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CIRCUIT ARRANGEMENT FOR PRODUCING AN IMPULSE SERIES

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Fig. 1

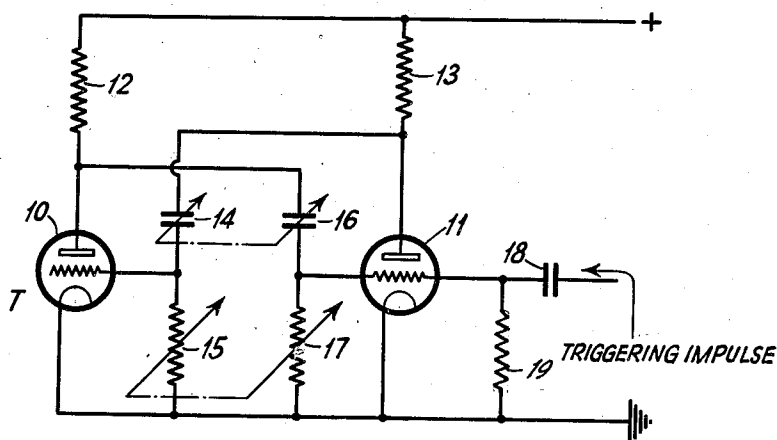


Fig. 2

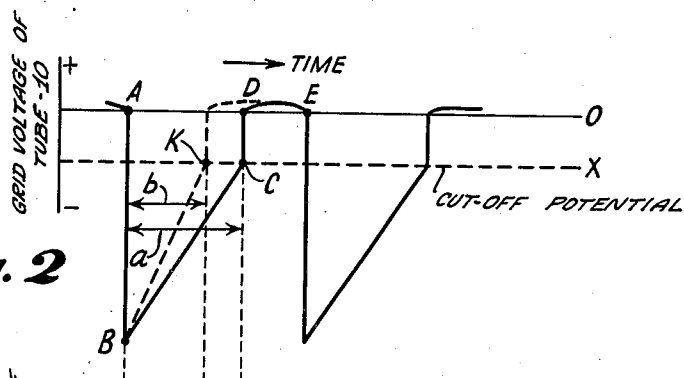
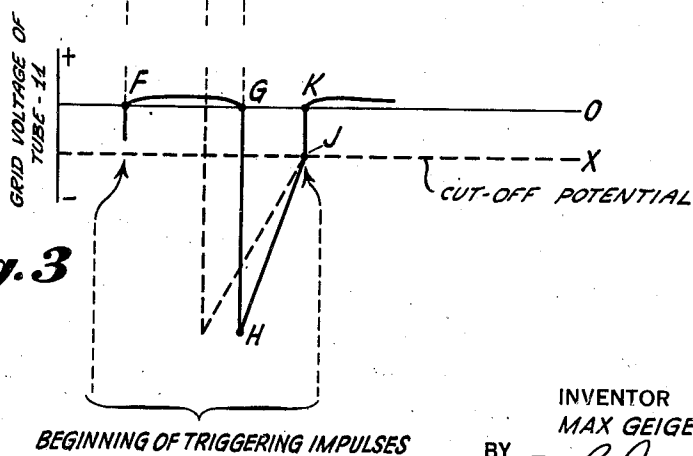


Fig. 3



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CIRCUIT ARRANGEMENT FOR PRODUCING
AN IMPULSE SERIES

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2 Claims. (Cl. 250—36)

In order to produce an impulse series, having a phase displacement relative to a triggering or synchronizing impulse series it has already been proposed in the prior art to use a relaxation oscillation generator which furnishes a saw tooth voltage. The triggering or synchronizing impulse series causes a release of the relaxation oscillation and if the saw tooth voltage passes through a predetermined adjustable value, an impulse of the new series is produced.

The problem to be solved by the present invention differs from the problem in accordance with the older suggestion concerning the idea of phase displacement of impulses, insofar as the impulses to be produced shall begin at a moment set with respect to the start of the impulses of the triggering impulse series without thereby influencing through the adjustable moment of the beginning of the impulses, the end of the impulses of the impulse series to be produced. That is, it is desired that the impulses shall have the same frequency as the triggering impulses but shall be displaced in phase relationship. Such a circuit arrangement and operation is in certain cases superior to the previously used circuits, especially when used in electrical television, in view of the fact that all disturbances are excluded which may be encountered at the phase displacement of the end of the impulses in the above-mentioned case.

The problem is to be solved by the invention in that a circuit arrangement having two stable operating conditions is provided of which the first one is established at the beginning of the triggering impulse, and initiates the second operating state following a time interval that can be set by adjusting the circuit. At this moment an impulse of the impulse series to be produced shall begin, and the first operating state shall again be established at the beginning of the following impulse of the triggering impulses.

The features of my invention are shown in the accompanying drawing in which:

Fig. 1 shows a circuit diagram of my improved circuit, and,

Figs. 2 and 3 show grid potentials as a function of time of the tubes of the oscillation generator.

