United States Patent Office 3,766,094 Patented Oct. 16, 1973

3,766,094

SEMICONDUCTOR COMPOSITIONS

Michael Ognyanov, 327 Alpine St., Pasadena, Calif. 91106

Continuation-in-part of abandoned application Ser. No. 77,452, Oct. 2, 1970. This application Sept. 20, 1971, Ser. No. 181,944

Int. Cl. H01b 1/00

U.S. Cl. 252—512 7 Claims

ABSTRACT OF THE DISCLOSURE

A resonance oscillator electric power pack for operating a flash lamp, for example, or other electrically operated device, operates without moving mechanical parts or electrolytic action. The power pack is contained in a cylindrical metal envelope and in a preferred embodiment is coupled to a relaxation oscillator and an incandescent lamp. Within the envelope, and insulated therefrom, is a semiconductor tablet having a metal base connected to the external circuit. A metal probe makes contact with a point on the semiconductor tablet and also with a cylindrical ferrite rod axially aligned with the envelope. Wound about the ferrite rod are concentric helical coils designated as a primary with many turns and a secondary with fewer turns than the primary. The primary coil is connected at one end to the probe and at the other end to the secondary coil. The leads from the secondary coil are connected to the relaxation oscillator by way of an adjustable capacitor. Oscillation within the envelope is resonance amplified, and the induced voltage in the secondary coil is rectified for application to the relaxation oscillator and lamp. Selenium and germanium base semiconductor compositions including Te, Nd, Rb and Ga in varying proportions are used for the tablet.

BACKGROUND

This is a continuation-in-part of my copending patent application Ser. No. 77,452, filed Oct. 2, 1970, entitled "Electric Power Pack," and now abandoned.

In many situations it is desirable to have a source of electric power that is not dependent on wires from a central generating station and, therefore, portable power supplies having no moving parts have been employed. Typically, such portable power packs have been primary or secondary electrolytic cells which generate or store electrical energy for release by chemical action. Such batteries have a limited amount of contained energy and must often be replaced at frequent intervals to maintain equipment in operation.

Thus, as one example, flashing lights are now commonly used along highways and other locations to warn of dangerous conditions. These flashing lights in remote locations are typically incandescent or gas discharge lamps connected to some style of relaxation oscillator powered by a battery. The batteries involved in such blinking lights have a limited lifetime and must be periodically replaced, typically each 250–300 hours of operation. This involves a rather large labor cost in replacing the expended batteries with fresh ones and additional cost for primary cells or for recharging secondary cells. It is desirable to provide an electric power pack capable of providing a sufficient quantity of electrical energy over a prolonged period of time so that the requirement for periodic replacement of the electrolytic cells can be avoided. Such a power pack is valuable even if appreciably more expensive than batteries beacuse of the greatly reduced labor for periodic replacement.

BRIEF SUMMARY OF THE INVENTION

There is provided in practice of this invention according to a presently preferred embodiment semiconductive compositions selected from the group consisting of selenium with from 4.85 to 5.5% tellurium, from 3.95 to 4.2% germanium, from 2.85 to 3.2% neodymium, and from 2.0 to 2.5% gallium; selenium with from 4.8 to 5.5% tellurium, from 3.9 to 4.5% germanium, from 2.9 to 3.5% neodymium, and from 4.5 to 5.0% rubidium; and germanium with from 4.75 to 5.5% tellurium, from 4.0 to 4.5% neodymium and from 5.5 to 7.0% rubidium.

DRAWINGS

These and other features and advantages of the invention will be appreciated as the same becomes better understood by reference to the following detailed description of a presently preferred embodiment when considered in connection with the accompanying drawings wherein:

FIG. 1 illustrates in exploded schematic a flashing lamp connected to an electric power supply constructed according to principles of this invention;

FIG. 2 illustrates in longitudinal cross section the power pack of FIG. 1; and

FIG. 3 is an electric circuit schematic of the system.

DESCRIPTION

FIG. 1 illustrates schematically a typical flashing lamp having a power supply constructed according to principles of this invention. As illustrated in this presently preferred embodiment an electric power pack **5** is electrically connected to a relaxation oscillator circuit (shown only schematically) on a conventional printed circuit board **6**. The power pack **5** and printed circuit board are mounted in a metal box **7** having a transverse partial partition **8** defining a space for the power pack and another space for the printed circuit board which is supported away from contact with the box by any convenient insulator. Preferably these elements are potted in place in a conventional manner. A cover **9** having mounting ears **10** is riveted on the box after assembly. A small terminal strip **11** on one side of the box **7** provides electrical contacts for connection to a load such as an incandescent lamp (not shown in FIG. 1). The lamp provides a flash of light when the relaxation oscillator switches. Although the described system is employed for a flashing lamp, it will be apparent to one skilled in the art that this is only exemplary and other applications can be made.

The electric power pack **10** is illustrated in longitudinal cross section in FIG. 2 and has dimensions as set out here after. These dimensions are exemplary of the illustrt aed embodiment for operating a conventional flasher lamp, and it will be apparent that other dimensions may be employed for other applications. In particular, the dimensions may be enlarged in many circumstances in order to obtain somewhat higher power levels and different voltage or current levels. The power pack comprises a cylindrical metal tube **16** having closely fitting metal caps **17** at each end, which are preferably sealed to the tube after the internal elements are inserted in place. The metal tube **16** and caps **17**, which are preferably of aluminum, thus form a closed conductive envelope which in a typical embodiment has an inside diameter of about 0.8 inch and a length of about 2¼ inch.

Mounted within one end of the envelope is a plastic cup **18**, the dimensions of which are not extremely critical; however, a wall thickness of at least 1/16 inch is preferred. Mounted within the plastic cup **18** is a semiconductor tablet **19** having a flat base and somewhat domed opposite side. The composition of the semiconductor tablet **19** is set out in greater detail hereinafter. Typically, the semiconductor tablet has a mass of about 3.8 grams. A