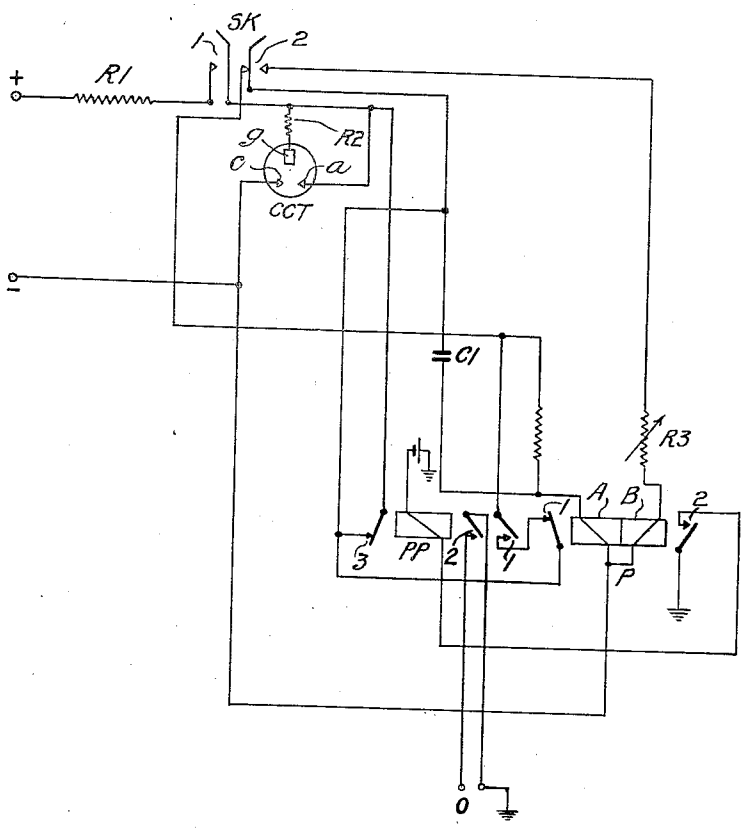
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ARRANGEMENT FOR PRODUCING ELECTRIC IMPULSES

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INVENTOR.
Frederick H. Bray
BY
R. P. Morris
ATTORNEY

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ARRANGEMENT FOR PRODUCING ELECTRIC IMPULSES

Frederick Harry Bray, London, England, assignor to Standard Telephones and Cables Limited, London, England, a British company

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1 Claim. (Cl. 175—373)

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This invention relates to arrangements for producing electric impulses.

It is an object of the present invention to provide such an arrangement of the kind comprising an electromagnetic relay and means for causing the relay periodically to open and close contacts in an electric circuit that shall have a constant period irrespective of changes in the source of energy for the relay, usually a battery.

In United States Patent No. 2,406,834, issued September 3, 1946, there is described and claimed a device for periodically opening and closing an electric circuit comprising a polarised relay having two opposed windings, means for passing current through one winding, means for passing the charging current of a condenser through the other winding, contacts controlled directly or indirectly by the relay to change the direction of current through the one winding and to start the discharge of the condenser through the other winding and contacts controlled directly or indirectly by the relay for opening and closing said circuit.

In such an arrangement the period of operation of the relay is independent of changes in the voltage of the battery which supplies energy to the relay because the current which is effective to open or close the relay contacts is the difference between two other currents which are affected equally by a change in battery voltage.

The present invention allows a non-polarised relay to be used whilst retaining the same constancy of period with variation of battery voltage.

According to the present invention I provide a device for periodically opening and closing an electric circuit by means of contacts controlled directly or indirectly by an electromagnetic relay which is caused to open and close contacts periodically by reason of the periodic charge and discharge of a condenser through a winding of the relay, in which potential is supplied to said relay from a cold cathode tube through which a discharge is maintained during the periodic operation of the relay.

When a discharge is initiated in a cold cathode tube the voltage applied between anode and cathode drops to a value lower than that needed to initiate the discharge and whilst the discharge is maintained the sustaining voltage between anode and cathode remains constant within very narrow limits. This sustaining voltage when applied to an electromagnetic relay the circuits of which are arranged so that a condenser charges (or discharges) through the winding of the relay

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so as to cause the relay to open and close its contacts periodically keeps the period of operation of the relay independent of any fluctuation of voltage in the source supplying the discharge in the cold cathode tube.