A mode of construction according to the invention will be described in the following, and which contains a so-called multi-vibrator, i. e., a relaxation oscillation generator having two discharge paths the one rendering the other one inactive.

In Figure 1, items 10 and 11 represent two

amplifier tubes whose anode lead-ins contain a resistor 12 and 13 respectively, and whose control grids are connected to a resistance-capacity member placed at the anode of the other tube. The resistance-capacity member for the control grid of tube 10 consists of the condenser 14 and resistor 15 and is connected to the anode of tube 11, while the resistance-capacity member for the control grid of tube 11 consisting of condenser 16 and resistor 17 is placed at the anode of tube 10. The triggering impulses are applied to the grid of tube 11 across a condenser 18, and a resistor 19, the resistor being placed parallel to the grid cathode path of tube 11.

When the condenser 18 and the resistor 19 are at first disregarded the circuit represented in Figure 1 is then an ordinary multivibrator and operates in a known manner, that is, the tubes 10 and 11 carry plate currents in a substantially alternative fashion, and the current which sets in in each tube by the discharge of the condensers 14 and 16 at the same time interrupts the current in the other tube. For instance, while the tube 11 has plate current, current is caused to set in in the tube 10 due to the discharge of condenser 14, whereby the current in tube 11 is interrupted, and then following a decrease of the voltage at the condenser 16 down to a certain value, the current in tube 11 sets in and that in tube 10 will again be interrupted. The grid potential of tube 10 takes hereby a course in relation to time such as shown by curve A—B—C—D—E in Figure 2, and that of tube 11 takes the course shown by curve F—G—H—J—K in Figure 3. In Figures 2 and 3 line O represents the zero grid potential relative to the tube cathodes, and X designates the negative potential value of grid at which plate current has not yet begun to flow or has just ceased flowing. The vertical portions of these curves correspond to the current increase in the one tube and to the current decrease in the other tube, the almost horizontal portions correspond to the stable operation of the tubes, and the oblique portions, to the discharge of condenser 14, and 16 respectively across the resistors 15 and 17 respectively.

When utilizing such multivibrator for the solution of the problem according to the invention, the triggering impulses shall now be applied to the control grid of tube 11 across the condenser 18, and the time constant members of both tubes shall be so set that the impulses to be produced set in at the desired moment following the beginning of the triggering impulses. If this de-

sired time interval has the value a in Figure 2, the appertaining time constant must be so chosen that the line B—C is passed through, but if the time constant has the value b , care is to be taken to adjust the appertaining member for the proper time constant, in order that the discharge time of condenser 14 as represented by dotted line B—K will at least equal or be greater than the time interval a . At the same time the invention provides that the other member for the time constant be displaced simultaneously in order that at the beginning of a new impulse of the triggering impulse series, the other discharge path can be re-established. If only a single time constant member would be displaced, then either the last-mentioned discharge path would have current already before the beginning of the new impulse of the triggering impulses, or the following impulse of the triggering impulses would not bring the control grid potential up to the line X, so that it would not be possible at all to produce an impulse series displaced in phase in the desired manner. Figure 3 shows in dotted line the course of the grid potential necessary according to the invention for the phase displacement of b .

The simultaneous adjustment or displacement of the members 14, 15 and 16, 17 for the time constant can in practice be obtained in the simplest manner is as shown by the dot and dash line in Figure 1. For instance, the rotary plates of the condensers 14 and 16 or sliding contacts of the resistors 15 and 17 may be arranged on a common shaft.

Various modifications may be made in my invention without departing from the spirit and scope thereof and I desire that only such limitations shall be placed thereon as are imposed by the prior art and are set forth in the appended claims.

I claim as my invention:

1. A multivibrator circuit for producing separate series of impulses of identical frequency comprising a pair of electron discharge devices each including a cathode, a control electrode and an anode, means including a resistance for maintaining the anode of each discharge tube positive with respect to the cathode, a condenser and a resistance connected in series between the anode and the cathode of each discharge tube, means for connecting the control electrode of one tube to the junction of said series condenser and resistance of the other tube, means for applying synchronizing impulses to the control electrode of one of said electron discharge tubes, and means for simultaneously differentially varying the values of said condensers whereby the phase relationship of said series of impulses may be varied.

2. A multivibrator circuit for producing separate series of impulses of identical frequency comprising a pair of electron discharge devices each including a cathode, a control electrode and an anode, means including a resistance for maintaining the anode of each discharge tube positive with respect to the cathode, a condenser and a resistance connected in series between the anode and the cathode of each discharge tube, means for connecting the control electrode of one tube to the junction of said series condenser and resistance of the other tube, means for applying synchronizing impulses to the control electrode of one of said electron discharge tubes, and means for simultaneously differentially varying the values of said last named resistances whereby the phase relationship of said series of impulses may be varied.

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