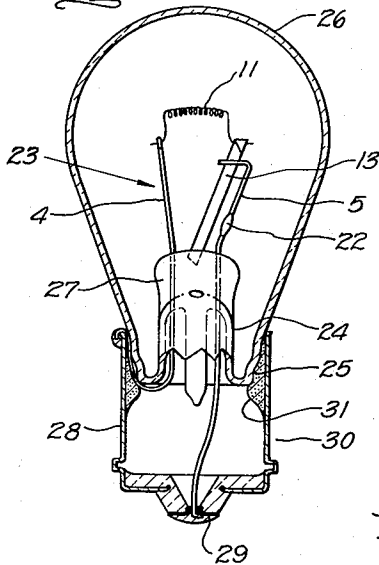


FIG. 7.

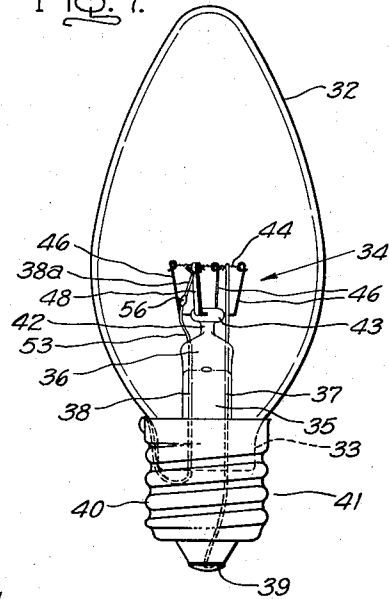


FIG. 8.

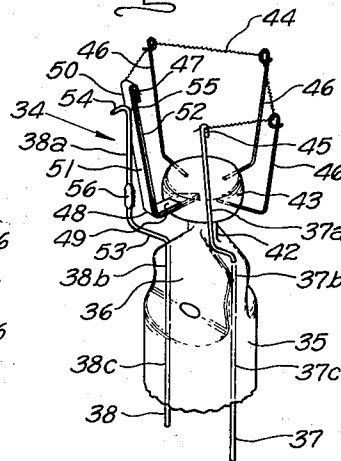


FIG. 9.

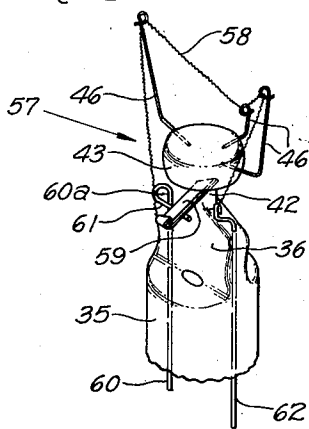
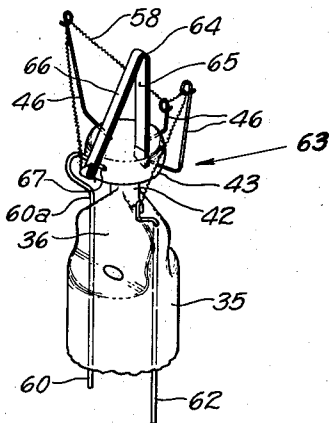


FIG. 10.



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2,901,667

FLASHING INCANDESCENT LAMP

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Application February 4, 1957, Serial No. 638,080

6 Claims. (Cl. 315—72)

This invention relates to incandescent lamps, and more particularly to an intermittently operated or automatic flashing lamp wherein the filament is automatically energized intermittently.

It has been previously proposed to construct an incandescent filament lamp with a bi-metallic element extending adjacent the filament and arranged in the circuit to the filament in such a manner that when the lamp is first connected to a source of electric power, the circuit through the lamp is complete and the filament is energized but when the filament heats up, the bi-metallic element bends to break the circuit and de-energize the filament, the sequence of operations being thereafter continued automatically as long as the lamp is connected to the source of electric power. Such flashing type incandescent lamps are commonly used for ornamental purposes, for instance, as Christmas tree lamps. They are also desirable for advertising purposes and for signalling purposes, such as for flashlights or lanterns and automobile turn signals, on account of the conspicuousness of a flashing lamp and particularly because of the longer battery and lamp life obtained for a given overall period of operation.

