

A Practical Guide to 'Free Energy' Devices

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This patent application shows the details of a device which it is claimed, can produce electricity via a solid-state oscillator. It should be noted that while construction details are provided which imply that the inventor constructed and tested several of these devices, this is only an application and not a granted patent.

Patent Application US 3,766,094 20th September 1971 Inventor: Michael Ognyanov

SEMICONDUCTOR COMPOSITIONS

ABSTRACT

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 from it, 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 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.

One end of the primary coil is connected to the probe and the other end is connected to the secondary coil. The leads from the secondary coil are connected to the relaxation oscillator via 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 OF THE INVENTION

This is a continuation-in-part of my co-pending patent application Serial No. 77,452, filed 2nd October 1970, entitled "Electric Power Pack" now abandoned.

In many situations it is desirable to have a source of electric power which 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 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 type of relaxation oscillator powered by a battery. The batteries employed in such blinking lights have a limited lifetime and must be periodically replaced, typically each 250 to 300 hours of operation. This involves a rather large labour 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 because of the greatly reduced labour costs required for periodic replacements.

BRIEF SUMMARY OF THE INVENTION

There is provided in practice of this invention according to a 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% 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 and better understood by reference to the following detailed description of a preferred embodiment when considered in conjunction with the following drawings:

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

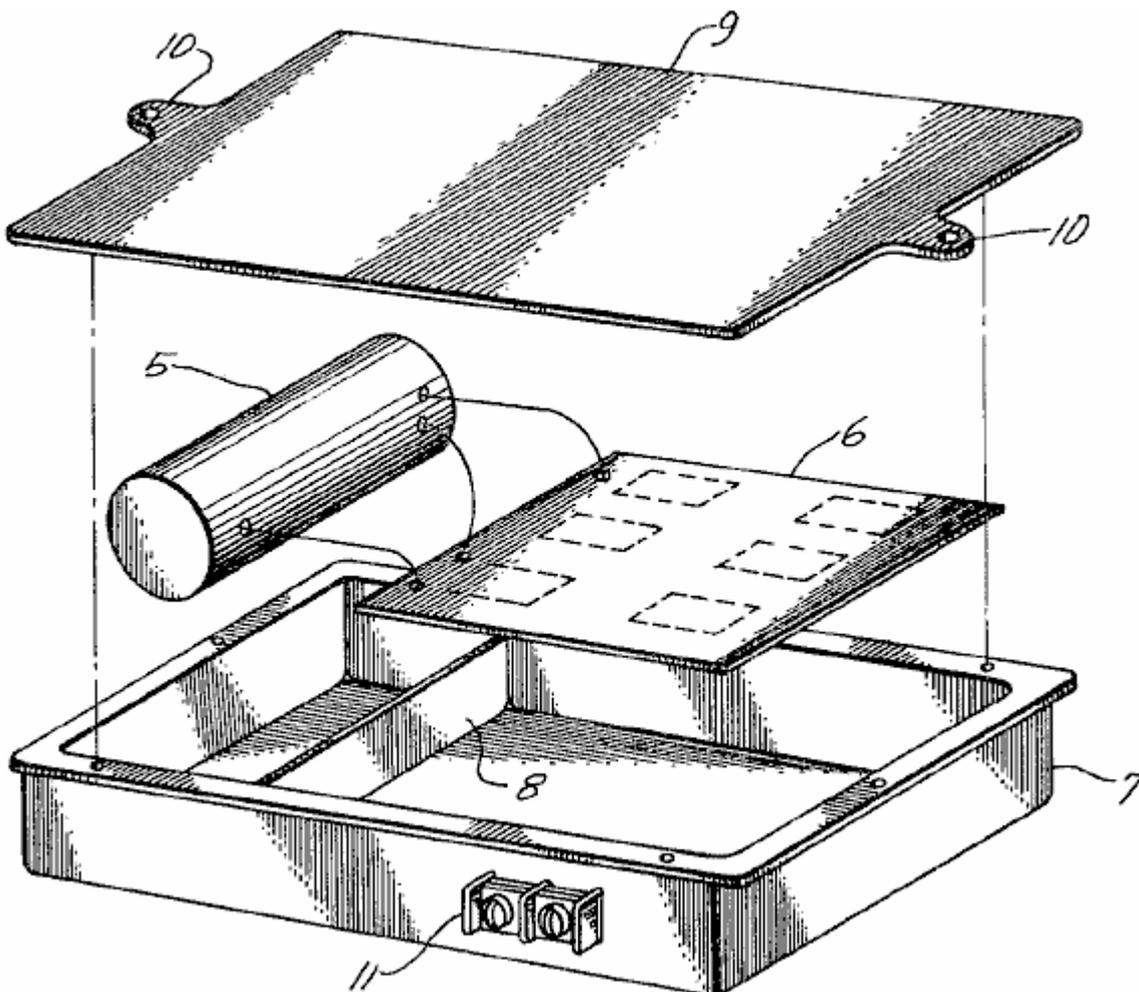


Fig.2 illustrates in longitudinal cross-section, the power pack of Fig.1

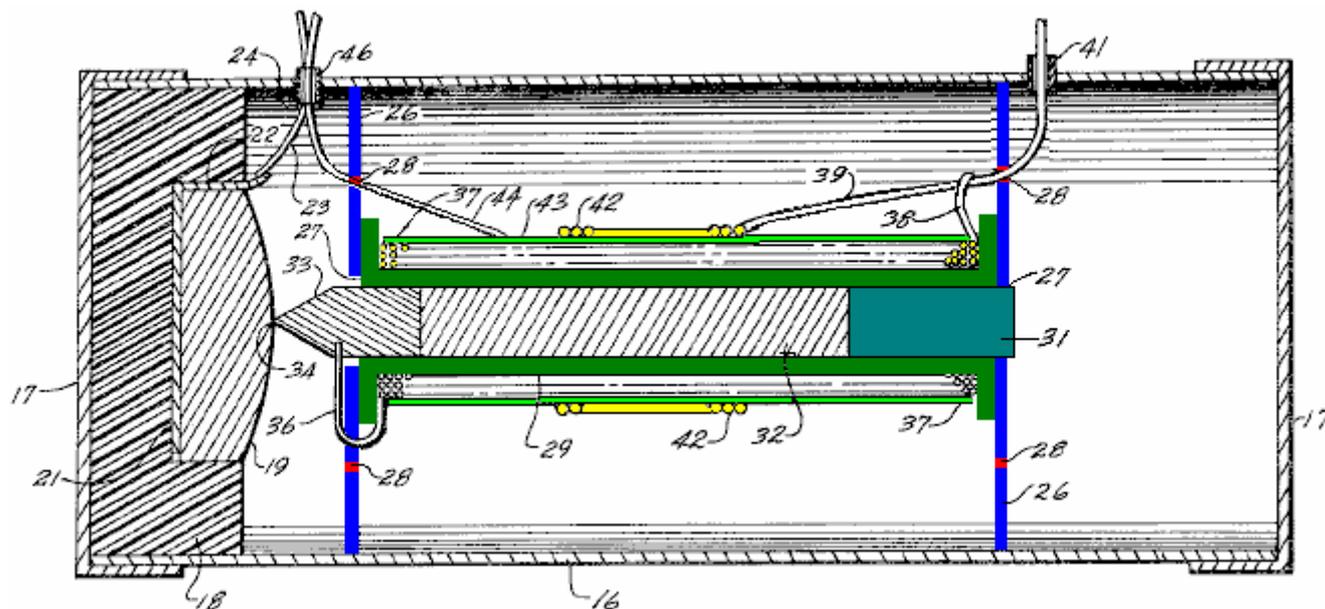
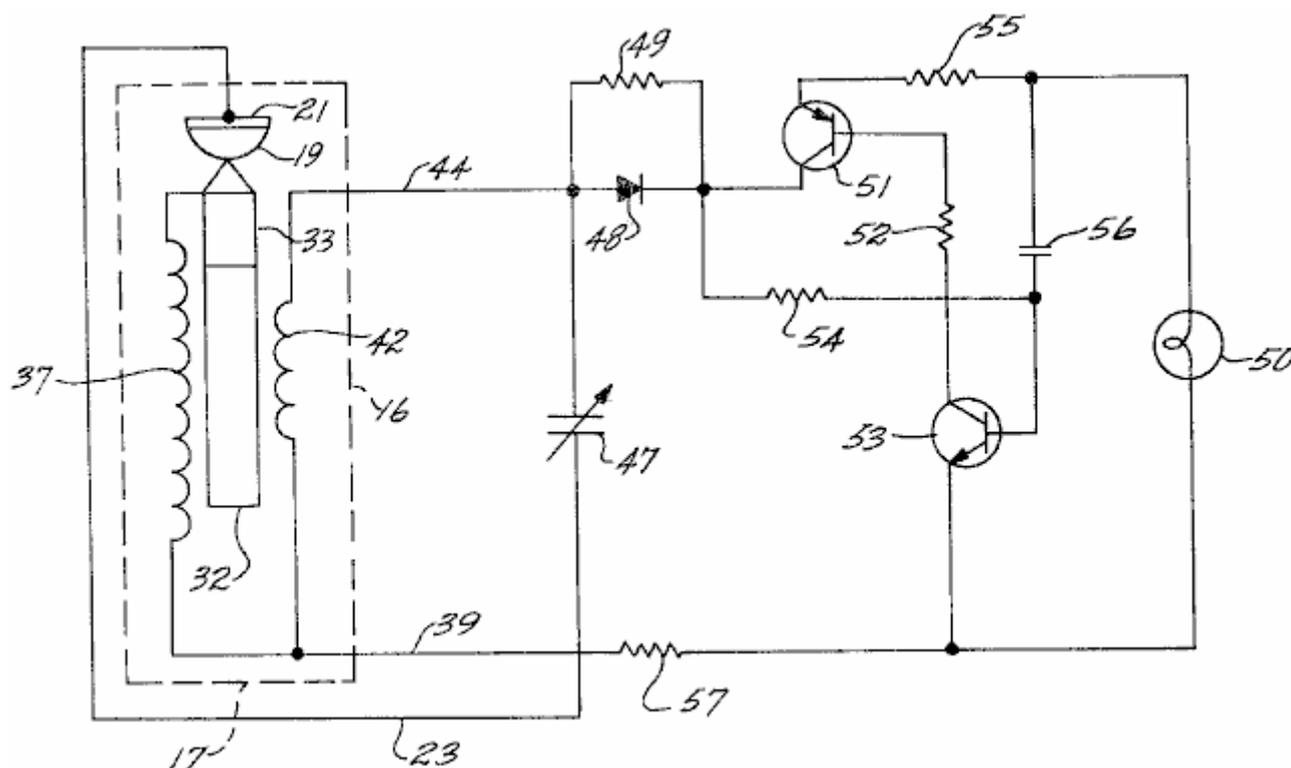


Fig.3 is an electric circuit diagram of the system.



DESCRIPTION

Fig.1 illustrates schematically, a typical flashing lamp having a power supply constructed according to the principles of this invention. As illustrated in this preferred embodiment, an electric power pack 5, is connected electrically to a relaxation oscillator circuit (shown only schematically) on a conventional printed-circuit board 6.

The power pack **5** and the printed-circuit board are mounted in a metal box **7**, which has a transverse partial partition **8**, which creates two spaces, one for the power pack and the other for the printed-circuit board which is prevented from contacting the metal box by any convenient insulating mounting. Preferably, these components are potted in place in a conventional manner.

A cover **9**, having mounting lugs **10**, is riveted on to the box after assembly. A small terminal strip **11**, mounted 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 that other loads may be powered by the invention.

In **Fig.2**, the electric power pack **10**, is illustrated in longitudinal cross-section and has dimensions as follows: These dimensions are provided by way of example for powering a conventional flashing lamp and it will be clear that other dimensions may be used for other applications. In particular, the dimensions may be enlarged in order to obtain higher power levels and different voltage or current levels. The power pack is comprised of 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 aluminium, 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 2.25 inches.

