United States Patent [19]

Cote

[11] 3,873,260

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[54] **PHOTOFLASH LAMP**

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[52] **U.S. Cl.** **431/95**

[51] **Int. Cl.** **F21k 5/02**

[58] **Field of Search** 431/93–95

[56] **References Cited**

UNITED STATES PATENTS

2,057,583	10/1936	Mey	431/95
2,699,659	1/1955	Haas	431/95
3,627,459	12/1971	Van Der Tas et al.	431/95

Primary Examiner—Carroll B. Dority, Jr.

Attorney, Agent, or Firm—John F. McDevitt; Lawrence R. Kempton; Frank L. Neuhauser

[57] **ABSTRACT**

An inlead wire of a photoflash lamp is provided which is recessed in a sleeve of electrically insulating material for improved lamp ignition. The sleeve is also vented to the bulb interior cavity to prevent gas entrapment during primer application which could prevent lamp ignition. The sleeve can be positioned with a second dielectric member being employed to maintain the pair of inlead wires in a spaced apart relationship.

7 Claims, 3 Drawing Figures

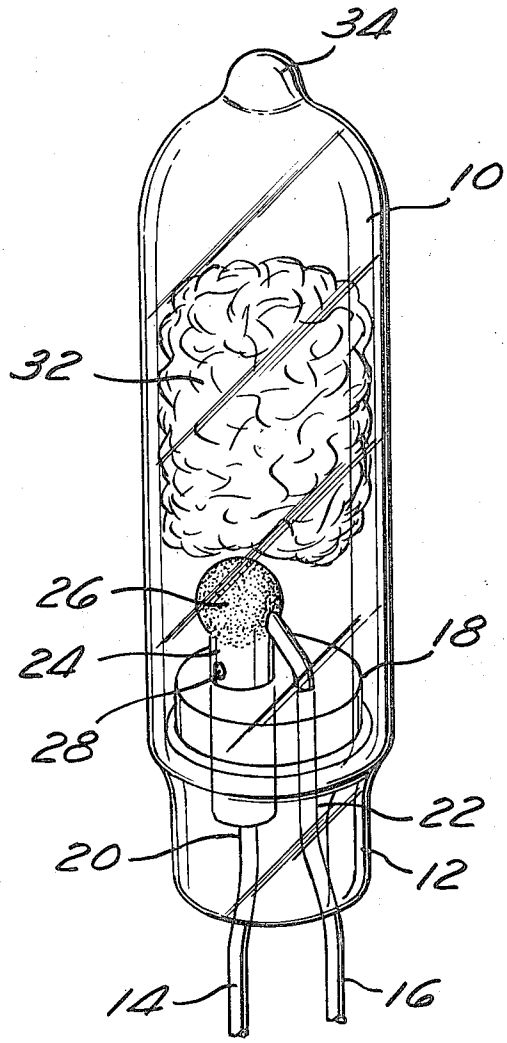


Fig. 1

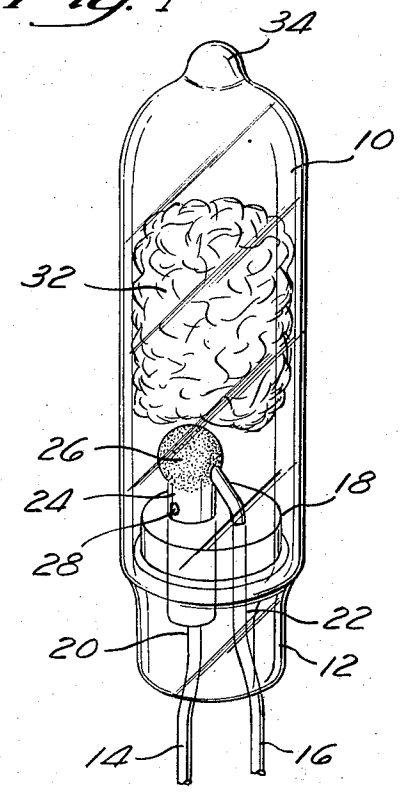
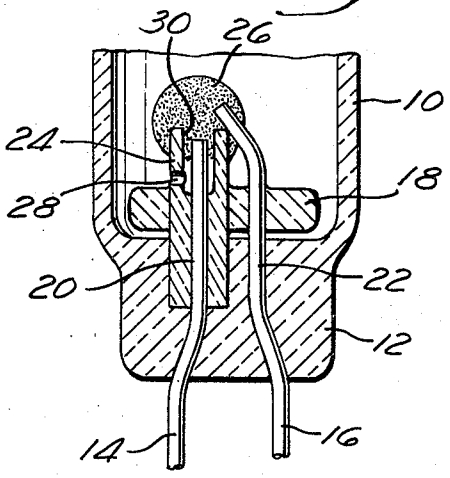