In prior known flashing incandescent lamps of the above general type, the transfer of heat from the filament to the bi-metallic element, as well as the transfer or removal of the heat from the bi-metallic element after de-energization of the filament, has been effected in a relatively inefficient manner. As a consequence, the degree of control obtainable over the flashing rate, i.e., the time-on to time-off cycle of such prior type flasher lamps, has not been as great as desired but instead has been limited to such a degree as to preclude the attainment of increased flashing rates. The mount construction, moreover, of such prior type flasher lamps have been of comparatively complicated character, and have usually employed one or more welded connections, such as prevents the high speed production manufacture of the mounts on automatic lamp making equipment, with the result that the lamps are very expensive to manufacture.

It is an object of our invention, therefore, to provide a flashing incandescent lamp affording greater control over the flashing rate thereof than that obtainable with prior type flasher lamps.

Another object of our invention is to provide a flashing incandescent lamp having greatly improved efficiency of heat transfer from the filament to the bi-metallic element, and thus affording markedly increased flashing rates, as compared to that obtained with prior type flasher lamps.

Still another object of our invention is to provide a flashing incandescent lamp embodying a mount structure of exceedingly simple and inexpensive construction which readily lends itself to high speed production manufacture on automatic lamp-making equipment.

Briefly stated, in accordance with one aspect of our invention, the bi-metallic element of a flasher lamp is supported within the lamp bulb by embedding one end

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thereof in a glass support member within the lamp bulb, such as the conventional lead-in wire glass support bead in butt-seal type incandescent lamps or the conventional stem press or stem press arbor in flange seal type incandescent lamps, and connecting the other or free end of the bi-metallic element to one end of the lamp filament the other end of which is connected to one of the lead-in conductors of the lamp. The other or contact lead-in conductor of the lamp extends to a point adjacent the free end of the bi-metallic element and is located in predetermined pressure contact therewith in position to cause the bi-metallic element to flex and disengage from the contact lead-in conductor when the lamp filament is heated, thereby interrupting the circuit to the filament. Such a simplified lamp mount structure can be constructed without any welded connections and readily lends itself to high speed production manufacture on automatic lamp-making equipment so that the lamp can be manufactured very inexpensively.

According to a further aspect of our invention, a conventional butt-seal type of lamp construction is employed to further minimize the cost of manufacture, the bi-metallic element in such case being embedded and anchored at one end in the conventional glass bead which is commonly employed in butt-seal lamp mounts to hold the two lead-in conductors in spaced relation to each other. In addition, the lamp bulb is filled with a suitable inert gas, such as nitrogen, hydrogen or helium for instance, at a suitable pressure which, for the purposes of the invention, may be any pressure up to atmospheric pressure, for example, from 5–100 millimeters of mercury, to provide gas convection currents within the lamp bulb, during operation of the lamp, which serve to transfer heat by convection from the filament to the bi-metallic element while the filament is energized and away from the bi-metallic element when the circuit to the filament is interrupted.

Further objects and advantages of our invention will appear from the following detailed description of species thereof and from the accompanying drawings.

In the drawings:

Fig. 1 is an elevation, partly in section, of a flashing incandescent lamp comprising our invention.

Fig. 2 is a fragmentary perspective view, on an enlarged scale, of the mount structure of the lamp shown in Fig. 1.

Fig. 3 is a fragmentary side elevation, on an enlarged scale, of the lamp mount structure shown in Fig. 1.

Fig. 4 is a fragmentary sectional view, on a greatly enlarged scale, through the glass support bead of the mount illustrated in Figs. 1–3 and showing the end of the bi-metallic element embedded in the glass bead.

Fig. 5 is a fragmentary perspective view, on a greatly enlarged scale, of the end of the bi-metallic element which is embedded in the glass support bead of the lamp mount.

Fig. 6 is a sectional view on an enlarged scale of a modified form of flashing incandescent lamp comprising our invention.

Fig. 7 is an elevation, partly in section, of still another modified form of flashing incandescent lamp comprising our invention.

Fig. 8 is a fragmentary perspective view, on an enlarged scale, of the mount structure of the modified lamp construction shown in Fig. 7, and

Figs. 9 and 10 are fragmentary perspective views, on an enlarged scale, of two further modified forms of flashing incandescent lamp mount structures according to the invention.