Mounted within one end of the envelope is a plastic cup **18**, the dimensions of which are not 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 below. Typically, the semiconductor tablet has a mass of about 3.8 grams. A metal disc **21** is positioned beneath the base of the tablet **19** in the cup **18**, and is preferably adhesively bonded inside the cup. The metal disc is tightly fitted to the base of the tablet so that good electrical contact is obtained over a substantial area of the semiconductor.

An ear **22** on one edge of the disc is soldered to a wire **23**, which extends through a short insulating sleeve **24** which passes through a hole in the side of the metal envelope. The insulating sleeve **24** acts as a grommet and ensures that there is no damage to the insulation of wire **23** and subsequent accidental short circuiting between the wire and the metal envelope. Preferably, the insulating sleeve **24** is sealed with a small amount of plastic cement or the like, in order to maintain clean air within the cylindrical envelope. Two other openings for leads through the tube **16**, as mentioned below, are also preferably sealed to maintain cleanliness within the envelope.

A pair of circular metal discs **26**, are fitted inside tube **16** and are preferably cemented in place to prevent shifting. The two discs **26**, are equally spaced from the opposite ends of the envelope and are spaced apart by slightly more than 1.15 inches. Each of the discs has a central aperture **27**, and there is a plurality of holes **28**, extending through the disc in a circular array midway between the centre of the disc and its periphery. The holes **28** are preferably in the size range of about 0.01 to 0.06 inch in diameter and there are 12 on each disc located at 30° intervals around the circle.

The two discs **26** divide the interior of the cylindrical envelope into three chambers, and the pattern of holes **28** provides communication between the chambers and affects the electrical properties of the cavity. It is believed that the pattern of holes affects the inductive coupling between the cavities inside the envelope and influences the oscillations in them.

Although an arrangement of 12 holes at 30° centres has been found particularly advantageous in the illustrated embodiment, it is found in other arrangements that a pattern of 20 holes at 18° centres or a pattern of 8 holes at 45° centres, provides optimum operation. In either case, the circle of holes **28** is midway between the centre and the periphery of the disc.

Mounted between the discs **26** is a plastic spool **29** which has an inside distance of 1.1 inches between its flanges. The plastic spool **29** preferably has relatively thin walls and an internal bore diameter of 1/8 inch. A plastic mounting plug **31**, is inserted through the central aperture **27** of the disc **26** farthest from the semiconductor table **19**, and into the bore of the spool **29**. The plastic plug **31** is preferably cemented to the disc **26** in order to hold the assembly together.

Also mounted inside the bore of spool **29** is a cylindrical ferrite core **32**, about 1/8 inch diameter and 3/4 inch long. Although a core of any magnetic ferrite is preferred, other ferromagnetic materials having similar properties can be used if desired. The core **32**, is in electrical contact with a metal probe **33** about 1/4 inch long. half of the length of

the probe **33** is in the form of a cylinder positioned within the spool **29**, and the other half is in the form of a cone ending in a point **34** in contact with the domed surface of the semiconductor tablet **19** where it makes an electrical contact with the semiconductor in a relatively small point.

Electrical contact is also made with the probe **33** by a lead **36**, which passes through one of the holes **28** in the disc **26** nearer to the semiconductor tablet and thence to a primary coil **37**, wound on the plastic spool **29**. The primary coil **37** is in the form of 800 to 1000 turns wound along the length of the spool, and the lead **38** at the opposite end of the coil **37** is soldered to one of the external leads **39** of the power pack. This lead **39** proceeds through one of the holes **28** in the disc farthest from the semiconductor tablet **19**, and through an insulating sleeve **41** in the metal tube **16**.

The lead **39** is also connected to one end of a secondary coil **42** which is composed of 8 to 10 turns around the centre portion of the primary coil **37**. A thin insulating sheet **43** is provided between the primary and secondary coils. The other lead **44** from the secondary coil passes through one of the holes **28** in the disk nearer the semiconductor tablet and thence through an insulating sleeve **46** through the wall of the tube **16**.