Fig. 2



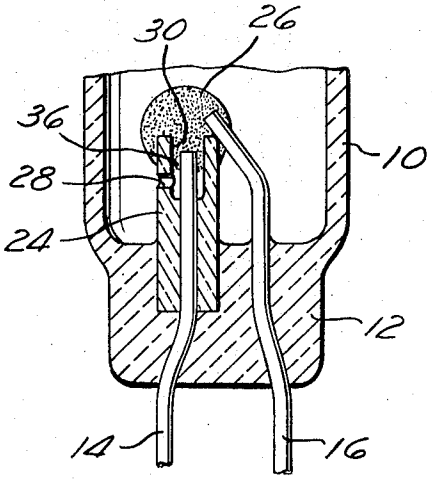


Fig. 3

PHOTOFLASH LAMP

BACKGROUND OF THE INVENTION

This invention relates to photographic flashlamps of the type comprising a sealed bulb envelope containing a combustion supporting atmosphere and a charge of combustible material which is ignited by a fulminating primer material in response to a high voltage pulse.

A photoflash lamp of the above general type is described in U.S. Pat. No. 2,868,003 to Warren F. Albrecht. In this lamp construction, the ignition means comprises a pair of spaced apart inlead wires or electrodes having a fulminating primer material disposed upon at least one of said electrodes so that a high voltage pulse can produce an electrical arc or spark between said electrodes for ignition of the primer which in turn ignites the combustible material. Lamps of this type are generally employed as a multiple-flash array for sequential flashing, one at a time, by means of an electrical firing circuit. A known firing circuit for such multiple-flashlamp array is described in U.S. Pat. No. 3,728,068 which issued to the present inventor. The flashlamps are connected in parallel according to this firing arrangement and are fired by connecting successive lamps sequentially across the firing pulse terminals by heat responsive switches. The circuit functions, basically, by sequencing beyond open-circuit flashed lamps, and applies the firing pulse to the first lamp in the array having a proper resistance across the spaced apart inlead wires or electrodes. An "open-circuit" flashed lamp, by comparison to a non-flashed lamp, has a higher electrical resistance between said inleads which makes the voltage breakdown characteristic of these flashlamps a critical factor in proper operation of the firing circuit in the intended manner. Said in another way, excessive variation in the electrical resistance of a non-flashed lamp due to non-uniformed spacing between the inlead wires or primer applications could lead to higher breakdown voltages being required thereby preventing lamp ignition. On the other hand, an already flashed lamp should not become short circuited when the flashlamps are connected in parallel and which can occur in a number of ways due to the severity of the photoflash reaction involved since succeeding firing pulses will be applied to the shorted flashlamp instead of the next lamp to be fired. Thus, the need is evident for a flashlamp design which will reliably provide ignition when fired by a high voltage pulse at a predetermined breakdown voltage as well as create an open circuit after firing.

SUMMARY OF THE INVENTION

An important object of the invention is to provide an improved photoflash lamp having a more uniform breakdown voltage characteristic and open circuit condition after firing.

Another important object of the invention is to provide a novel flashlamp construction which is less prone to ignition failure due to shorting between the inleads or between the combustible metal foil and the sleeved inlead.

Basically, the foregoing objectives are achieved with a flashlamp construction comprising a sealed bulb of light transparent material, a pair of inlead wires extending into said bulb in a spaced relationship, a mass of metallic combustible material substantially filling said bulb, a combustion supporting atmosphere in said bulb and ignition means connected between said inlead wires, wherein the improvement comprises a sleeve of electrically insulating material extending beyond the end of one inlead wire which is vented to the bulb interior cavity and a mass of primer material which bridges the end of said sleeved inlead and the other inlead wire. In a preferred embodiment, the dielectric sleeve includes a larger end opening than the diameter of said inlead wire with the primer material extending into the larger end opening beyond the end of the inlead wire to better insure primer contact with the recessed lead. In a different preferred embodiment, the sleeved inlead wire extends further into the bulb cavity than the bare inlead wire and with said bare inlead wire being bent in a manner to provide better electrical contact with a mass of metal filaments or foil being employed as the combustible material in the lamp. The sleeve member helps provide a uniform spacing between the inlead wires to insure a predetermined breakdown voltage when the lamp is fired by a high voltage pulse. By having one inlead recessed in the dielectric sleeve, there is also less opportunity for accidental grounding or shorting between the inleads or between the sleeved inlead and the combustible metal foil. After-flash shorting between the electrodes is also reduced by the sleeve member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a photoflash lamp in accordance with a preferred embodiment of the invention;

FIG. **2** is a cross-sectional view of the inlead construction for the photolamp in FIG. **1**; and