Referring to Fig. 1, the flashing incandescent lamp there illustrated comprises a sealed glass envelope or bulb 1 provided with a neck portion 2. Sealed into the bulb.

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1 by the well-known butt-seal method is a lamp mount 3 comprising a pair of lead-in conductors or wires 4, 5 which are sealed through the wall of the bulb neck 2 through the butt seal 6 thereof. Exteriorly of the bulb 1, the lead-in conductors 4, 5 are electrically connected, as by soldering, to the metal side shell contact 7 and the metal end contact eyelet 8, respectively, of a conventional type lamp base 9 suitably secured to the bulb around the neck 2 thereof, as by conventional basing cement. The lead-in conductors 4, 5 may be made of any suitable material. However, in the case of the particular butt-seal type lamp illustrated, designed for operation at relatively low voltage, for instance, less than 20 volts and preferably around 7 volts, the lead-in conductors 4, 5 are preferably made of silver-plated Dumet wire having a diameter of approximately 10 mils, for instance.

Interiorly of the bulb 1, the lead-in conductors 4, 5 extend from the butt seal 6 in more or less spaced parallel relation to each other in the direction of the bulb axis, as shown, and they are rigidly tied together and held in such spaced relation by an insulating bead or support member 10 of glass or other suitable insulating material which is fused to the lead-in conductors at a point spaced inwardly of the bulb from the butt seal 6.

Disposed within the bulb 1 and supported on the mount structure 3 therein, is an incandescent body or light source comprising an electrical energy translation element or filament 11 preferably in the form of a wire coil of tungsten or other refractory metal. One end of the filament 11 is electrically connected to the inner end of one of the lead-in conductors, i.e. lead-in conductor 4, in a suitable manner, preferably by being clamped thereto as indicated at 12 in Fig. 2.

In accordance with the invention, the other end of the filament 11 is electrically connected to the free or flexing end of a bi-metallic element or strip 13, preferably by being clamped thereto as indicated at 14. The other end of the bi-metallic element is embedded in the glass support member or bead 10 to rigidly anchor and support the bi-metallic element 13 in place on the mount structure 3. The bi-metallic element 13 may be of any commercially available type, although for a relatively low operating voltage type of lamp such as illustrated in Figs. 1-3, designed to operate at a voltage of, for example, 7 volts or thereabout, the bi-metallic element 13 is preferably composed of laminations consisting, respectively, by a copper layer 15 and a nickel steel layer 16 such as that commercially known as "Invar." As shown, the bi-metallic element 13 is embedded in the glass bead 10 at a point between, and in insulated relation to, the two lead-in conductors 4, 5 passing therethrough, with the flat sides of the bi-metallic element disposed approximately in the plane of the said lead-in conductors 4, 5. The bi-metallic element or strip 13 extends inwardly of the bulb 1 from the glass support bead or member 10 at a slight angle to the axis of the bulb, as shown in Fig. 1, so as to locate its free or flexing filament-supporting end adjacent the inner end of the other or contact lead-in conductor 5, with the copper face 15 of the bi-metallic element presented to and disposed opposite the inner end of said conductor 5. To permit ready insertion of the bi-metallic element into the glass support bead 10 during the manufacture of the mount structure 3, the end of the bi-metallic element 13 to be embedded is pointed, as shown at 17 in Fig. 5. In addition, the embedded end of the bi-metallic element 13 is provided with an indentation therein preferably in the form of a transversely extending groove 18, as shown in Fig. 5, for the purpose of securely locking or keying the bi-metallic element in place in the glass support bead 10 against withdrawal or removal therefrom.

The bi-metallic element 13 constitutes the movable contact member of an automatically operating thermostatic switch within the lamp bulb 1 for intermittently making and breaking the electrical circuit to the lamp filament

