Dec. 10, 1968 D. M. GRIFFITH ET AL 3,416,029

FLASHING INCANDESCENT LAMP

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FIG.1.

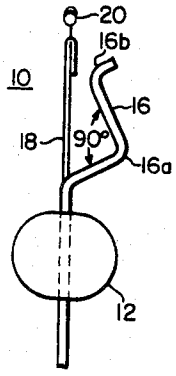


FIG.2.

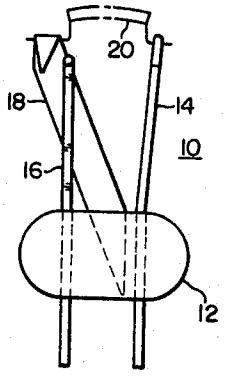


FIG.3.

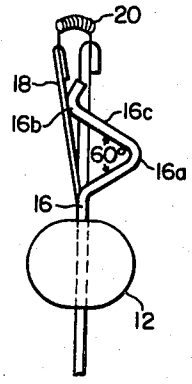


FIG.4.

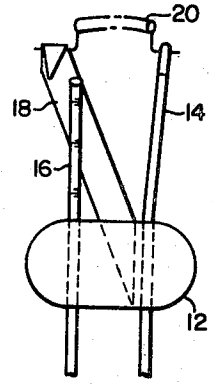
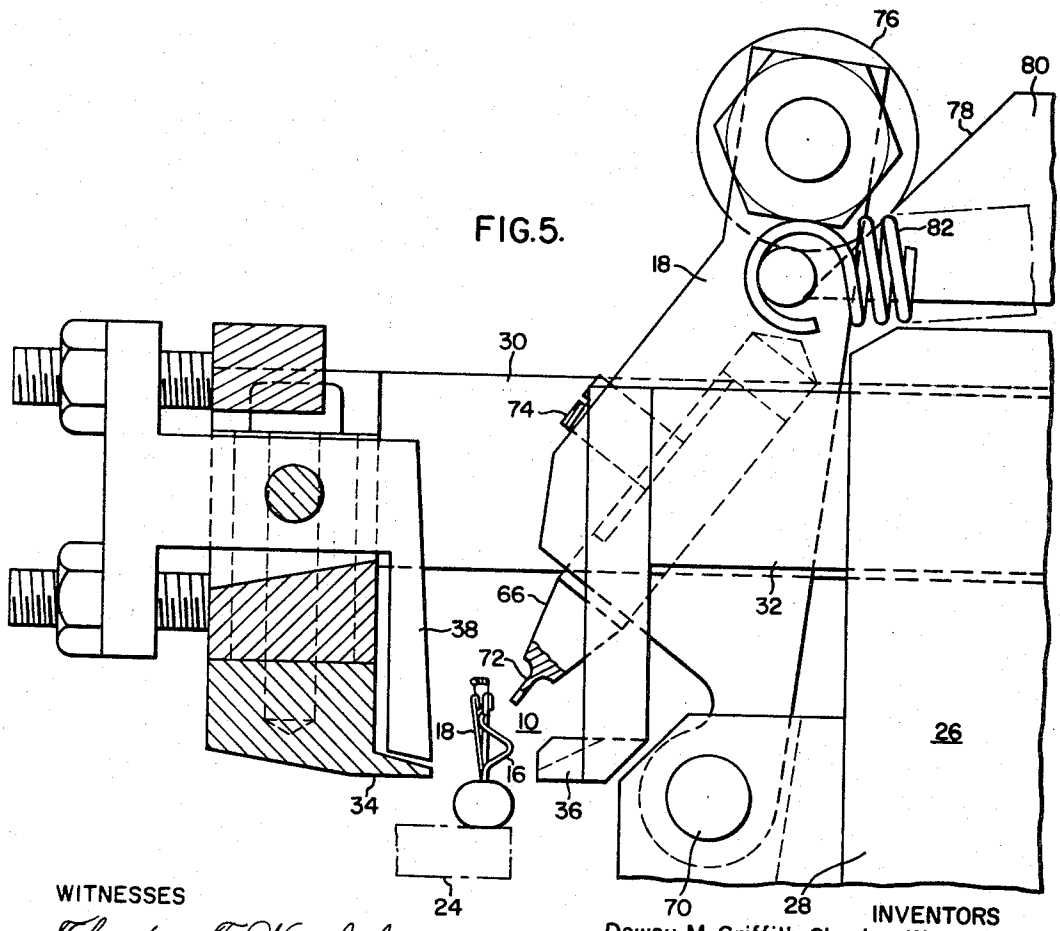


