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DEVICE FOR PRODUCING ELECTRIC FLASHLIGHT

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Fig.1

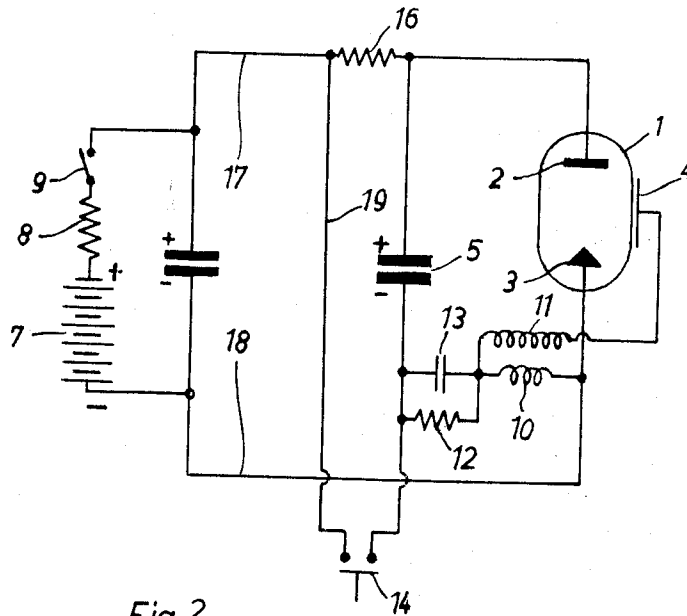
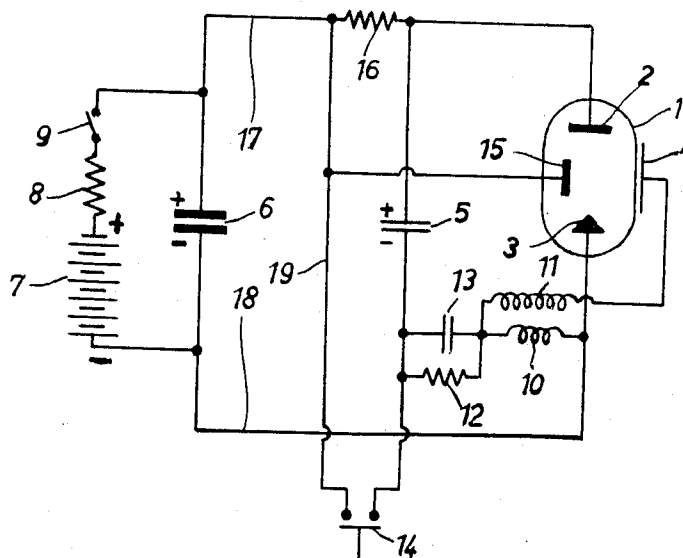


Fig.2



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DEVICE FOR PRODUCING ELECTRIC FLASHLIGHT

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7 Claims. (Cl. 315—234)

The present invention relates to a device for producing electric flashlight, especially for photographic purposes, which, between the electrodes of a gas-filled discharge tube, produces a discharge of a high luminous intensity by means of the electrical energy put into one or more condensers.

Some types of such devices have already been known, which produce the electrical energy for the discharge tube by means of several condensers connected in series, the voltage of which is lower than that of the discharge tube.

This involves the advantage of allowing to use low voltage condensers, which, since such devices use electrolytic condensers, are more reliable, easier to manufacture, and, thereby, cheaper.

On the other hand, there is the inconvenience of the high manufacturing tolerances inevitable with electrolytic condensers, which manifest themselves in the fact that, with condensers of the same rated capacity the effective capacity and the internal resistances differ considerably. These tolerances still more increase after a lengthened use. Thus, with such condensers connected in series, considerable differences of voltage and energy can appear, so that under certain circumstances the working voltage of a condenser or several condensers will be exceeded, which, already after a short service period, can lead to the destruction of the overloaded condenser or condensers.

The present invention remedies all these inconveniences by creating a device which effects the connection in series of condensers connected in parallel simultaneously with actuating the ignition.

In order to obtain the high voltage required for the tube, such condensers are charged while connected in parallel, after which the condensers charged are connected in series and then discharged in the usual way over the electrodes of the ignited tube.

According to the embodiment hereinafter described, this can be realized by closing, at the moment of igniting, one or more open bridging leads between the intermediate leads which connect the like poles of the condensers with each other, the said intermediate leads comprising resistances which, at the moment of the discharge of the condensers, temporarily act as automatic disconnecting switches.

For that purpose a current producer of an accordingly low voltage will do, which is considerably cheaper and which means considerable savings of weight, a feature of outstanding importance with portable devices.

Some further features and advantages of the invention will be illustrated in the following description of the drawings representing the switch diagrams of two preferably chosen embodiments of the same.

Fig. 1 is a switch diagram of a device according to the invention equipped with a discharge tube of the usual type comprising two main electrodes.

Fig. 2 shows another embodiment of the invention, with which a discharge tube comprising three electrodes is used.

Fig. 1 represents a device for producing electric flashlight with a usual gas discharge tube 1, comprising an

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anode 2, a cathode 3, and an ignition electrode 4. The discharge circuit lying close to the two electrodes 2 and 3 of the tube 1 contains two condensers 5 and 6 as well as the ignition system consisting of the ignition coil with the primary winding 10, the secondary winding 11, the ignition condenser 13, the resistance 12, and the ignition contact or switch 14. The condenser 6 is connected to the current-producing circuit consisting of the battery 7, the protective resistance 8, and the charging switch 9.

