

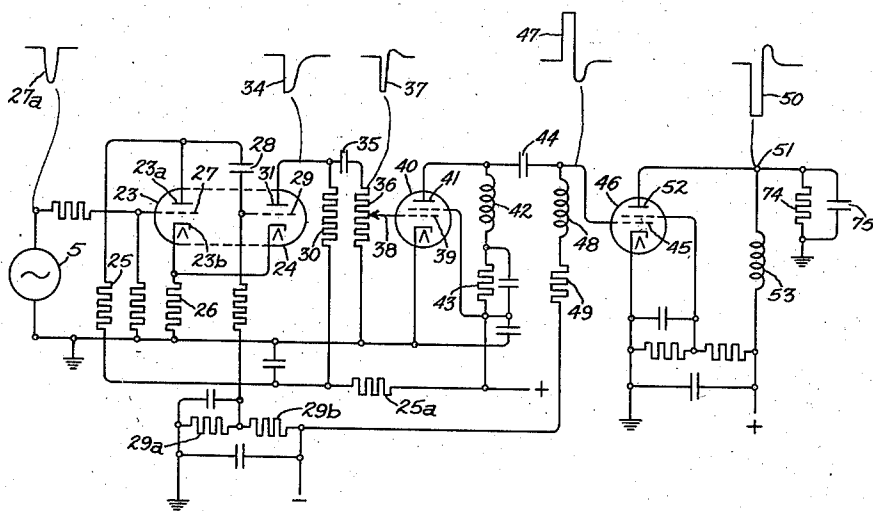
April 27, 1948.

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2,440,547

PULSE GENERATOR

Original Filed Jan. 23, 1943



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UNITED STATES PATENT OFFICE

2,440,547

PULSE GENERATOR

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Original application January 23, 1943, Serial No.
473,279. Divided and this application April 12,
1944, Serial No. 530,624

2 Claims. (Cl. 250-27)

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This application is a division of my application
Serial No. 473,279, filed January 23, 1943.

The present invention relates to a pulse gener-
ator for producing pulses of variable width or
duration.

An object of my invention is to provide an im-
proved circuit for obtaining variable width pulses.

The novel features which I believe to be char-
acteristic of my invention are set forth with
particularity in the appended claims. My in-
vention itself, however, both as to its organi-
zation and method of operation, together with
further objects and advantages thereof, may best
be understood by reference to the following de-
scription taken in connection with the accom-
panying drawing in which the single figure is a
circuit diagram of a pulse generator embodying
my invention.

Referring to the drawing, there is shown a
pulse generator for converting the voltage of an
alternating current source 5 from a more or
less peaked wave form to square wave pulses of
variable width.

The input of the pulser, which is fed from the
alternating current source 5, consists of a mul-
tibrator having electron discharge devices 23
and 24 which may be within a single envelope.
The device 23, which is normally conducting, has
its anode 23a connected to the positive terminal
of the power supply through resistances 25 and
25a and its cathode 23b connected to ground
through resistance 26. While the device 23 is
conducting, the anode voltage is less than the
voltage of the power supply by the drop through
the resistance 25 and 25a. The grid 27 of the
device 23 is connected to the alternating voltage
source 5 and is driven negatively during the
peaks 27a, causing a decrease in the anode cur-
rent with the resultant increase in anode voltage
which is applied through a condenser 28 to the
grid 29 of the tube 24.

The grid 29 has a negative bias obtained from
a resistance 29a in series with a resistance 29b
across a source of negative bias potential and
maintains the device 24 nonconducting until the
negative bias is overcome by the voltage from
the anode 23a. At this point current flows
through a resistance 30 to the device 24 and
through the resistance 26. The voltage drop
through the resistance 26 drives the grid of de-
vice 23 negative with respect to the cathode of
that device, causing a rapid interruption of the
current in the device 23 and a sudden increase
in the current in the device 24. This results in
a sudden drop in voltage at the anode 31 of the

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device 24 as shown at 34. As the condenser 28
is charged, the positive bias on the grid de-
creases and causes a decrease in the current in
tube 24. The decreased current flowing through
the resistance 26 renders the grid of device 23
positive with respect to the cathode, causing that
device to become conducting, and the decrease
in voltage at the anode 23a drives the grid of
device 24 to cut-off. The decrease in current in
the device 24 is accompanied by a rise in anode
voltage which, as shown at 34, is not as rapid
as the drop.

