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ELECTRICAL ARMING CIRCUIT

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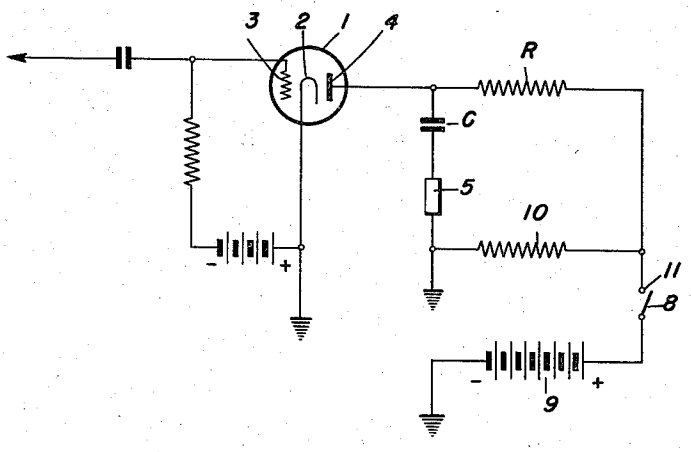

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ELECTRICAL ARMING CIRCUIT

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1 Claim. (Cl. 102—70.2)

(Granted under Title 35, U.S. Code (1952), sec. 266)

This invention relates to arming circuits for electrically operable fuzes.

In projectiles and other military devices containing fuzed explosive charges, it is important, for the sake of safety, to delay the arming of the fuzing means until the projectile has traveled a safe distance from the point of discharge. This has previously been accomplished by means of mechanical time delay mechanisms of various kinds. Such devices are relatively complex and apt to get out of order, and it is therefore an object of the present invention to provide an electrical circuit whereby a similar result may be accomplished in an effective, reliable, yet very simple and inexpensive manner.

Other objects will become apparent from the following description taken in conjunction with the drawing forming a part hereof.

The single figure of the drawing shows the arming circuit in conjunction with a detonator controlled by a "Thyratron" type trigger acting tube, although other types of relays could be used.

The trigger tube **1** is adapted to be fired by associated electrically operable fuze means (not shown) connected to its grid circuit. The connections for the usual cathode **2**, grid **3**, and anode **4** are well understood in the art and accordingly shown only briefly. Detonator **5** is connected between the ground and one terminal of capacitance C, the other terminal of which is connected to anode **4**. Detonator **5** and capacitance C are connected in series and constitute a first circuit. One end of resistance R is connected to anode **4** and the other end of this resistance is connected to a terminal of switch **8**, the other switch terminal being connected to the positive terminal of B battery **9**. The negative terminal of this battery is connected to ground as shown. Resistance R, switch **8**, and battery **9** are connected in series and constitute a second circuit. The first and second circuits are connected in parallel between the anode **4** and cathode **2** of tube **1**. Resistance **10**, connected between ground and switch terminal **11**, is a bleeder resistance, constituting a high resistance shunt of capacitance C, to assure that capacitance C will always start operation at zero voltage. Ordinarily this resistance may be 1 or 2 megohms. Switch **8** may be closed automatically as by setback upon firing of the gun, by means forming no part of the present invention. Such setback operated switching means are known in the art, and it will be understood that any other suitable initiating means may be employed for rendering the battery operative.

Resistance R may have a value of approximately 1 megohm, but this may be varied to change the time delay. Capacitance C may be of any value provided it is large enough to supply the necessary energy to cause the detonator to function, when the capacitance is charged to say 100 volts and the trigger tube is fired. The product RC or the time constant of the circuit (the time after closing of switch **8**, when 63% of the voltage of battery **9** appears across capacitance C) controls the time delay of the circuit. When R is 1 megohm and C is 2 microfarads the time constant is 2 seconds. The potential of anode **4** is controlled by the potential across capacitance C and since this potential is built up through high resistance R, there is a time delay after closing the switch, before the anode voltage reaches a sufficiently high value to fire the detonator. During this delay period the detonator therefore cannot be fired even if the tube were to become conducting.

After the anode potential has reached 100 volts, for example, whenever grid **3** is so charged as to make the tube conducting, the energy stored in capacitance C is fed to detonator **5** through the tube, the return circuit being through the ground. This fires the detonator.

If desired, the location of capacitance C and detonator **5** in the first circuit could be interchanged.

It will be understood that either the resistance or capacitance, or both, may be varied to alter the interval of delay, a very simple means thus being provided whereby the delay may be adjusted as desired.

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

In an electrically operable fuze having associated electrically operable means for initiating the detonation of the fuze, a thyratron having an anode, a cathode, and a grid, said grid being adapted to be connected to the associated electrically operable means, a first circuit comprising a capacitance and detonator connected in series, a second circuit comprising a resistance, a switch, and a source of substantially steady direct current connected in series, said circuits being connected in parallel between the anode and cathode of the thyratron, and a bleeder resistor of high resistance shunting the capacitance so that no potential can be built up on said capacitance before said switch is closed, whereby the detonator is prevented from firing until after a fixed, predetermined period of time has elapsed after said switch is closed.

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