

July 30, 1940.

C. J. FITCH

2,209,395

SIGNALING SYSTEM

Original Filed Dec. 7, 1934

FIG. 1.

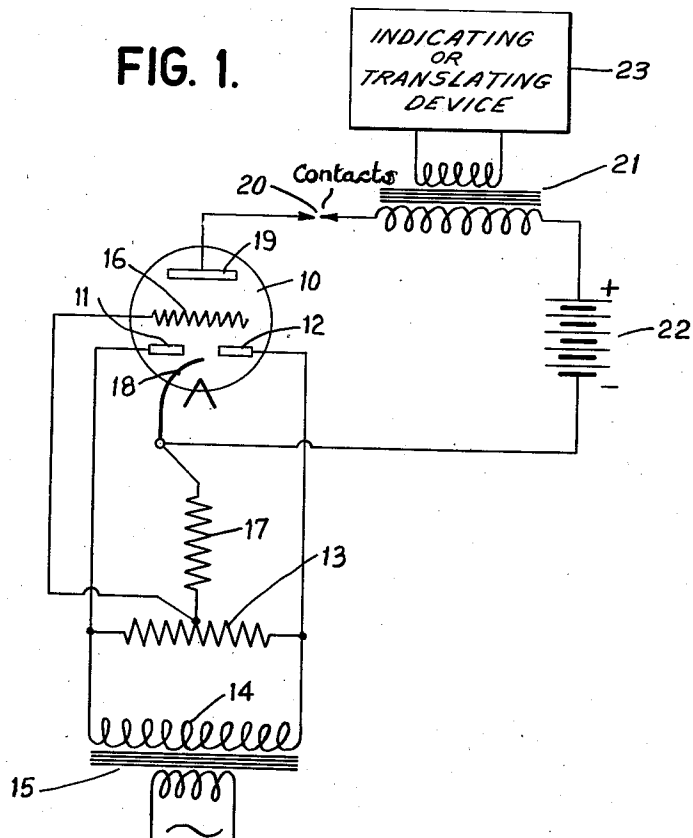


FIG. 2.

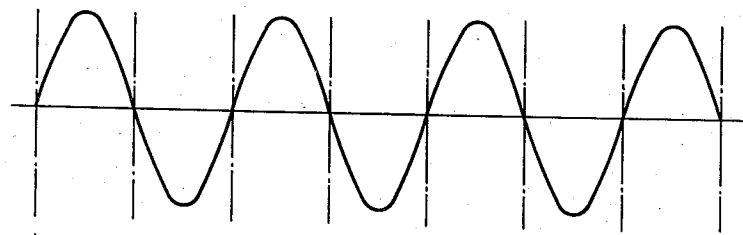


FIG. 3.

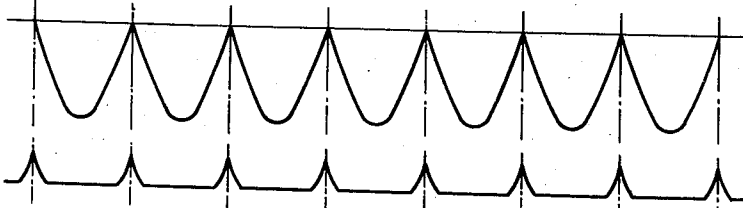


FIG. 4.

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2,209,395

SIGNALING SYSTEM

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Original application December 7, 1934, Serial No. 756,443. Divided and this application December 21, 1937, Serial No. 180,967

2 Claims. (Cl. 250-36)

This invention relates broadly to signaling systems and more particularly to an electronic impulse generator adaptable for use in such systems; and is a division of the co-pending application Serial No. 756,443, filed December 7, 1934,

which application has now matured and issued as U. S. Patent No. 2,153,178, dated April 4, 1939.

An object of the present invention is to provide a signal generator capable of initiating a series of equally spaced impulses automatically.

Another object of the present invention is to provide a signal generator comprising entirely electronic control means and associated circuits to generate control signal impulses.

Another object is to provide means to initiate the signals in the electronic generator whenever the grid bias thereof is a predetermined value, so that the series of impulses initiated thereby are accurately and equally spaced.

Further objects of the instant invention reside in any novel feature of construction or operation or novel combination of parts present in the embodiment of the invention described and shown in the accompanying drawing.

In the drawing:

Fig. 1 shows diagrammatically a preferred form of the signal generator.

Figs. 2 to 4 show the wave shape forms in different sections of the circuit arrangement.

The present invention is shown and described in the said co-pending application in conjunction with a printing telegraph system; however, it is obvious to those skilled in the art that this invention is not limited solely to application in such systems. For example, the circuit arrangement shown per se in the present application may be used to control the operation of any number of indicating devices utilizing individual control impulses or a series of timed control impulses. Certain applications suggested at the present are as an impulse generator for ringing circuits in local telephone exchange systems or for use in integrating circuits and impulse counting control circuits, or any circuit utilizing equally spaced timed impulses.

