

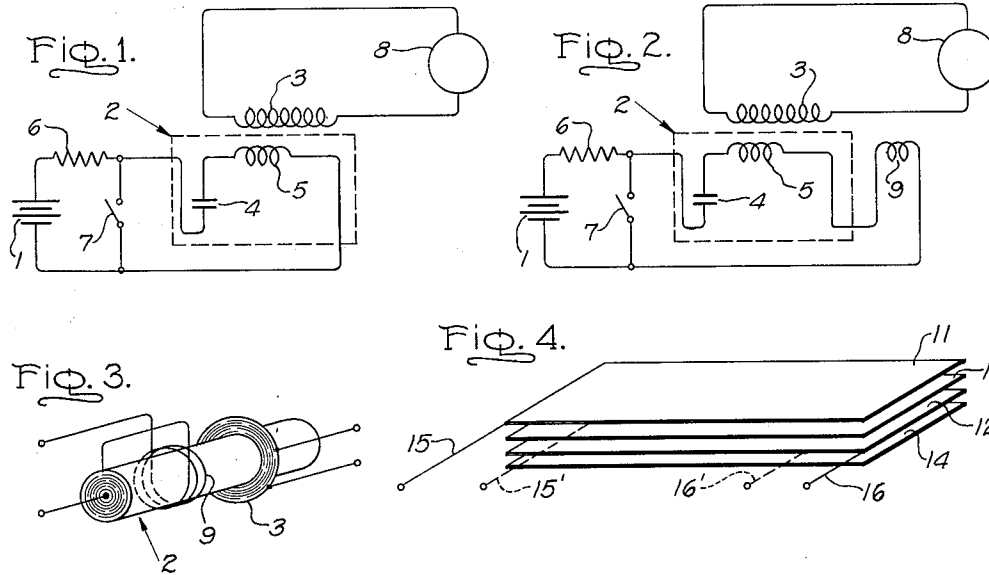
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FLASH APPARATUS

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3,025,431

FLASH APPARATUS

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This invention relates to flash type illuminating devices such as are useful in photographic applications, and, more particularly to a firing circuit for a flash lamp. A photoflash lamp of the type herein referred to is characterized in that its light output is due primarily to chemical reaction rather than to electrical energy.

One type of photographic flash lamp commonly in use at present comprises a sealed glass envelope or bulb having a charge of readily combustible metal foil loosely arranged within the bulb, a filling of a combustion supporting gas, and ignition means extending into the envelope and containing a primer of fulminating material coated on the inner ends of said means. When such a lamp is flashed, combustion is initiated by the igniting of the primer material, which in turn ignites the charge of readily combustible material. The combustible material reacts with the gaseous filling to produce a momentary flash of light of high intensity suitable for photographic purposes. Such lamp may be fired by a condenser-transformer power source. While a power source of this type produces good results, yet there exists certain difficulties, for example, such a power source has an appreciable weight and volume so that certain inconveniences are associated with its portability, particularly to the amateur photographer.

It is an object of this invention to provide an improved apparatus for flashing photoflash lamps.

Another object of this invention is to provide an improved power source for flashing photoflash lamps.

Briefly stated, according to the instant invention, a condenser-transformer type power source for flashing photoflash lamps consists of a condenser which is not compensated to eliminate impedance and a secondary winding on the body of the condenser. Such a condenser has an appreciable inductance when discharged, and functions as the primary winding of the transformer.

The invention will best be understood by reference to the following detailed description and to the drawings, wherein:

FIG. 1 is a schematic wiring diagram of the instant invention;

FIG. 2 is a schematic wiring diagram showing a modification of the instant invention;

FIG. 3 shows the physical construction of the condenser-transformer power source of the embodiment of FIG. 2; and

FIG. 4 illustrates the active elements of a non-compensated condenser before winding.

Referring to FIG. 1, the firing circuit comprises a condenser-transformer power source. It is supplied with direct current by the battery 1 and includes a non-compensated type of condenser 2 having wound thereon a secondary winding 3. Any condenser having an inductance when discharged may be used, such as the resonant type condenser with no metal shield around its body. Such a condenser serves as a capacitance 4 while being charged; when the condenser is discharged its charge releasing foils perform as an inductance 5 which generates a magnetic field and functions as the primary winding of the transformer. The secondary winding 3 is slipped over the body of the condenser and will perform a transformation of the set up by the inductance 5. A limiting resistor 6 may be placed in series with the battery 1 to limit the rate of charging of the capacitance 4. A flash lamp 8 is connected across the secondary winding 3.

