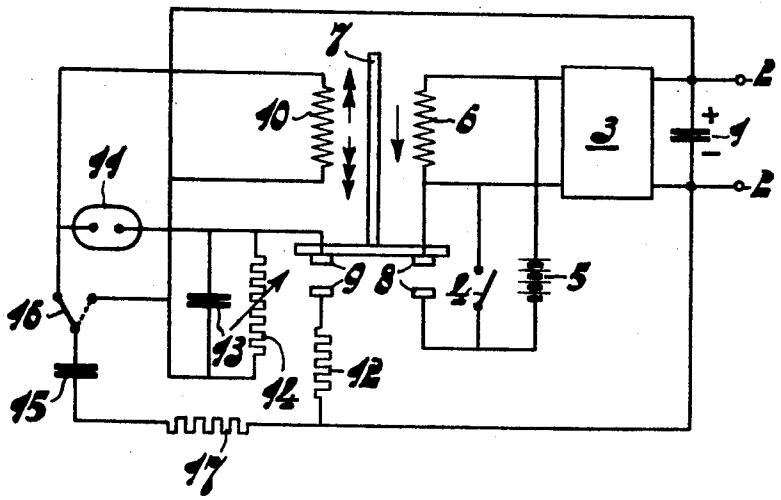
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DEVICE FOR CHARGING A CAPACITY

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INVENTOR.

THEO WILLEM WILLEMSE

BY Fred M Vogel

AGENT

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DEVICE FOR CHARGING A CAPACITY

Theo Willem Willemse, Eindhoven, Netherlands, assignor to Hartford National Bank and Trust Company, Hartford, Conn., as trustee

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4 Claims. (Cl. 320—1)

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The present invention relates to devices for charging a capacity.

In the copending patent application Serial No. 144,367 filed February 15, 1950 there is described and claimed a device for charging a capacity from which energy is derived discontinuously. Said device comprises means which stop the charging of the capacity automatically when the voltage of the capacity has reached a given value and which subsequently do not absorb any further energy. In one embodiment, the device comprises a converter, which, if fed by direct current of low voltage, supplies direct current of increased voltage which is suitable for charging a capacity.

The device comprises a relay having two coils and two switches mechanically coupled and operative in the same sense, one coil, the energizing coil, shunting the input terminals of the converter and being adapted to be connected by way of one switch to the source of supply, and the second coil, the compensation coil, being connected by way of the second switch and a spark gap connected in series therewith to the output terminals of the converter, the compensation coil, when sparking-over occurs, counter-acting the energizing coil, which keeps the two switches closed, in such manner that the switches are opened.

The device is again switched-in by means of an operating switch connected in parallel to the switch of the relay through which the energizing coil is adapted to be connected to the source of supply.

The object of the invention is to ensure that the device is again switched-in automatically.

According to the invention, the output terminals of the converter are connected to a circuit comprising the series-connection of a condenser, designated as a reswitching-in condenser and a further coil, designated as a reswitching-in coil, of the relay which is connected in such manner that the relay is closed when the capacity suddenly discharges.

In one preferred embodiment of the invention, the compensation coil is also used as the reswitching-in coil.

Provided in series with the reswitching-in coil may be a change-over switch which in the open position is connected to an extremity of this coil other than that to which it is connected in the closed position.

It is preferable to provide a decoupling resistance in that portion of the reswitching-in circuit which does not form part of the compensation circuit.

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In order that the invention may be more clearly understood and readily carried into effect, it will now be described more fully by reference to the accompanying drawing showing a schematic diagram of a preferred embodiment of the invention.

In the figure, the reference numeral 1 indicates a capacity from which energy is taken discontinuously at terminals 2, for example with the use of a gaseous discharge tube, which serves as a flash-light source for photographic exposures. The capacity 1 is charged with direct current to a high voltage of, for example, some thousands of volts with the use of a converter 3, which may be connected by way of an operating switch 4 to a direct current source 5 of low voltage, for example a dry battery.