A preferred embodiment of the invention will now be described with reference to the accompanying drawing. Referring to the drawing, P is a telephone type relay having two windings A and B. When it is desired to cause the relay to open and close its contacts periodically a locking type key, SK, is operated. Contacts 1 of key SK connect a source of voltage, which is connnected to terminals + and —, in series with resistances R_1 and R_2, between the control electrode *g* and cathode *c* of a cold-cathode tube CCT. The tube CCT may be a gas triode of the cold-cathode glow-discharge type. When key SK is operated ionization is provided between cathode *c* and the control or starter electrode *g*. This initiates a discharge in tube CCT which then transfers to the anode *a*. The voltage between the cathode *c* and the anode *a* of tube CCT, which is substantially constant during conduction of the tube, is applied to the circuits of a relay P.

When key SK is operated, contacts 2 thereof remove a short circuit from condenser C1 and complete a circuit over the back contact of contact 3 of relay PP and resistance R_3 through winding B of relay P. At the same time a charging current for condenser C1 flows through winding A of the relay. The current in the two windings is opposed, so that the relay P does not operate its contacts until after an interval. The operation of the contacts takes place when the charging current of the condenser has fallen sufficiently. During this portion of the functioning of the relay circuits because of shunt valve CCT a change in the voltage supplied to the circuits would have no effect on the time taken by the relay to operate. When the relay P operates, its contacts 2 close, causing relay PP to operate. Contacts 2 of relay PP close the circuit O to which impulses are to be supplied, i. e. which is to be opened and closed periodically whilst contacts 3 of relay PP interrupt the current flowing in winding B of relay P and the charging current for condenser C1.

Condenser C1 thereupon commences to discharge through windings A and B of relay P and the discharge current tends to keep the relay operated. When the discharge current has fallen sufficiently the relay contacts 1 of relay P close and contacts 2 of relay P open. Relay PP releases and opens its contacts 1 and 2 and closes con-

tacts 3. Momentarily contacts 1 of relay PP are closed whilst contacts 1 of relay P are also closed and any remaining charge on condenser C1 is dissipated through the short circuit for it thus provided. Contacts 2 of relay PP open the circuit O and contacts 3 of relay PP connect the voltage across the tube CCT to the relay and condenser once more.

The period during which relay P remains operated depends upon the voltage to which condenser C1 was charged and this again depends upon the voltage of the source supplying the charging current. By causing this voltage to be that across the tube CCT whilst a discharge is sustained therein, this period is maintained constant.

The total period for the operation and release of relay P may be varied by varying resistance R3.

What is claimed is:

In an arrangement for periodically opening and closing an electrical circuit, a source of potential, a condenser, a first non-polarized relay having two windings and normally open and normally closed contacts, a second relay having three sets of contacts, one normally open and arranged in series in said electrical circuit, another normally open and arranged in series in a final discharging circuit of said condenser, and one normally closed, means for connecting said source in series with the set of normally closed contacts of the second relay and one of said windings across the condenser to charge it, the current flowing through said winding in a given direction, means for connecting the second of said windings to said source so that the second mentioned normally closed contacts are in series therewith and current flows through said second winding in an opposite direction whereby the normally open contacts of said first relay remain open until the condenser has been charged to a predetermined level thereby causing the current flow through said first winding to diminish to a point at which the normally open contacts of said first relay are closed and its normally closed contacts are opened, and means responsive to the closing of the contacts of the first relay for actuating said second relay to open the normally closed set of contacts thereof, thereby causing the condenser to discharge through said second winding, and to close its normally open sets of contacts in said electrical circuit and in said final discharging circuit, the normally open contacts of said first relay opening when the discharged current from said condenser falls below a predetermined value, and the normally closed contacts of said first relay closing at a second point said final discharging circuit a short time before said last mentioned circuit is opened by the deenergizing of the said second relay.

FREDERICK HARRY BRAY.

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