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Greater efficiency of transformation of the power may be achieved with the modification shown in FIG. 2. In such a modification, one terminal of the condenser 2 is wound a couple of turns to form a primary winding 9 around the body of the condenser, so as to form, in combination with the inductance, the primary of the transformer. The primary winding 9 and the condenser 2 are then in series. The inductance of the winding 9, of course, must be in phase with that of inductance 5 so that the magnetic field generated by both inductances is cumulative; the winding 9 and the winding of the condenser plate to which it is secured must be in the same direction. The remainder of the circuit is similar to that of FIG. 1, comprising the battery 1, limiting resistance 6, secondary winding 3, and capacitance 4; the lamp 8 to be flashed is connected across the secondary winding 3. The lamp 8 is flashed by closing the switch 7 and discharging the capacitance 4 through both inductance 5 and winding 9. The secondary winding 3 has a comparatively large number of turns as compared to the primary winding 9.

The condenser-transformer is illustrated in FIG. 3 and includes an uncompensated condenser 2, which, as previously stated, may be of the resonant type without a metal casing. One lead of the condenser 2 is wound a couple of turns around the body of the condenser 2 to form the winding 9. As previously stated, the winding 9 must be in the proper direction so that the impedance from the winding 9 and the impedance 5 of condenser 2 is cumulative. A secondary winding 3 is placed on the condenser casing.

Specifically referring again to FIG. 2, the suitable circuit may comprise a battery 1 of, for example, 3 volts, a limiting resistance 6 of 1000 ohms, an uncompensated condenser 2 of 0.5 microfarad, an inductance winding 9 of 3½ turns and a secondary winding 3 of 600 turns. This circuit produces a secondary winding voltage of about 600 volts peak. The lamp 8 may be of the type which can be flashed by a low-energy impulse of relatively substantial voltage, for instance, in the range of 200 to 1000 volts. Such a lamp is described and claimed in copending application Serial No. 639,959, filed February 13, 1957 by Warren F. Albrecht and assigned to the assignee of the present application, now Patent 2,868,003.

A non-compensated condenser may be made by rolling together plates or foils of conducting material insulated from each other and having the condenser leads attached to the conducting foil at the proper location. Such conducting plates, before winding, are illustrated in FIG. 4 with suitable taps for producing an inductance 5. Such transformer plates, before coiling, involve two plates of conducting foil 11, 12 separated by insulating paper 13, 14. To produce maximum impedance 5, the lead tap 15 to plate 11 is at one end of the foil plate; the other lead tap 16 is at the other end of the other plate 12. After winding the plates so as to form the condenser 2 shown in FIG. 3, the current flow in the plates or foils during discharge of the condenser creates the impedance 5.

Alternatively, the leads may be secured to the plates 11, 12 inwardly of the ends, as shown by the dotted lines 15', 16'; this, however, does not produce maximum inductance 5 but may be found useful in securing a relative proportion between the capacitance 4 and inductance 5. Such inductance 5 will occur so long as the leads 14, 15 are not secured to both plates 10, 11 at the same linear place, as viewed in FIG. 4.

According to the instant invention, the condenser-transformer power source is of very compact size, has excellent electrical efficiency, and is simple to assemble thereby reducing the manufacturing cost. As distinguished from a separate condenser and transformer assembly, the instant invention requires no core, and minimizes the number of electrical connections to the assembly.

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Other suitable sources of direct current may be used; if the maximum value of the charging current is sufficiently low, the limiting resistor 6 may be omitted from the circuit. The condenser-transformer assembly illustrated in FIG. 3 may be assembled as a complete article of manufacture and sold for use with different types of power sources and flash lamps. The invention, therefore, is to be limited only by the claims annexed to and forming a part of this specification.

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

1. A photoflash lamp firing circuit comprising a direct current source, a condenser connected thereacross formed by a pair of conducting foils with insulation inbetween wound upon themselves into a roll, the connections from the source to the condenser being made at opposite linear ends of each foil, a switch connected across said condenser for discharging same, said condenser foils serving as a primary winding, a secondary winding comprising turns of wire wound around said roll of wound condenser foils, and a photoflash lamp connected across said secondary winding.

2. A photoflash lamp firing circuit comprising a direct

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current source, a condenser formed by a pair of conducting foils with insulation inbetween wound upon themselves into a roll, the connections to the condenser being made at opposite linear ends of each foil, an additional winding wound around said wound condenser foils, said condenser foils and said additional winding being connected in series across said source and phased for cumulative inductance and operating together as a primary winding, a switch connected across said condenser and additional winding for discharging said condenser, a secondary winding comprising turns of wire wound around said roll of wound condenser foils, and a photoflash lamp connected across said secondary winding.

3. A photoflash lamp firing circuit as defined in claim 2 and including a current limiting resistance inserted between said source and said condenser.

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