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11, the other or stationary contact member of the switch being constituted by the lead-in conductor 5. For such purpose, the contact lead-in conductor 5 is bent or offset at a point just above the glass bead 10 as indicated at 19, to offset the conductor to one side of the bi-metallic element 13, i.e., to that side 15 thereof which flexes away from the conductor 5 when the bi-metal is heated, and the innermost end portion of the conductor 5 is bent back away from the bi-metallic element as indicated at 20 to extend away from the bi-metallic element and provide a contact node 21 which, during the manufacture of the lamp mount structure 3, is pressed against the said face 15 of the bi-metallic element 13 so as to have a predetermined initial contact pressure thereagainst when the bi-metallic element is in its unheated and therefore unflexed state. In this connection, the contact lead-in conductor 5, which customarily is formed of round cross-section wire, is preferably provided with a short constricted or flattened section 22 in accordance with the invention disclosed and claimed in co-pending application Serial No. 638,081, R. J. Ayres, filed February 4, 1957, now abandoned, and assigned to the assignee of the present invention, the constricted or flattened section 22 being located at a point intermediate the glass support member or bead 10 of the mount and the contact node 21 of the conductor 5. By providing such a constricted section 22 in the contact lead-in conductor 5, the manufacture of mount structures 3 having a predetermined contact pressure between the contact lead-in conductor 5 and the bi-metallic element 13 is rendered less critical and facilitated, thereby greatly promoting uniformity of operation of the manufactured lamps and minimizing production rejects, due to faulty or improperly operating lamps, to such an extent as to render practical the high speed automatic production manufacture of such lamps.

By connecting one end of the filament 11 directly to the bi-metallic element 13, it will be evident that the heat generated by the filament upon energization is transferred to the bi-metallic element by direct conduction as well as by radiation, thus improving the efficiency of the heat transfer from the filament to the bi-metallic element over prior flashing incandescent lamp constructions wherein the filament is not connected directly to the bi-metallic element and the heat is not transferred to the bi-metallic element by conduction. In this connection, the use of copper as a material for one of the layers 15 of the bi-metallic element 13 is particularly advantageous not only because of the fact that copper is a good electrical contact-making material, but also because of the fact that, due to its good heat conductivity, it readily conducts the heat from the filament down along the length of the bi-metallic strip, and past the contact point thereof with the contact lead-in conductor 5, before the bi-metallic element flexes away and breaks contact with the conductor 5, thereby minimizing so-called bi-metal "overshoot" or excessive heating and flexure of the bi-metallic strip.

In accordance with the invention, however, to effect an even further improvement in the efficiency of heat transfer to the bi-metallic element 13, as well as away therefrom, the bulb 1 is filled with a small amount of a suitable inert gas such as nitrogen, hydrogen or helium, for example. By thus providing such an inert gas filling within the bulb 1, gas convection currents are set up in the bulb during the operation of the lamp which then act to transfer the heat to the bi-metallic element, as well as away therefrom, by convection. The combination of the three modes of heat transfer from the filament to the bi-metallic element, i.e., by radiation, conduction and convection, and the improved dissipation or removal of the heat from the bi-metallic element resulting from the presence of gas convection currents within the lamp bulb, together act to provide greatly broadened and improved control over the flashing rate or time-on to time-off cycle of the lamp, as compared with that here-

tofore obtainable in prior type flashing incandescent lamps. Since the heat transfer characteristic of the gas is independent of its pressure, the pressure of the inert gas filling in the lamp bulb 1 therefore is not critical and accordingly may be any pressure up to atmospheric pressure. However, for practical purposes, the filling gas pressure may range from 5 to 100 millimeters of mercury, and preferably from about 20 to 40 millimeters of mercury. For the particular low voltage (7 volt) flashing incandescent lamp illustrated in Figs. 1-5, a gas filling of nitrogen at a pressure of the order of 30 millimeters of mercury has been found to be entirely satisfactory for the purposes of the invention.

When the flashing incandescent lamp according to Figs. 1-5 is first placed in operation by connecting it across a source of electrical power, the bi-metallic element 13, being initially in contact with the stationary contact lead-in conductor 5, completes the electrical circuit through the filament 11, causing the latter to become incandescent. The resulting heat generated by the energized filament 11 is then transferred to the bi-metallic element 13 by conduction, radiation and convection, causing the bi-metallic element to eventually flex away from and disengage the stationary contact lead-in conductor 5, thereby interrupting the electrical circuit to the filament 11. Because of the resulting de-energization of the filament 11, the heat stored in the bi-metallic element 13 is then dissipated therefrom, aided by the gas convection currents within the bulb, as a result of which the bi-metallic element cools and returns to its original position in contact with the stationary contact lead-in conductor 5, thus automatically completing the circuit once again through the filament 11 and automatically initiating a new cycle of operation which thereafter continues until the lamp is disconnected from the source of electric power.

