

United States Patent

[11] 3,555,339

[72]	Inventors	Teddy J. Peacher; Dorwin L. Kilbourn, Huntsville, Ala.
[21]	Appl. No.	789,531
[22]	Filed	Jan. 7, 1969
[45]	Patented	Jan. 12, 1971
[73]	Assignee	The United States of America as represented by the Secretary of the Army

Primary Examiner—Raymond F. Hossfeld
Attorneys—Harry M. Saragovitz, Herbert Berl, Edward J. Kelly and Harold W. Hilton

[54] **ELECTROMAGNETIC PIN RESTARTABLE LAMP**
3 Claims, 1 Drawing Fig.

[52] U.S. Cl..... 313/152,
313/198, 313/214, 313/217

[51] Int. Cl. H01j 61/54

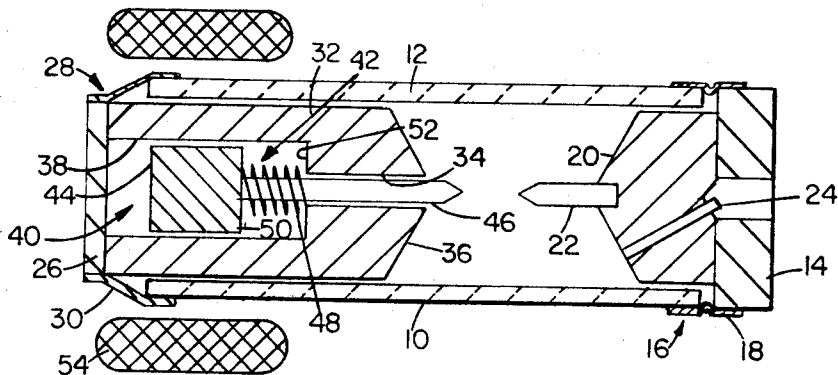
[50] **Field of Search**..... 313/146,
152, 197, 198

[56] **References Cited**

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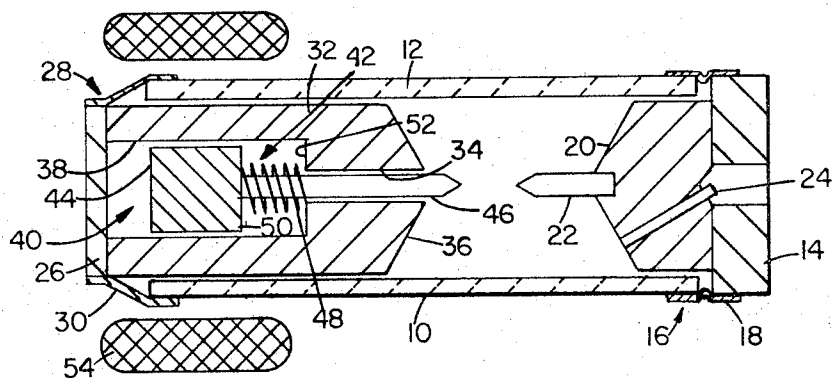
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ABSTRACT: An arc lamp having a tubular envelope enclosing a first fixed electrode disposed at one end and a second electrode structure, having a movable tip, disposed at the other end of the tubular envelope. The second electrode structure includes a fixed hollow electrode portion secured to the tubular housing and a movable electrode portion slidably carried in the opening of the hollow electrode and provided with a tip portion for extending out of the hollow electrode. The movable electrode includes a core of magnetic material having a tip extending therefrom through an opening in the hollow electrode and in axial alignment with the first electrode. The core is in biased relation with the hollow electrode by means of a spring seated between the hollow electrode and core. An electromagnetic coil is circumferentially mounted about the core for movement of the movable electrode responsive to energization of the coil.



PATENTED JAN 12 1971

3,555,339



Teddy J. Peacher
Dorwin L. Kilbourn
INVENTOR:

Harry M. Sengstacke
Edward J. Kelly
Herbert Ben
Harold W. Wilson

BY

ELECTROMAGNETIC PIN RESTARTABLE LAMP

BACKGROUND OF THE INVENTION

Almost all high pressure short arc gas lamps utilize a third electrode to which a high voltage is applied to initiate the arc in the lamp. With the advent of the usage of short arc lamps aboard missiles, where high voltage arcs are undesirable, the third electrode was replaced by a fuse link mounted between the two high current electrodes. Although the fuse link concept permits the lamp to be started at low voltages, the lamp can not be restarted by low voltages once the fuse link has been destroyed. This makes the lamp a "one-shot" unit. Such lamps can not be tested except by a statistical lot sampling process. There is always some doubt as to the quality of any given lamp, except by reliability experience, if it can not be fully tested prior to actual use. The device of the present invention gives such lamps a restart capability without using a high voltage. Such a lamp could be used in almost all applications where high voltages and high frequencies are not desirable, and where a ready supply of low voltage current is available.