FIG.5.



WITNESSES

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FLASHING INCANDESCENT LAMP

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FIG.6.

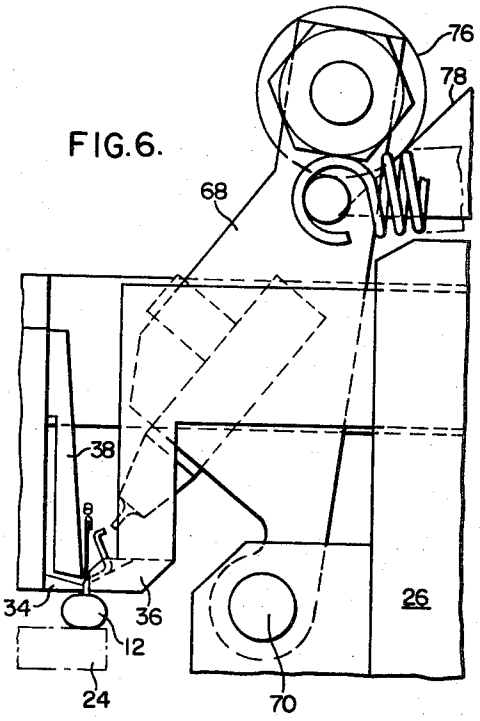


FIG.8.

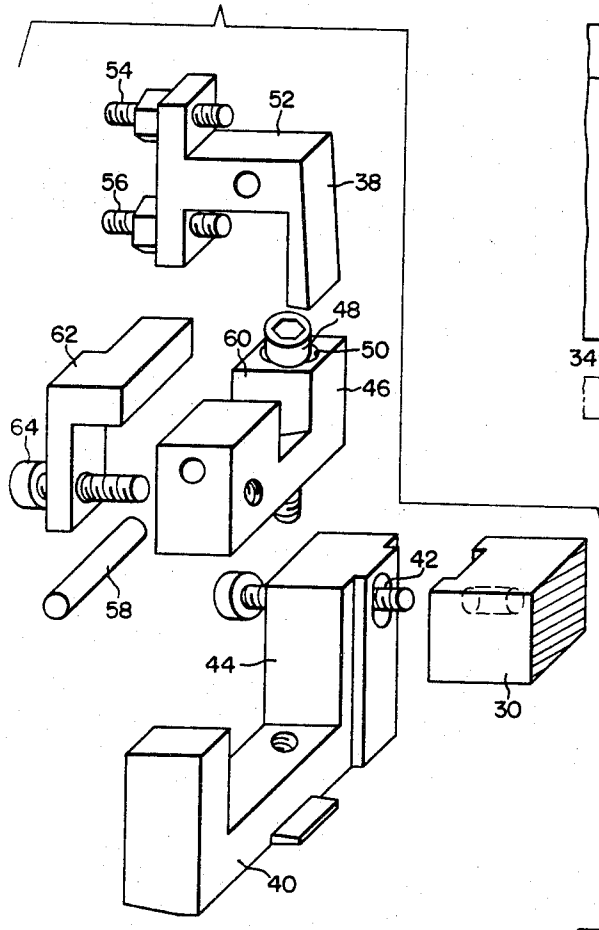


FIG.7.