From the above description it will be readily apparent that, by embedding and anchoring the bi-metallic element 13 in the glass support member or bead 10 of the lamp mount 3, and clamping the filament 11 at its opposite ends to the bi-metallic element 13 and to the lead-in conductor 4, we have provided a greatly simplified flasher lamp mount structure in which all welded connections are eliminated and which enables the mounting of the bi-metallic element on the mount structure by means of automatic mounting mechanism similar to that commonly employed in the lamp-making art for inserting auxiliary filament support or anchor wires in the glass support beads or stem arbors of conventional type incandescent lamps. Thus, the mount structure comprising our invention readily lends itself to low cost production manufacture on automatic lamp-making equipment and as a result is very inexpensive and practical to manufacture from a commercial standpoint. Moreover, the provision of an inert gas filling in the lamp bulb 1 affords, in combination with the other features of the invention, greatly improved control over the flashing rate of the lamp, as a result of which appreciably faster flashing rates are obtainable.

Fig. 6 illustrates the invention as embodied in an incandescent lamp of the well-known flange seal type employing a mount structure 23 comprising a tubular glass stem or support member 24 which is sealed to the neck 25 of the glass lamp bulb 26 so as to extend thereinto and is provided inwardly of the bulb with a flattened stem press portion 27 through which the lead-in conductors 4 and 5 of the mount are sealed. As in the case of the previous lamp construction shown in Fig. 1, the lead-in conductors 4, 5 are electrically connected exteriorly of the lamp bulb 1 to the metal side shell contact 28 and the metal end contact eyelet 29, respectively, of a lamp base 30 suitably secured to the neck portion 25 of the lamp bulb, as by conventional basing cement 31. Interiorly of the bulb 1, the structure of the mount 23 is substantially the same as that disclosed in Fig. 1 except that the bi-

metallic element 13 is supported in place within the lamp bulb by embedding and anchoring one end thereof in the stem press 27 which, in this form of the invention, constitutes the glass support member for the bi-metallic element. Like the mount structure 3 of the previous form of the invention shown in Fig. 1, the mount structure 23 is also well adapted to high speed production manufacture on automatic mount-making equipment since the mount does not embody any welded connections and the bi-metallic element 13 can be inserted into the stem press portion 27 of the glass support member or stem 24 by means of automatic inserting mechanism similar to that commonly employed in the lamp-making art for inserting auxiliary filament support or anchor wires in the glass support bead or stem arbor of conventional type incandescent lamps. The lamp of Fig. 6, being illustrated as of the low voltage type designed to operate on a voltage of, for example, 7 volts or thereabouts, is preferably provided with an inert gas filling within the lamp bulb 26 similar to that employed in the lamp disclosed in Fig. 1.

In the modification shown in Figs. 7 and 8, the invention is therein illustrated as embodied in an incandescent lamp designed for operation at conventional household voltages of, for example, 115-125 volts, the filament in such high voltage lamps being of considerably longer length than in the case of the low voltage lamps shown in Figs. 1-6. Referring to Fig. 7, the lamp there shown comprises a sealed glass envelope or bulb 32 having a neck portion 33 into which a mount structure 34 is sealed so as to extend into the bulb. The mount structure 34 comprises a tubular glass stem 35 which is sealed at one end to the bulb neck 33 and extends therefrom into the bulb in the direction of the bulb axis and terminates at its other or inner end in a flattened stem press portion 36 through which are sealed a pair of lead-in conductors or wires 37, 38. As indicated in Fig. 8, the lead-in conductors 37, 38 are each of the multi-section type comprising an inner lead section 37a or 38a, an intermediate or press lead section 37b or 38b, and an outer lead section 37c or 38c, which sections are butt-welded together in end-to-end relation to form a three-part lead-in conductor. For the purposes of the invention, the inner lead sections 37a and 38a are preferably made of silver-plated copper wire having a diameter of approximately 12 mils, for example, and the intermediate or press lead sections 37b and 38b are made of Dumet wire and are sealed in the stem press 36. The outer lead sections 37c and 38c, which are preferably made of hard copper wire, are electrically connected at their outer ends to the metal end contact eyelet 39 and the metal side shell contact 40, respectively, of a lamp base 41 which is suitably secured to the lamp bulb 32 around the neck portion 33 thereof, as by conventional basing cement.