The two condensers 5 and 6 are connected in parallel, i. e. their homopolar coatings are interconnected. A lead 17 connects the positive coatings to each other and to the anode 2, another lead connects the negative coatings with each other, over the resistance 12 of the ignition system operated in the usual way, to the cathode 3. According to the invention, between the two intermediate leads 17 and 18, a bridging lead 19 is provided, which is interrupted by the ignition switch 14. Besides, a resistance is arranged in the lead 17.

As soon as, after charging the condensers 5 and 6, the open bridging lead 14 is closed, which can be done either by operating the ignition switch 14 by hand, or by means of a contact synchronously operated from the shutter of the camera, the tube 1 will not only receive an ignition impulse at the ignition electrode 4, but, at the same time, also the connection in parallel of the condensers 5 and 6 will be transformed into a connection in series, so that the voltages of the condensers summed up will yield the voltage required for the tube. Then the discharge can take place. As the resistance offered by the gas discharging tube, at the moment of the discharge, is but a fraction of the resistances 16 and 12, the electrical energy resulting from the two condensers will discharge over the tube 1. Thus, the resistances 16 and 12 will transitorily act as automatic disconnecting switches interrupting the intermediate leads 17 and 18 at the moment of the discharge of the ignition tube 1, so that the bridging lead 19 closed will establish at that very moment the connection in series of the condensers.

In order to remedy the inconveniences which, as herebefore mentioned, might result from the fact that the condensers 5 and 6, despite the same rated capacity values, differ considerably in their effective capacity and their internal resistances, the bridging lead 19, as shown in Fig. 2, may be connected to a third electrode 15 provided in the tube 1. Then, with the tube ignited, the condenser 5 alone can discharge over the electrodes 2 and 15, and the condenser 6 alone can discharge over the electrodes 2 and 3, so that any existing difference of voltage, capacity, and, accordingly, energy will not act in a sense that the condenser possessing the higher electrical energy might load the other condenser, in the final phase of the discharge, by its discharging current with an opposite polarity tending to form it in an opposite sense. The use of a third electrode 15 presents the advantage that the values of the condensers can vary without any prejudice, not only within the usual tolerances, but that it also allows different values to be chosen on purpose. Thus, if the condenser 5 is small, the current flowing over the contact 14 will also grow small, so that the flash-releasing contact can be used direct on the camera itself as an ignition contact. The selection of different capacity values for the condensers 5 and 6 will also result in differences of the outside dimensions, which can be taken advantage of for their spatial disposition. Thus, for instance, it will be possible to lodge the smaller condenser 5 in the flashlight system consisting of the reflector and tube.

The present invention, when combining the ignition contact 14 with the charging switch 9 into a two-pole change-over switch, also presents the advantage of easier handling and attendance.

I claim:

1. Apparatus for producing a high intensity flash of light for photographic purposes in synchronism with the opening of the shutter of a camera, which comprises, a gas-filled discharge tube having two electrodes between which the principal discharge occurs, a triggering electrode, a triggering circuit including a control capacitor having a shunting resistor and having one pole connected to a pulsing auto-transformer having primary and secondary windings connected respectively to one of said two electrodes and the triggering electrode, a D. C. source, a power capacitor connected across the source and also across said two electrodes but with a current blocking resistor between one pole and an electrode, a second power capacitor also connected across the source and across the two electrodes, but with one pole thereof connected in series with the triggering circuit whereby the shunting resistor and primary winding are interposed between said one pole and said one electrode, and a switch connected between opposite poles of the respective power capacitors.

2. Apparatus for producing a high intensity flash of light for photographic purposes in synchronism with the opening of the shutter of a camera, which comprises a gas-filled discharge tube having two electrodes between which the principal discharge occurs, a triggering electrode and a triggering circuit between said triggering electrode and one of said two electrodes, a source of D. C. power of relatively low voltage, two power capacitors each connected across the source and across the two electrodes, but each having a direct current impedance in the loop defined by itself and the two electrodes to the exclusion of the loop formed by the other capacitor with the electrodes, and a switch between opposite poles of the power capacitors adapted to be closed to discharge the power capacitors in series through the gaseous discharge device, the triggering circuit connected with one of said opposite poles for acquiring activation also through the closing of said switch.

3. Apparatus as described in claim 2 in which the triggering circuit includes a condenser and shunt resistor for leaking the charge off the condenser, and the said shunt resistor serves as the direct current impedance in one of said above defined loops, a part of the triggering circuit being included in series in said last mentioned loop.

4. Apparatus as described in claim 2 in which the triggering circuit includes a condenser and shunt resistor for leaking the charge off the condenser, and the said shunt resistor serves as the direct current impedance in one of the said defined loops, a part of the triggering circuit being included in series in said last mentioned loop, said triggering circuit including a pulse transformer having primary and secondary windings, said part being the primary winding.

5. Apparatus as described in claim 2 in which the gaseous discharge device has a third electrode connected to one side of said switch such as to provide an intermediate condenser discharge path through said tube.

6. Apparatus as described in claim 2 in which the gaseous discharge device has a third electrode connected to one side of said switch such as to provide an intermediate condenser discharge path through said tube and in which one of said power condensers only is in series with said switch during discharge, so that the current flow through said switch is low.

7. A device as described in claim 6 in which said one power condenser is of smaller capacity than the other, and is arranged to discharge initially.

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