The negative dip in the voltage at the anode
31 has a wave shape determined by the regenera-
tive build-up time of the device 24 and is inde-
pendent of the wave shape of the alternating
voltage supply 5, although a peaked wave shape
will provide a more definite starting point.

The output voltage of the device 24 is fed
through a differentiating circuit consisting of a
condenser 35 and a resistance 36 which causes a
more sharply peaked voltage 37 to appear across
the resistance 36. This peaked voltage is ap-
plied through a variable tap 38 to the grid 39
of a normally conducting electron discharge de-
vice 40 and at some value less than its maximum
negative drives it to cut-off. At cut-off the cur-
rent flowing to the anode 41 through the in-
ductance 42 and resistance 43 is interrupted and
a transient voltage is induced in the inductance
and is applied through a condenser 44 to the grid
45 of an electron discharge device 46, driving
the device to saturation. The grid 45 has a nega-
tive bias, from its connection to the source of
bias potential through an inductance 48 and re-
sistance 49, which normally holds the device 46 at
cut-off.

The voltage at the grid 45, shown at 47, rises
abruptly to a peak limited by the grid current
in the device 46 and lasts until the stored energy
in the inductance 42 is dissipated in the grid
45 and the associated circuits. As the voltage
drops, the voltage 37 becomes sufficiently posi-
tive to make the device 40 conducting and any
negative transient is damped by the flow of cur-
rent to the anode 41.

The duration or width of the pulse 47 is de-
termined by the inductance 42, the negative bias
on the grid 45, and the magnitude and duration
of the voltage applied to the grid 39 and could
be changed by varying any of these factors. In
the present circuit, the inductance 42 and the
bias on the grid 45 are fixed so the pulse width
is varied by the tap 38. As the tap 38 is moved
toward the upper end of the resistance 36, the

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rate at which the device 40 is driven to cut-off increases, the amplitude of the transient voltage due to the energy stored in the inductance 42 increases, and the device 40 is held longer at cut-off. All of these factors tend to widen the pulse. Variations in pulse width of from 4 or 5 to 1 have been obtained.

The device 46 converts the positive pulse 47 to a negative pulse 50 at a terminal 51 connected to the anode 52 and through an inductance 53 to the power supply and to ground through a resistance 74 and a condenser 75. Prior to the pulse 47, no current flows through the inductance 53 and the voltage at the terminal 51 is equal to the voltage of the power supply. At the pulse 47, the device 46 is driven to saturation connecting the terminal 51 to ground through the low impedance of the device. This results in a sudden decrease in voltage at the terminal 51. With a power supply voltage of 1,000 volts, the terminal voltage may drop to 100 volts, producing a negative pulse of 900 volts. At the end of the pulse 47, the device 46 is driven to cut-off and the voltage at the terminal rises above the power supply voltage due to the induced voltage in the inductance 53.

While I have shown particular embodiments of my invention, it will be understood that many modifications may be made without departing from the spirit thereof, and I contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A pulse generating circuit comprising a first, normally conductive, discharge device having an input circuit and having a substantially aperiodic output circuit including an inductive reactance, a source of triggering voltage pulses of peaked waveform, means for impressing a negative triggering pulse from said source on said input circuit, said pulse having sufficient amplitude to drive said device beyond cutoff, thereby to induce a positive voltage pulse of steep wave front and predetermined duration across said

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reactance, a second, normally non-conductive, discharge device having a substantially aperiodic grid circuit and a load circuit, and means to impress said induced pulse on said grid circuit, said induced pulse having sufficient amplitude to drive said second device abruptly beyond saturation, said aperiodic circuits being damped for undesired negative transients by return of said first device to conductive condition at the termination of said induced pulse, and means to vary the duration of said induced pulse comprising means to vary the amplitude of the triggering pulse applied to said input circuit.

2. A pulse generating circuit comprising a first, normally conductive, discharge device having an input circuit and having a substantially aperiodic output circuit including an inductive reactance, a source of triggering voltage pulses of peaked waveform, means for impressing a negative triggering pulse from said source on said input circuit, said pulse having sufficient amplitude to drive said device beyond cutoff, thereby to induce a positive voltage pulse of steep wave front and predetermined duration across said reactance, a second, normally non-conductive, discharge device having a substantially aperiodic grid circuit and a load circuit, and means to impress said induced pulse on said grid circuit, said induced pulse having sufficient amplitude to drive said second device abruptly beyond saturation, said aperiodic circuits being damped for undesired negative transients by return of said first device to conductive condition at the termination of said induced pulse.

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