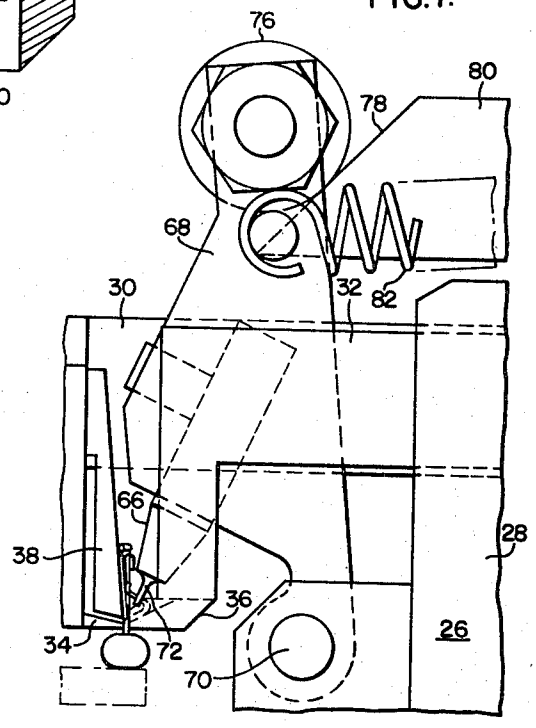
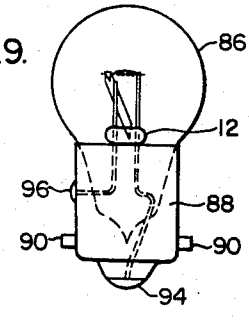


FIG.9.



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FLASHING INCANDESCENT LAMP

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7 Claims. (Cl. 315—72)

ABSTRACT OF THE DISCLOSURE

A flashing incandescent lamp in which the filament is mounted between a first lead-in conductor and a thermostatic element. A second V-shaped lead-in conductor contacts the thermostatic element and applies sufficient pressure to that element to maintain a predetermined deflection of the thermostatic element when the lamp is cold.

This invention relates to flashing incandescent lamps and more particularly to the filament mount structure of such a lamp.

Considerable difficulty has been encountered in attempting to manufacture, on a production basis, flashing incandescent lamps which have consistent flashing rates within acceptable tolerances, as for example 100–160 flashes per minute. A particular problem with this kind of miniature incandescent lamp is the "no light" or "stay light," the no light being a condition where the lamp does not light at all, as opposed to the stay light where the lamp remains lighted and does not flash.

It has been a common practice where the filament is mounted between one lead-in conductor and a thermostatic or bimetal strip to preform the other lead-in conductor to its final shape and then subsequently place it against the bimetal to establish the required tension or deflection. In construction of this nature, since the establishment of uniform tension between the bimetal and the deflecting lead-in conductor is critical to uniform flashing rates, bimetal springback against the deflective action of the lead-in conductor is an important factor. Attempts to unify the tension between the bimetal and the lead-in conductor have been accomplished by mechanically displacing the bimetal, then placing the lead-in conductor in front of the bimetal and releasing the bimetal against the lead-in conductor. This method of production has proved unsuccessful in producing lamps having a uniform flashing rate and has resulted in a substantial loss of finished lamps due to their failure to comply with established standards, such as automotive standards, for acceptable flashing rates.

It has been found that lead-in conductor to bimetal tension determines the flashing rate of miniature flashing incandescent lamps to a greater degree than any other variable and therefore this tension or more particularly the initial deflection and springback of the bimetal must be controlled. The present invention provides a flashing incandescent lamp of extremely uniform flashing rates by providing a preshaped lead-in conductor adjacent to a flexible bimetal strip which supports and is electrically connected to one end of a conventional lamp filament, positioning an angular backup plate adjacent to the bimetal strip and applying a predetermined force normal to the upper portion of the preformed lead-in conductor to cause the upper end of said lead-in conductor to force the bimetal against the backup plate causing a predetermined deflection of the bimetal strip, said predetermined force also providing a permanent set in the lead-in conductor to maintain a predetermined deflection of said bimetal and preventing any springback of the bimetal from its deflected position. By placing this permanent set or kink in the lead-in conductor the problems of bimetal springback are thus eliminated.