Projecting inwardly of the bulb from the stem press 36 substantially along the bulb axis is a glass arbor or support rod 42 which terminates in a glass support member or button 43. An electric energy translation element or filament 44, preferably in the form of a wire coil of tungsten wire, is electrically connected at one end, preferably by clamping as indicated at 45, to the inner end of the lead-in conductor 37 and is supported in place within the lamp bulb 32 above the glass button 43 and in a more or less horseshoe shape approximating the five sides of a hexagon as shown in Fig. 8, and generally in a plane transverse to the bulb axis, by a plurality (three) of supplementary filament-support or anchor wires 46 which are embedded and anchored at one end in the glass support member or button 43, in insulated relation to each other, and are hooked around the filament at their other ends to support the filament in place. The other end of the filament 44 is electrically connected, preferably by clamping as indicated at 47 in Fig. 8, to the free or flexing end of a bi-metallic element or strip 48 the other end of which is embedded and anchored in the glass support member or button 43 on the stem tube 35. The em-

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bedded end of the bi-metallic element 48 is preferably pointed; and indented like the pointed end 17 and indentation 18 in the bi-metallic element 13 shown in the lamp of Figs. 1-5. As shown more particularly in Fig. 8, the bi-metallic element 48 is bent at an angle of the order of 90° (preferably slightly less than a right angle) to form an anchor leg portion 49 which is embedded in the glass support member or button 43 and extends outwardly therefrom in a direction transversely and approximately radially of the bulb axis, and an upstanding flexing arm portion 50 which extends inwardly of the bulb from the anchor leg portion 49 in the general direction of the bulb axis and is connected at its upper or free end to one end of the filament 44, preferably by clamping as indicated at 47.

The bi-metallic element 48, like the bi-metallic element 13 in the previous forms of the invention, constitutes the movable member of a thermostatic switch for intermittently making and breaking the electrical circuit to the filament 44, the stationary contact member of the thermostatic switch being constituted by the inner lead portion 38a of the lead-in conductor 38.

For a high voltage operating lamp such as illustrated in Figs. 7 and 8 designed to operate at, for example, 115-125 volts, the bi-metallic element 48 is preferably formed of a silver contact-making layer 51 and an "Invar" layer 52, and the bi-metallic element is so formed and mounted as to locate its silver layer 51 at the outer side of its flexing arm portion 50 so as to cause the flexing arm portion 50 to bend and flex inwardly toward the bulb axis when the bi-metallic element is heated. The inner lead section 38a of the contact lead-in conductor 38 is offset to the outer or silver layer side 51 of the flexing arm portion 50 of the bi-metallic element 48 by means of an offset leg portion 53 formed in the inner lead 38a adjacent the stem press 36. From the offset leg portion 53, the inner lead 38a extends inwardly of the bulb 1 in the general direction of the bulb axis toward the free or flexing end of the bi-metallic element 48 and at a slight converging angle to its flexing arm portion 50 so as to contact therewith at a point adjacent its free end when the bi-metal is in its unheated state. As in the case of the contact lead-in conductor 5 of the lamp shown in Figs. 1-5, the innermost end portion of the inner lead section 38a of conductor 38 is bent back away from the flexing arm portion 50 of the bi-metallic element 48, as indicated at 54, to extend away from the bi-metallic element and provide a contact node 55 which, during the manufacture of the lamp mount structure 34, is pressed against the outer or silver layer side 51 of the bi-metallic element 48 so as to have a predetermined initial contact pressure thereagainst when the bi-metallic element is in its unheated and therefore unflexed state. In this connection, the inner lead section 38a is provided, at a point intermediate its offset leg portion 53 and its contact node 55, with a short constricted or flattened section 56 similar to and for the same purposes as the constricted or flattened section 22 in the contact lead-in conductor 5 of the previous form of lamp shown in Fig. 1.