FIG. **3** is a cross-sectional view of the inlead construction wherein the spacing between inleads is established solely by the dielectric sleeve.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The lamp shown in FIG. **1** is of the sub-miniature type having a construction described in U.S. Pat. No. 3,506,385 to Kurt Weber and George Cressman, and comprising a tubular envelope **10,** preferably made of a borosilicate glass or other suitable transparent vitreous material having a stem press seal **12** at one end thereof through which a pair of lead wires **14** and **16** extend from the exterior to the interior cavity of the bulb **10** in a mutually parallel spaced apart manner. A bead **18** of glass or other suitable vitreous dielectric material secures portions **20** and **22** of the leads **14** and **16,** respectively, in spaced relationship to each other within the bulb **10.** A dielectric sleeve **24** which can be of the same material as the bead material is disposed along the length of inlead **14.** By reason of the correspondence in the inlead construction for FIGS. **1–2,** common reference numerals are employed in each Figure. Returning to the lamp description, it will be noted that inlead **16** is bent in a manner to insure better electrical contact with adjacent combustible filling in the bulb cavity. A mass or bead **26** of suitable primer material bridges the upper ends of sleeve **24** and bare lead wire **16** to provide a coherent assembly establishing uniform gap spacing for an electrical spark between the inleads. The dielectric sleeve includes a side vent opening **28** and a larger end opening **30** than the diameter of inlead wire **14.**

The bulb **10** is substantially filled with a loose mass of filamentary or shredded metal wire or foil **32,** of zirconium or hafnium or other suitable combustible metal. Air is exhausted from the bulb **10,** and the bulb is filled with oxygen at a pressure of at least several atmospheres, such as about 5 to 10 atmospheres, and the bulb is sealed off at an exhaust tip **34** at the other end thereof from the stem press seal **12.** The lamp may then be coated as a final assembly step with the usual lacquer or plastic protective coating.

FIG. **3** represents a different inlead construction of the present invention wherein the dielectric sleeve **24** is the only spacer means employed to establish a spaced apart relationship between the inleads. Accordingly, the lamp comprises sealed bulb **10,** a pair of spaced apart inlead wires **14** and **16** extending into said bulb, a mass of metallic combustible material and a combustion supporting atmosphere in said bulb (not shown), with the ignition means being connected between said inlead wires in the form of a vented sleeve **24** having primer mass **26** bridging the gap spacing between said inleads. In this embodiment, the primer mass extends into the larger end opening **30** of the dielectric sleeve beyond the upper end of inlead wire **14** as shown at **36.** The dielectric sleeve further includes side vent opening **28** to prevent gas entrapment during primer application which could disrupt the primer contact to the sleeved lead.

While preferred embodiments of the present invention have been shown and described, various other embodiments and modifications thereof will be apparent to those skilled in the art as being within the scope of the following claims. For example, it is contemplated to form the dielectric sleeve and spacer members in the above described embodiments as an integral construction during lamp manufacture. Consequently, it is intended to limit the present invention only to the scope of the following claims.

What I now claim and desire to secure by Letters Patent of the United States is:

1. A photoflash lamp comprising a sealed bulb of light transparent material, a pair of inlead wires extending into said bulb in a spaced relationship, a mass of metallic combustible material substantially filling said bulb, a combustion supporting atmosphere in said bulb, and ignition means connected between said inlead wires, wherein the improvement comprises a sleeve of electrically insulating material extending beyond the end of only one inlead wire, said sleeve having a larger end opening than the diameter of said inlead wire with said opening being disposed at the sleeve end adjacent the mass of metallic combustible material in the sealed bulb cavity and being vented to said bulb cavity, and a mass of primer material which bridges the end of said sleeved inlead and the other inlead wire.

2. A lamp as in claim **1** wherein the inlead wires are spaced apart with dielectric support means positioned substantially laterally across both inleads.

3. A photoflash lamp comprising a sealed glass bulb, a pair of inlead wires hermetically sealed through the wall of said bulb and extending in spaced apart relationship into said bulb, a mass of metallic combustible material substantially filling said bulb, a combustion supporting atmosphere in said bulb, and ignition means connected between said inlead wires, wherein the improvement comprises a sleeve of electrically insulating material extending beyond the end of only one inlead wire which includes a larger end opening than the diameter of said inlead wire with said opening being disposed at the sleeve end adjacent the mass of metallic combustible material in the sealed bulb cavity and being vented to said bulb cavity, and a mass of primer material which bridges the end of said sleeved inlead and the other inlead wire, said primer mass further extending into the larger end opening of the insulating sleeve beyond the end of the inlead wire.

4. A lamp as in claim **3** wherein the inlead wires are spaced apart with dielectric support means positioned substantially laterally across both inleads.

5. A lamp as in claim **4** wherein said dielectric support means also positions the insulating sleeve.

6. A photoflash lamp comprising a sealed glass bulb, a pair of inlead wires hermetically sealed through the wall of said bulb and extending in spaced apart relationship into said bulb, a mass of metallic combustible material substantially filling said bulb, a combustion supporting atmosphere in said bulb, and ignition means connected between said inlead wires, wherein the improvement comprises a sleeve of electrically insulating material extending beyond the end of only one inlead wire which includes a larger end opening than the diameter of said inlead wire with said opening being disposed at the sleeve end adjacent the mass of metallic combustible material in the sealed bulb cavity and being vented to said bulb cavity and with said sleeved inlead wire forming a gap spacing with a bare inlead wire which is bent to provide electrical contact with adjacent combustible material, said gap spacing being bridged with a mass of primer material.

7. A lamp as in claim **6** wherein the inlead wires are spaced apart with dielectric support means positioned substantially laterally across both inleads.

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