Referring now to Fig. 1, the signal generator is shown in one form to comprise an electric discharge device 10 comprising the combination of a full wave rectifier and triode in one envelope and is a type known in the art as a duplex diode triode type. The diode plates 11 and 12 are joined to the terminals of a resistance 13 which is connected in shunt relationship with the secondary winding 14 of transformer 15. The center tap of the said resistance is connected to the grid

element 16 of the tube and is also connected to a second resistance 17 inserted between the said center tap and the cathode element 18. The triode plate 19 is connected to a set of control elements such as contacts 20 which are included in a circuit comprising the primary winding of transformer 21, battery 22 and connected to the said cathode element. The secondary winding of the transformer 21 is associated with any desired type of responsive device indicated generally by the reference character 23. As mentioned hereinabove, the responsive or controlled device associated with the described impulse generator circuit may be a counting relay device operated by successive initiated impulses, or may be in the form of a vibratory device such as employed in ringing circuits in telephone systems or any other desired controlled device responsive to control signals. These applications are mentioned at this time to show that the application of the described generator is not limited to that shown in the said co-pending application.

It is evident from the description of the circuit connections just set forth that normally the grid element 16 of the tube is at zero bias due to the fact that no current is passing through the resistance 17; therefore, upon closure of the contacts 20 current flow will be established in the triode plate circuit as follows: from the positive terminal of battery 22 through the primary winding of transformer 21, contacts 20, anode 19 and cathode 18 of the tube to the negative terminal of the said battery. However, the condition just described exists in the said circuit for only a comparatively short time because the bias on the grid 16 is not a constant factor but varies in a timed relationship with the frequency of the A. C. supply source. The said supply is impressed upon the full wave rectifier and therefore the rectified voltage impressed on the resistance 17 immediately drives the grid bias negative with respect to the cathode which is of sufficient value to prevent further flow of plate current in the triode output circuit, but as mentioned before the grid bias becomes effective to reduce the plate current to substantially zero value, a pulse is impressed upon the output circuit of the triode in which the transformer 21 is included so that a control pulse or signal is impressed on the selected indicating or responsive device 23. If the contacts 20 are maintained in an operated condition for a number of complete cycles of the current supply source, a control pulse is initiated automatically each time the current value of the rectifier supply passes through zero, thus initiating a series of

equally spaced and timed control pulses. By referring to the graphic representations in Figs. 2 to 4, the voltage conditions in the various sections of the circuit are shown; Fig. 2 shows the alternating voltage supply wave forms impressed on the diode plates; Fig. 3 shows the rectified voltage wave forms impressed on the resistance 17; and Fig. 4 shows the series of short equally spaced and accurately timed pulse or control signals impressed on the triode output circuit.

The circuit just described has shown one method of converting a single phase sinusoidal wave into a series of short impulses having non-sinusoidal wave forms, all of which are similar, and that in the said circuit two impulses are initiated for each complete cycle of the alternating current supply. It has also been shown that for certain conditions of the alternating voltage supply the electric discharge device is conditioned so as to be conductive for a predetermined timed interval to automatically initiate control signals and that at all other times the said device is controlled by the voltage conditions so as to be rendered non-conductive.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A signal generator of the character described comprising an electron discharge device having input and output circuits and a control grid included in the input circuit, a source of sinusoidal potential, a full wave rectifying means, means for impressing the said potential

thereon, means for impressing the rectified potential on the said input circuit, and a regulating device having resistance included in the input circuit, the resistance of said device automatically controlling the bias condition on the control grid in accordance with the flow of current therethrough, thereby controlling the conductivity of the discharge device and said resistance being of such value with relation to the current flow therethrough and the characteristic of the electron discharge device as to render it non-conductive upon flow of appreciable current therethrough and to render it conductive only as the current supply impressed thereupon approaches zero value to produce a series of comparatively short periodic impulses in the said output circuit.

2. The combination of an electron discharge device having a common cathode, a plurality of diode plates, a control grid and triode plate, of means for applying a positive potential to the triode plate with respect to the cathode, a source of alternating current and means for impressing said current upon the diode plates, and a regulating device having resistance and having one terminal connected to the said cathode element and the other terminal connected to the control grid and an intermediate point on said source of alternating current, the resistance of said device automatically controlling the bias condition on the grid in accordance with the flow of current therethrough thereby controlling the conductivity of the discharge device, said resistance being of such value with relation to current flow therethrough and the characteristic of the electron discharge device as to render the triode section non-conductive upon flow of appreciable current therethrough and to render the said triode section conductive only as the current supply impressed thereupon approaches zero value.

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