While the bulb 32 of the lamp shown in Fig. 7 may be provided with an inert gas filling of the same character as that employed in the low voltage flashing lamp disclosed in Fig. 1, nevertheless, for a relatively high voltage lamp such as shown in Fig. 7 it is preferable to employ a vacuum in the lamp bulb rather than an inert gas filling since the cooling effect of such a gas filling on the lamp filament, and resulting reduction in light-producing efficiency of the lamp, would necessitate the use of much finer filament wire than is desirable, in order to obtain somewhere near the same light-producing efficiency as a vacuum lamp. Like the mount structures 3 and 23 of the previous forms of the invention, the mount structure 34 also readily lends itself to high speed production manufacture on automatic mount-making equip-

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ment since the mount does not require any welded connections and the bi-metallic element 48 can be inserted into the glass support member or button 43 of the stem 35 by means of automatic inserting mechanism similar to that commonly employed in the lamp-making art for inserting the auxiliary filament support or anchor wires 46 in the glass support bead 43. Moreover, the use of a silver-plated inner contact lead 38a, and a silver contact-making face 51 on the bi-metallic element 48, assures reliable contact-making and breaking action between the bi-metallic element and the contact lead during the operation of the lamp. From the above, therefore, it will be apparent that we have provided a flasher lamp mount structure 34 for high-voltage service which is not only inexpensive and commercially practical to manufacture but which is also highly reliable and uniform in operation.

Figs. 9 and 10 illustrate modified forms of mount constructions according to the invention suitable for use in flashing incandescent lamps designed for high voltage service such as the conventional household operating voltages of 115-125 volts. The mount structures 57 and 63 shown in Figs. 9 and 10 differ from the mount 34 of Fig. 7 principally in that they are provided with a differently configured filament and a differently shaped bi-metallic element. Thus, in Fig. 9 the filament 58 is draped up and down in a more or less zig-zag manner around the glass button 43 over the three supplementary filament support or anchor wires 46, while the bi-metallic element 59 is embedded in the underside of the glass support button 43 and extends downward therefrom at a slight outward angle relative to the stem tube 35 and contacts at its outer or free end the stationary or inner lead portion 60a of lead-in conductor 60 which, for such purpose, is looped around as shown at 61 so as to extend across and contact the free or flexing end of the bi-metallic element 59 when in its unheated state. The contact lead-in conductor 60 and the other lead-in conductor 62 are both sealed through the stem press 36 of the stem tube 35, and the conductor 62 is connected at its inner end to one end of the filament 58 the other end of which is connected to the free end of the bi-metallic element, the same as in the previous forms of the invention.

The mount 63 shown in Fig. 10 differs from the mount 57 shown in Fig. 9 only in the shape and manner of mounting of the bi-metallic element and the shape of the inner lead portion of the contact lead-in conductor. Thus, as shown in Fig. 10, the bi-metallic element 64 of the mount 63 is of V-shaped form having an anchor leg or arm portion 65 and a flexing leg or arm portion 66. The anchor leg portion 65 is embedded at its free end in the top side of the glass support member or button 43 of the stem tube 35 so as to extend upwardly therefrom in the general direction of the axis of the stem tube, and the flexing arm portion 66 extends downwardly from the V-bend in the bi-metallic element at a slight angle from the anchor leg portion 65 so as to clear the glass support button 43 and contact the inner lead portion 60a of the contact lead-in conductor 60 the inner end of which, for such purpose, is bent in the manner indicated at 67 so as to extend across and contact the free or flexing end of the flexing arm portion 66 of bi-metallic element 64 when the latter is in its unheated and therefore unflexed state.

Although preferred species of our invention have been disclosed, it will be understood that the invention is not to be limited to the specific constructions and arrangements of parts shown, but that they may be widely modified within the spirit and scope of our invention as defined by the appended claims.

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

1. A flashing incandescent lamp comprising a sealed glass envelope having a glass support member therein, a pair of lead-in conductors sealed into said envelope, a

bimetallic element in said envelope having an end free of electrical connections thereto embedded in said glass support member with the glass thereof surrounding the said embedded end to electrically insulate it therein, said bi-metallic element having its other end free and located adjacent one of said conductors and in normal pressure contact therewith in position to flex away and disengage therefrom when heated, the sole electrical connection of said bi-metallic element to said one conductor being its said pressure contact therewith when in its normal unheated position and a filament in said envelope having one end directly connected to and supported by the free end of said bi-metallic element and its other end directly connected to and supported by the other of said conductors.