SUMMARY OF THE INVENTION

A restartable arc lamp having an envelope containing a gas and provided with a fixed electrode and a movable electrode and electromagnetic means for moving the movable electrode into contact with the fixed electrode and for displacing the movable electrode from the fixed electrode to create an arc between the electrodes for energization of the gas in the flash lamp.

It is, therefore, an object of the present invention to provide an arc lamp having restartable capabilities.

It is a further object of the present invention to provide such an arc lamp with activating means for separating a pair of contacting energized electrodes to initiating an arc therebetween in a gaseous atmosphere.

It is an additional object of the present invention to provide such activating means which is electromagnetically controlled.

These and other objects and advantages of the present invention will be more readily apparent from the following description and drawing.

BRIEF DESCRIPTION OF THE DRAWING

The FIG. is an elevational sectional view illustrating the principles of our invention.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the FIG., an arc lamp 10 is shown to include a tubular envelope 12 having a first end seal member 14 secured in sealing relation to one end 16 thereof by a metallic ferrule 18 bonded to the end member and the envelope. An electrode 20 is secured to or integrated with end member 14 and includes a tip 22 extending into the envelope. A tube 24 extends through end member 14 and electrode 20 in communication with the interior of the envelope for pressurization thereof by a gaseous medium.

A second end member 26 is secured to end 28 of the envelope by a metal ferrule 30 bonded to the end member and the envelope. A second electrode 32 which may be secured to or integrated with end member 26 is carried in the envelope adjacent the end 28 thereof. Electrode 32 is hollow, having a small opening 34 extending through the conical end 36 thereof into a larger opening 38 at the rearward end 40 of electrode 32. Electrode 32 is mounted in stationary relationship in the envelope.

A movable electrode 42, includes a core of magnetic material forming an armature 44 and a tip 46 extending through opening 34 in axial alignment with tip 22. A spring 48

is between a surface 50 of the armature and a surface 52 of electrode 32. An electromagnetic coil 54 is circumferentially disposed about armature 44 for movement thereof in response to energization by an electrical source (not shown).

The lamp of the present invention is operated by moving electrode tip 46 into contact with electrode tip 22 and the electrodes are energized (by a source not shown). Current then flows through electrodes 20 and 32 to tips 22 and 46, respectively. To provide an arc in the gas filled lamp for energization thereof, the electrode tips are disengaged, creating the arc and energizing the lamp. The movable electrode is completely retracted in opening 34 to prevent destruction of the tip. Once tip 46 is retracted into opening 34, the plasma or electron flow to tip 46 is transferred to electrode 32. There are many means of operating a lamp of the type disclosed, with the object of being able to move the electrode pin so as to close the gap between the electrodes while the electrodes are under an electric potential. The coil 54 can be supplied with current to close the gap and the current then removed to permit the retainer spring 48 to displace electrode 42 for disengagement of the electrode tips.

If desired, coil 54 may be supplied with current so as to move tip 46 into engagement with tip 22 and the current in the coil 54 reversed for rearward displacement of electrode 42 for disengagement of the electrode tips. Alternatively, the lamp may be mounted in a vertical position to open the gap on the one hand or to close the gap on the in the reverse position; the coil may then be used to close or open the gap as needed.

The end members engage the large internal electrodes or are integral therewith and external of the tubular housing to dissipate the heat generated therein.

It is to be understood that various modifications of the present invention may be resorted to by those skilled in the art without departing from the spirit and scope of the appended claims.

I claim:

1. An arc lamp structure comprising:

- a. a tubular envelope;
- b. a first electrode secured in sealing relation at a first end of said envelope;
- c. a second electrode secured in sealing relation at the second end of said envelope, said second electrode having a central opening therein;
- d. movable electrode means mounted in said opening of said second electrode and disposed for displacement from a first position of nonengagement to a second position of engagement with said first electrode, said moveable electrode means having an armature portion comprised of magnetic material carried in said central opening and a tip portion disposed for extending out of said second electrode for the engagement with said first electrode;
- e. electromagnetic means disposed around said tubular envelope adjacent said second end thereof, said electromagnetic means disposed for energization to effect the displacement of said movable electrode means from said first to said second position; and
- f. biasing means for return of said moveable electrode means to said first position whereby an arc is created between said movable electrode means and said first electrode responsive to separation thereof,

2. The device as set forth in claim 1 wherein said second electrode is a hollow member having a first opening extending therethrough and a second larger opening rearwardly of said first opening and in communication therewith and forming a shoulder therebetween; said armature portion of said moveable electrode means being carried in said larger opening and said tip portion of said movable electrode means being carried in said first opening.

3. The device as set forth in claim 2 wherein said biasing means is a spring member seated between said armature portion and said shoulder for biased relation of said moveable electrode means therein.