An object of the present invention is to provide miniature flashing incandescent lamps having substantially uniform flashing rates.

Another object of the present invention is to provide a lead-in conductor configuration that will provide consistency of bimetal displacement in a flashing incandescent lamp.

These and other objects as well as many of the attendant advantages of the present invention will become more readily apparent as the following detailed description is considered in conjunction with the accompanying drawings, in which:

FIGURE 1 is a side elevation view of a filament mount prior to tension setting;

FIG. 2 is a front elevation view of a filament mount prior to tension estting;

FIG. 3 is a side elevation view of a filament mount after the tension has been set;

FIG. 4 is a front elevation view of a filament mount after tension has been set;

FIG. 5 is a fragmentary elevational view, partly in section, of the tension setting apparatus used in performing the method of the present invention;

FIG. 6 is a fragmentary elevational view of the tension setting apparatus in a first position;

FIG. 7 is a fragmentary elevational view of the tension setting apparatus in its crimping position;

FIG. 8 is an exploded view of the bimetal backup plate and rear stop mechanism of the tension setting apparatus; and

FIG. 9 is an elevation view, partly in section, of a flashing incandescent lamp employing the filament mount of the present invention.

Referring now in detail to the drawings, wherein like reference characters represent like parts throughout the several views, there is shown in FIGS. 1 and 2 the preformed filament mount generally designated **10** including a conventional supporting insulator or glass bead **12** having a pair of lead-in conductors **14** and **16** extending therethrough. A thermostatic metal element **18** is positioned approximately midway between the two lead-in conductors substantially along a line defined by the intersection between each lead-in conductor and the glass bead. The thermostatic element **18** extends at an angle of about 68° with the upper surface of the glass bead and lies behind the upper portion of lead-in conductor **16** as shown in FIGS. 1 and 2. The thermostatic element **18** is preferably a bimetal strip conventionally constructed of Invar and silver with the Invar side to the rear and the silver side facing lead-in conductor **16**. The lead-in conductor **16** in its preformed condition, as best shown in FIG. 1, extends vertically from the glass bead for about one-sixth of its extended length then bends at about 60° from the vertical for about one-third of its extended length, then bends at **16***a* at an angle of approximately 90° with respect to the last mentioned third back toward the vertical for approximately another one-third of its extended length, then proximate to its extremity at **16***b* it bends 90° in a direction away from the plane of the bimetal.

After the filament mount is formed with its lead-in conductors **14** and **16** and bimetal **18** in the positions shown in FIGS. 1 and 2 a force is applied to lead-in conductor **16** at approximately the point **16***c* (see FIG. 3) causing the point **16***b* to contact the bimetal and deflect it a predetermined distance. The force applied at **16***c* causes lead-in conductor **16** to bend at an angle or elbow **16***a* a sufficient distance to provide a set or kink in the lead-in conductor at that point which maintains the bimetal **18** in the predetermined deflected position. After a force has been applied to lead-in conductor **16** at point **16***c* the lead-in

conductors and bimetal **18** will maintain the relationships and shapes shown in FIGS. 3 and 4. The two significant changes which occur in lead-in conductor **16** from that shown in the FIG. 1 position are: (1) the angle or elbow at **16***a* defined by the two longer sections of the lead-in conductor is now approximately 60° as opposed to the 90° angle of FIG. 1 and, (2) the radius of curvature of the bend or elbow at **16***a* is increased slightly due to the rolling effect as the kink or set is established. The novel filament mount structure shown in FIGS. 3 and 4 provides for a comparatively uniform flashing rate in miniature flashing incandescent lamps by providing a fixed and substantially uniform minimum deflection of bimetal **18** due to the comparatively unyielding tension applied thereto by the permanent set, crimp or bend applied to lead-in conductor **16** at bend or elbow **16***a*.