Fig.3 illustrates schematically, the electrical circuit employing an electric power pack constructed according to the principles of this invention. At the left hand side of **Fig.3**, the arrangement of elements is illustrated in a combination of electrical schematic and mechanical position inside tube **16** for ready correlation with the embodiment illustrated in **Fig.2**. Thus, the semiconductor tablet **19**, probe **33** and ferrite core **32** are shown in both their mechanical and electrical arrangement, the core being inductively coupled to the coils **37** and **42**. The lead **23** from the metal base of the semiconductor tablet **19**, is connected to a variable capacitor **47**, the other side of which is connected to the lead **44** from the secondary coil **42**. The lead **44** is also connected to a rectifying diode **48** shunted by a high value resistor **49**.

It will be seen that the variable capacitor **47** is in a tank circuit with the inductive coils **37** and **42** which are coupled by the ferrite core **32**, and this circuit also includes the semiconductor tablet **19** to which point contact is made by the probe **33**. The mechanical and electrical arrangement of these elements provides a resonant cavity in which resonance occurs when the capacitor **47** is properly trimmed. The diode **48**, rectifies the oscillations in this circuit to provide a suitable DC for operating an incandescent lamp **50** or similar load.

The rectifying diode **48** is connected to a complementary-symmetry relaxation circuit for switching power to the load **50**. The diode is connected directly to the collector of a PNP transistor **51** which is in an inverted connection. the emitter of the PNP transistor is connected to one side of the load **50** by way of a timing resistor **55**. The base of the transistor **51** is connected by way of a resistor **52** and a capacitor **56** to the collector of an NPN transistor **53**, the emitter of which is connected to the other side of the load **50**. The base of the NPN transistor **53** is coupled to the diode by a resistor **54**. The emitter of the PNP transistor **51** is fed back to the base of the NPN transistor **53** by the resistor **55**. Current flow through the lamp **50** is also limited by a resistor **57** which couples one side of the lamp and the emitter of the NPN transistor **53** to the two coils **37** and **42** by way of the common lead **39**.

The electrical power pack is believed to operate due to a resonance amplification once an oscillation has been initiated in the cavity, particularly the central cavity between the discs **26**. This oscillation, which apparently rapidly reaches amplitudes sufficient for useful power, is then half-wave rectified for use by the diode **48**. With such an arrangement, a voltage level of several volts has been obtained, and power sufficient for intermittent operation of a lamp requiring about 170 to 250 milliwatts has been demonstrated. The resonant amplification is apparently due to the geometrical and electrical combination of the elements, which provide inductive coupling of components in a suitable resonant circuit. This amplification is also, at least in part, due to unique semiconductor properties in the tablet **19**, which has electronic properties due to a composition giving a unique atomic arrangement, the exact nature of which has not been measured.

The semiconductor tablet has electronic properties which are determined by it's composition and three such semiconductors satisfactory for use in the combination have been identified. In two of these, the base semiconductor material is selenium provided with suitable dopant elements, and in the third, the base element is germanium, also suitably doped. The semiconductor tablets are made by melting and casting in an arrangement which gives a large crystal structure. It has not been found necessary to provide a selected crystal orientation in order to obtain the desired effects.

A preferred composition of the semiconductor includes about 5% by weight of tellurium, about 4% by weight of germanium, about 3% by weight of neodymium and about 4.7% by weight of rubidium, with the balance of the composition being selenium. Such a composition can be made by melting these materials together or by dissolving the materials in molten selenium.

Another highly advantageous composition has about 5% by weight of tellurium, about 4% by weight of germanium, about 3% by weight of neodymium, and about 2.24% by weight of gallium, with the balance being selenium. In order to make this composition, it is found desirable to add the very low melting point gallium in the form of gallium selenide rather than elemental gallium.