Connected in parallel to the input terminals of the converter is an energizing coil 6 of a relay, the armature 7 of which operates two switches 8 and 9. The switch 8 is connected in parallel to the operating switch 4. Closure of the switch 4 acts to connect the input terminals of the converter to the battery 5, so that the charge of the capacity commences. At the same time, the energizing coil 6 is connected to the battery. As a result, the armature 7 of the relay moves in the direction of the single arrow, closing the switches 8 and 9. The latter keep closed even after opening of the operating switch 4 since the coil 6 is invariably connected to the battery by the closed switch 8. The input terminals of the converter are now also connected through switch 8 to the battery, so that the charging of the capacity continues.

The relay furthermore comprises a winding 10, which is connected in series with a spark gap 11, the closed switch 9 and a resistance 12 to the output terminals of the converter. The series-combination of the coil 10, and the spark gap 11 is shunted by way of a condenser 13 and a variable resistance 14 connected in parallel therewith. As soon as the voltage across the capacity has reached a value at which sparking-over occurs, the winding 10 is traversed by a current which causes the armature to move in the direction of the double arrow against the action of the coil 6. Thus, the switches 8 and 9 are opened and keep open until the armature 7 of the relay is again moved into the closing position.

According to the invention, the relay is again switched-in automatically upon each sudden discharge of the capacity by means of a circuit comprising the coil 10 and a condenser 15 connected

in series therewith. When the capacity 1 is discharged the condenser 15 also discharges, the coil 10 being traversed by a current of such direction that the armature 7 of the relay is moved in the direction of the triple arrow so that the switches 8 and 9 are closed. The energizing coil 6 and also the input terminals of the converter 3 are then again connected to the battery 5 by the switch 8. The capacity 1 is subsequently recharged until a sharp discharge occurs across the gap 11. It will be evident that the use of the coil 10 both for the automatic switching on and switching off constitutes a material simplification since otherwise the use of separate coils would be required for the two switching movements.

Provided between the spark gap 11 and the condenser 15 is a change-over switch 16, the countercontacts of which are connected to the two extremities of the coil 10. The coil 10 is switched off in the dotted position of the change-over switch 16, so that automatic reswitching-in does not take place. Since the change-over switch in the dotted position is connected to a point of potential substantially equal to that in the reswitching-in position, current substantially does not flow to the condenser 15 upon operating the change-over switch and sparking does not occur.

A resistance 17 is included between the resistance 12 of the compensation circuit and the condenser 15 of the reswitching-in circuit, that is to say in that portion of the reswitching-in circuit which does not coincide with any part of the compensation circuit. In the absence of resistance 17, the switching-off current pulse occurring upon breakdown of the spark gap 11 could flow through the series-connection of the condenser 15 and the capacity 1 instead of through the coil 10. Furthermore, in the absence of resistance 17, the current pulse for reswitching-in, originating from the condenser 15, might bring about across coil 10 a voltage such that the gap 11 might be sparked over and cause the coil 10 to be shunted in series with the condenser 13. The resistance 17 thus serves as a decoupling element between the compensation and reswitching-in circuits.

What I claim is:

1. Apparatus for charging a capacity from which energy is withdrawn discontinuously comprising a source of direct voltage constituted by a low voltage supply and a converter whose input terminals are connected to said supply and whose output terminals are connected to said capacity to produce a relatively high charging voltage therefor, a relay including first and second coils for actuating first and second normally open switches, said first coil when energized causing said switches to close and said second coil when simultaneously energized counteracting the effect of said first coil whereby said switches reopen, means interposing said first switch between said low voltage supply and the input terminals of said converter, a spark-gap connected through second coil in series with said second switch across the output terminals of said converter, said gap being rendered conductive when said capacity attains a predetermined value, a reswitching-in coil for said relay, a condenser, and a circuit connecting said condenser in series with said reswitching-in coil across the output terminal of said converter, said reswitching-in coil being energized upon sudden discharge of said capacity thereby to close said relay.

2. Apparatus, as set forth in claim 1, wherein said second coil acts also as the reswitching-in coil.

3. Apparatus, as set forth in claim 1, further including a change-over switch in series with the reswitching-in coil, which switch in the open position thereof is connected to an end of this coil other than that to which it is connected in the closed position.

4. Apparatus, as set forth in claim 1, further including a resistance included in that portion of the reswitching-in coil circuit that is not included in the compensation circuit.

THEO WILLEM WILLEMSE.

No references cited.