FIGS. 5 to 8 inclusive, represent a mechanism for providing for the uniform deflection of bimetal strip **18** and the substantially constant configuration for lead-in conductor **16**. A filament mount **10** is constructed on a conventional flashing miniature mount machine and is carried by an indexing head **24** during the assembly thereof. After the filament mount has been assembled the head **24** is indexed to a position shown in FIG. 5 with the filament mount constructed as shown in FIGS. 1 and 2. At this position the filament mount **10** is acted upon by the tension setting mechanism generally designated **26**. The tension setting mechanism **26** includes a base **28** which carries a rotatable pinion gear (not shown) and a pair of associated racks **30** and **32**. The racks **30** and **32** carry filament mount support jaws **34** and **36** respectively and are operable in response to rotation of the pinion gear to move the support jaws **34** and **36** in opposite directions to the positions shown in FIG. 6 to support the lower half of the lead-in conductor **16**. A bimetal backup plate **38** is also carried by rack **30**. The position of the backup plate **38** with respect to the position of the filament mount carried by indexing head **24** is completely adjustable to control the deflection of bimetal **18** during the tension setting operation.

The adjustable backup plate assembly as can best be seen by reference to FIG. 8, generally includes a base member **40** which is adjustably secured to rack **30** by means of a bolt and slot connection at **42**. This bolt and slot connection provides for the vertical adjustment of both the backup plate **38** and the support jaw **32**. Within the cutout portion **44** of base member **40** is mounted a yoke **46** which is adjustably secured to base member **40** by bolt **48**. Slot **50** in yoke **46** through which bolt **48** extends allows for the horizontal adjustment of yoke **46** toward or away from the vertical plane of the filament mount. Bimetal backup plate **38** is carried by a rocker arm **52** and includes a pair of threaded adjustment bolts **54** and **56**. The bimetal backup plate through rocker arm **52** is rotatably mounted within a cutout portion **60** of yoke **46** by means of a pin **58** and secured therein by a cover plate **62** which overlies cutout portion **60** and is threadedly secured by means of a bolt **64** to the yoke **46**. Adjustment bolts **54** and **56** coact with cover plate **62** and yoke **46** respectively to accurately position bimetal backup plate **38** angularly about pivot pin **58** to accurately control the degrees of deflection imparted to bimetal **18** by tension setting tool **66**.

A tension setting tool head **68** is pivotally mounted at **70** to base **28** and has adjustably secured therein the tension setting tool **66**. The tension setting tool **66** has a bifurcated probe **72** which receives lead-in conductor **16** when the head **68** is actuated. Tension setting tool **66** is adjustably mounted within head **68** by means of a tap screw **74** which serves to adjustably position the tool **66** toward or away from the point of contact with lead-in conductor **16** and thus accurately controls the force imparted thereto. At its upper end the head **68** carries a roller **76** which coacts with a cam surface **78** on the leading end of actuating bar **80**. Actuating bar **80** is sequentially operated by means of a cam mechanism (not shown) to force the head **68** to pivot about the pivot **70** to set the tension in lead-in conductor **16** through tool **66**. A spring **82** secured at one end to head **68** and at its other end to base member **28** serves to hold roller member **76** in continuous contact with cam surface **78**.

In operation an indexing head **24** carrying a filament mount **10** is indexed to the position shown in FIG. 5. The pinion (not shown) operates to move racks **30** and **32** to the position shown in FIG. 6, thus placing support jaws **34** and **36** in a position to support the lower half of the filament mount structure. Bar **80** is then operated by its actuating mechanism (not shown) to pivot tool carrying head **68** about the pivot **70** to cause tension setting tool **66** to move to the position shown in FIG. 7 forcing bimetal **18** against bimetal backup plate **38**. At this point a slight further motion of tool **66** causes a set or crimp at the elbow **16***a* of lead-in conductor **16** which prevents springback by bimetal **18** when the tension setting tool is removed. Carriage **68** is then returned to its FIG. 6 position and the support jaws moved to their FIG. 5 position permitting the indexing out of the mount carrying head **24**.