A third suitable composition has about 5% by weight of tellurium, about 4% by weight of neodymium, about 6% by weight of rubidium, with the balance being germanium. These preferred compositions are not absolute and it has been found that the level of dopant in the compositions can be varied within limits without significant loss of performance. Thus, it is found that the proportion of tellurium in the preferred composition can range from about 4.8% to about 5.5% by weight; the germanium can range from about 3.9% to 4.5% by weight; neodymium can range from about 2.9% to 3.5% by weight, and rubidium can vary from about 4.5% to 5.0% by weight. The balance of the preferred composition is selenium although it has also been found that nominal impurity levels can be tolerated and no great care is required in preventing minor contamination.

The other selenium base composition useful in practice of this invention can have a tellurium concentration in the range of from about 4.85% to 5.5% by weight, germanium in the range of from about 3.95% to 4.2% by weight, neodymium in the range of from about 2.85% to 3.2% by weight, and gallium in the range of from about 2.0% to 2.5% by weight. As in the preferred composition, the balance is selenium and nominal impurity levels can be tolerated. It is preferred to add the gallium in the form of gallium selenide rather than as elemental gallium with a corresponding decrease in the selenium used to make up the composition.

The above selenium base compositions are easier to make and less expensive than the germanium base composition and are therefore preferable for most applications. It is found that these are particularly suited for relatively small semiconductor tablets up to about 1 inch or a little less. For relatively large tablets, it is preferred to use the germanium base composition.

The germanium base composition has a tellurium level in the range of from about 4.75% to 5.5% by weight, neodymium in the range of from about 4.0% to 4.5% by weight, and rubidium in the range of from about 5.5% to 7.4% by weight. It is also found that it is of greater importance to maintain purity of the germanium base compositions than the selenium base compositions. Although the exact purity levels have not been ascertained, it is in excess of 99%.

It has been found that it is not necessary to have single crystals in the semiconductor tablets and any convenient grain size in excess of about 1 millimetre appears satisfactory. In the above compositions, when the recited ranges are exceeded, oscillation in the power pack drops off rapidly and may cease altogether.

The reasons that these compositions are satisfactory in the arrangement providing resonance amplification has not been determined with certainty. It is possible that the semiconductor serves as a source of electrons for providing an oscillating current in the circuit. This is, of course, combined with a relatively large area contact to one side of the semiconductor tablet, and a point contact on another area. Any resonant current in the coils wound on the ferrite rod, induces a varying magnetic field in the resonant cavity, and the electrical connection between the ferrite rod and the metal probe, provides a feedback of this oscillation to the semiconductor tablet.

It should particularly be noted that the oscillation in the circuit does not commence until it is initiated by an oscillating signal. In order to accomplish this, it is only necessary to apply a few millivolts of AC for a few seconds to the semiconductor tablet and the associated coils coupled to it. The initial signal applied to the base of the semiconductor tablet and the lead 39 is preferably in the frequency range of 5.8 to 18 Mhz and can be as high as 150 Mhz. Such a signal can be applied from any conventional source and no great care appears necessary to provide a single frequency signal or to eliminate noise. Once such energisation has been applied to the circuit and oscillations initiated, it does not appear to be necessary to apply such a signal again. This is apparently due to the feedback provided by the ferrite rod to the probe which makes contact with the semiconductor tablet.

Energy is, of course, dissipated in the lamp, or other utilisation device, as the combination operates. Such energy may come from deterioration of the semiconductor tablet as oscillations continue; however, if there is any such deterioration, it is sufficiently slow that a power source may be operated for many months without attendance. Such a source of energy may be augmented by ambient Radio Frequency radiation, coupled into the resonant cavity by the external leads. This is a surprising phenomenon because the leads are small compared to what would normally be considered an adequate antenna, and it is therefore postulated that stimulated amplification may also be a consequence of the unique electronic configuration of the semiconductors having the compositions specified above.

Although only one embodiment of electric power pack constructed according to principles of this invention has been described and illustrated here, many modifications and variations will be apparent to one skilled in the art.

Thus, for example, a larger power pack may be axially arranged in a cylindrical container with various electronic elements arranged in the annular space. It is therefore to be understood that other configurations are included within the scope of the invention.