

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO FLASH APPARATUS

(71) We, FRANKE HEIDECHE G.M.B.H., a German Body Corporate, trading as ROLLEI-WERKE FRANKE & HEIDECHE, of 196 Salzdhumerstrasse, Braunschweig, Germany, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to a discharge-type flash apparatus with an adjustable flash voltage.

In circuits hitherto used a control unit in the form of a voltage indicator, e.g. a glow lamp, was connected to a voltage divider in parallel with a storage capacitor. When the glow lamp reaches its ignition voltage and has ignited, the pre-selected voltage value has been reached. The voltage supply source, usually in the form of a converter then only supplies the leakage current, which flows via a resistor or potentiometer in parallel with the capacitor and the capacitor voltage remains substantially constant. If, by changing the voltage supplied to the glow lamp, the preselected voltage is reduced, no further current will be taken from the converter until the new lower preselected voltage has been reached, which is then kept constant by supplying the leakage current. When the preselected voltage is increased, the charging voltage of the capacitor also increases at the rate at which the converter is able to supply current. If, on the other hand, the preselected voltage is reduced, the capacitor voltage only decreases as quickly as the aforementioned resistor will allow. If this parallel resistor or potentiometer is of low value, the new selected voltage will, it is true, be reached very rapidly, when it is lower than the previous value. Since, however, the supply current continues to flow, considerable energy losses occur and a great amount of heat is developed, in addition to which the charging time of the capacitor is prolonged.

[Price 25p]

If the voltage divider or shunt resistor is selected to give a high capacitor charge rate, these losses are correspondingly lower, but on the other hand the time required for the capacitor voltage to reach the lower selected value is prolonged.

The present invention seeks to avoid these energy losses and bring about a considerable reduction in the charging time and in the time involved in reaching the lower selected voltage, without having to obtain these advantages at the cost of unnecessary losses.

In accordance with the present invention there is provided a discharge-type flash apparatus comprising a charging thyristor connected between one terminal of a current source and a storage capacitor, a discharge thyristor connected in parallel with the capacitor, a control unit which has an input voltage which is adjustable to produce a preselected input voltage, the arrangement being such that said control unit supplies ignition current to said charging thyristor when the capacitor voltage is below said preselected voltage and to said discharge thyristor when the capacitor voltage is above said preselected voltage, and a further thyristor ignited by said control unit for quenching the discharge thyristor when said capacitor voltage is below said preselected voltage.

As the control unit need only respond to voltage differences, the voltage divider, connected in parallel with the capacitor to provide the adjustable input voltage to the control unit value, has a high resistance so that only a small leakage current flows. Only when the preselected voltage is lower than the existing capacitor voltage does a leakage current flow until the new preselected voltage is reached.

In order that the invention may be better understood an embodiment thereof will now be described by way of example only and with reference to the accompanying draw-

Price 75p

ing which shows the circuit diagram of a flash apparatus in accordance with the invention.

The charging of the capacitor 3 takes place via a charging resistor 1 and the thyristor 2 from a power supply, usually a converter (not shown), when the thyristor 2 is conductive. During the charging operation the charging thyristor 2 is ignited. When a preselected voltage of the capacitor 3 has been reached, then all that is necessary to maintain this voltage is to provide a replacement for the leakage current of the capacitor and a small current which flows through a potentiometer 4 connected in parallel with the capacitor. When the preselected value of the voltage is reached, the charging thyristor 2 is no longer ignited. A control unit in the form of a voltage indicator 10 is connected to the potentiometer 4. If the preselected voltage is, for example, to be reduced by the potentiometer 4 below the existing capacitor voltage, then the voltage indicator 10 senses that the voltage is excessive. As a result, a pulse is generated by indicator 10 which ignites the thyristor 9 in series with a charging resistor 8. Consequently, the capacitor 3 is discharged via the resistor 8, until the voltage reaches the new preselected value. In this discharge operation the thyristor 2 is extinguished. If the voltage of the capacitor 3 falls below the new preselected value, the charging thyristor 2 and the additional second thyristor 6 are ignited, this latter quenching the discharge thyristor 9. A very rapid adjustment to the new preselected value thus takes place, without any additional loading on the charging circuit or unnecessary development of heat, so that the system can be used with particular advantage in flash apparatus of high performance, e.g. studio flash apparatus. The preselected voltage is always reached by stopping the discharge operation when the charging operation commences.

As with any control circuit, a certain deviation of the actual voltage from the preselected voltage is necessary before the regulating operation is initiated. This is necessary in order to prevent the device from being continually switched on and off. Con-

sequently, there will always exist a certain deviation from the theoretical voltage before the regulating operation sets in. By adjusting to a new lower preselected value, the discharge thyristor 9 is ignited and the capacitor 3 is discharged as described. The switching off of the discharge, i.e. the ignition of the thyristor 6 and the resultant quenching of the thyristor 9, now only takes place when charging starts, i.e. when the thyristor 2 is ignited, and this starting point lies somewhat below the preselected voltage.

WHAT WE CLAIM IS:—

1. A discharge-type flash apparatus comprising a charging thyristor connected between one terminal of a current source and a storage capacitor, a discharge thyristor connected in parallel with the capacitor, a control unit which has an input voltage which is adjustable to produce a preselected input voltage, the arrangement being such that said control unit supplies ignition current to said charging thyristor when the capacitor voltage is below said preselected voltage and to said discharge thyristor when the capacitor voltage is above said preselected voltage, and a further thyristor ignited by said control unit for quenching the discharge thyristor when said capacitor voltage is below said preselected voltage.

2. A discharge-type flash apparatus in accordance with Claim 1, further comprising a series resistor connected to the discharge thyristor, for determining the rate of discharge of the storage capacitor when the preselected voltage is below the existing capacitor voltage.

3. A flash apparatus, substantially as described herein with reference to and as illustrated by the accompanying drawing.

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