It has been found that by employing the structure and method according to the present invention that a miniature flashing incandescent lamp utilizing a "Thermostat metal" (Invar and silver) bimetal 0.005 inch thick and extending 5 mm. above the glass bead which is contacted at 3.5 mm. above the bead by the curved lead-in conductor with a contact pressure of from about 6 to 8 grams will consistently produce flashing rates in the lamp between 100 and 160 flashes per minute which is well within established requirements, such as used in the automotive industry.

The filament mount structure can, of course, be employed in any of the many different bulb shapes and base configurations available in the art. However, for purposes of illustration, the typical automotive type bayonet base has been shown in FIG. 9 and includes a light transmissive bulb portion **86** and metal shell base **88** having bayonet protuberances **90** to secure the base in a complementary socket. One lead-in conductor, for example lead-in conductor **14**, is connected to a metal end contact eyelet **94** and the remaining lead-in conductor, for example lead-in conductor **16**, is connected to a metal side shell contact **96** in the conventional manner.

As can be seen from the foregoing the present invention provides a lead wire to bimetal contact which can be uniformly set and will produce a comparatively consistent flashing rate in a miniature flashing incandescent lamp. It has further been shown that the invention accurately determines the position of the lead with respect to the bimetal, and therefore accurately determines the lead to bimetal tension which is a critical factor in controlling flashing rates in flashing incandescent lamps.

Since numerous changes may be made in the above described apparatus and different embodiments of the invention may be made without departing from the spirit thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A flashing incandescent lamp having a base portion and a bulb portion, and a filament mount therein, said filament mount comprising:

(a) a supporting insulator;

(b) a pair of lead-in conductors in contact with said base portion and extending through said supporting insulator;

(c) a thermostatic element mounted in said supporting insulator and extending substantially in a common plane with one of said lead-in conductors and located adjacent the other of said lead-in conductors; and

(d) a filament mounted between one end of said one conductor and an end of said thermostatic element,

said other lead-in conductor having a substantially V-shaped bend therein lying in a plane substantially perpendicular to said common plane and contacting said thermostatic element to provide a predetermined deflection in said element whereby upon operation of said lamp said element will alternately make and break contact with said other lead-in conductor to cause said lamp to flash at a predetermined rate.

2. A flashing incandescent lamp according to claim 1, wherein said other lead-in conductor applies a pressure of about 6 to 8 grams to said thermostatic element.

3. A flashing incandescent lamp according to claim 1, wherein said other lead-in conductor extends in a direction parallel to the plane of said thermostatic element for approximately one-sixth of its length, then first bends at an angle of approximately 60° away from said plane for one-third of its length, then secondly bends back toward said plane at an angle of about 60° for approximately one-third of its length, and thirdly bends away from said plane for approximately one-sixth of its length at an angle of about 60°.

4. A flashing incandescent lamp according to claim 3, wherein said other conductor contacts said thermostatic element at its third bend.

5. A flashing incandescent lamp according to claim 1, wherein said other lead-in conductor includes a first bend away from the plane of said thermostatic element, a second V-shaped bend toward the plane of said thermostatic element, and a third bend away from the plane of said thermostatic element.

6. A flashing incandescent lamp according to claim 5, wherein said V-shaped bend subtends at an angle of approximately 60° forming a permanent set in said other lead-in conductor and said other lead-in conductor contacts said thermostatic element at said third bend.

7. A flashing incandescent lamp according to claim 1, wherein said V-shaped bend defines an acute angle.

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U.S. Cl. X.R.

315—73, 74, 100; 313—331