2. A flashing incandescent lamp comprising a sealed glass envelope having a glass support member therein, a pair of lead-in conductors sealed into said envelope, a bi-metallic strip in said envelope having an end free of electrical connections thereto embedded in said glass support member with the glass thereof surrounding the said embedded end to electrically insulate it therein, the embedded end of said bi-metallic strip having a surface projection on one of its flat sides forming a transverse shoulder thereon positively locking the bi-metallic strip in place in said glass support member against withdrawal therefrom, the other end of said bi-metallic strip being free and located adjacent one of said conductors and in normal pressure contact therewith in position to flex away and disengage therefrom when heated, the sole electrical connection of said bi-metallic strip to said one conductor being its said pressure contact therewith when in its normal unheated position, and a filament in said envelope having one end directly connected to and supported by the free end of said bi-metallic strip and its other end directly connected to and supported by the other of said conductors.

3. A flashing incandescent lamp comprising a sealed glass bulb having a neck portion and butt-sealed at the end of the neck, a pair of lead-in conductors fused in the butt-seal and extending into the bulb, a glass bead fused to the said conductors at a point spaced inwardly of the bulb from the said seal and rigidly holding the conductors together in spaced relation, a bi-metallic element in said bulb having an end free of electrical connections thereto embedded in said glass bead in spaced relation to said conductors with the glass of said bead surrounding the said embedded end to electrically insulate it therein, said bi-metallic element having its other end free and located adjacent one of said conductors and in normal pressure contact therewith in position to flex away and disengage therefrom when heated, the sole electrical connection of said bi-metallic element to said one conductor being its said pressure contact therewith when in its normal unheated position and a filament in said bulb having one end directly connected to and supported by the free end of said bi-metallic element and its other end directly connected to and supported by the other of said conductors.

4. A flashing incandescent lamp comprising a sealed glass bulb provided with a re-entrant stem having a press portion, a pair of lead-in conductors sealed into said stem press and extending into said bulb, a bi-metallic element in said bulb having an end free of electrical connections thereto embedded in said stem with the glass of said stem surrounding the said embedded end to electrically insulate it therein, said bi-metallic element having

its other end free and located adjacent one of said conductors and in normal pressure contact therewith in position to flex away and disengage therefrom when heated, the sole electrical connection of said bi-metallic element to said one conductor being its said pressure contact therewith when in its normal unheated position, and a filament in said bulb having one end directly connected to and supported by the free end of said bi-metallic element and its other end directly connected to and supported by the other of said lead-in conductors.

5. A flashing incandescent lamp comprising a sealed glass bulb provided with a re-entrant stem having a press portion with a glass arbor extending therefrom inwardly of the bulb and terminating in a glass button, a pair of lead-in conductors sealed through the said press portion and extending into said bulb, a filament in said bulb, support wires anchored in said glass button and supporting said filament at spaced points intermediate its ends, and a bi-metallic element in said bulb having an end free of electrical connections thereto embedded in said glass button with the glass thereof surrounding the said embedded end to electrically insulate it therein, said bi-metallic element having its other end free and located adjacent one of said conductors and in normal pressure contact therewith in position to flex away and disengage therefrom when heated, the sole electrical connection of said bi-metallic element to said one conductor being its said pressure contact therewith when in its normal unheated position, said filament having one end directly connected to and supported by the free end of said bi-metallic element and its other end directly connected to and supported by the other of said lead-in conductors.

6. A flashing incandescent lamp comprising a sealed glass bulb provided with a reentrant stem having a press portion with a glass arbor extending therefrom inwardly of the bulb and terminating in a glass button, a pair of lead-in conductors sealed through the said press portion and extending into said bulb, a filament in said bulb, support wires anchored in said glass button and supporting said filament at spaced points intermediate its ends, and a bi-metallic strip in said bulb having an end free of electrical connections thereto embedded in said glass button with the glass thereof surrounding the said embedded end to electrically insulate it therein, said bi-metallic strip extending laterally outwardly from said glass button transversely to the bulb axis and being bent up to provide a flexing arm portion extending upwardly from the glass button in the general direction of the bulb axis and terminating in a free end located inwardly of and adjacent one of said conductors and in normal pressure contact with the inner end portion thereof in position to flex away and disengage therefrom when heated, the sole electrical connection of said bi-metallic strip to said one conductor being its said pressure contact therewith when in its normal unheated position, said filament having one end directly connected to and supported by the free end of said bi-metallic strip and its other end directly connected to and supported by the other of said lead-in conductors.

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