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IMPULSE GENERATOR

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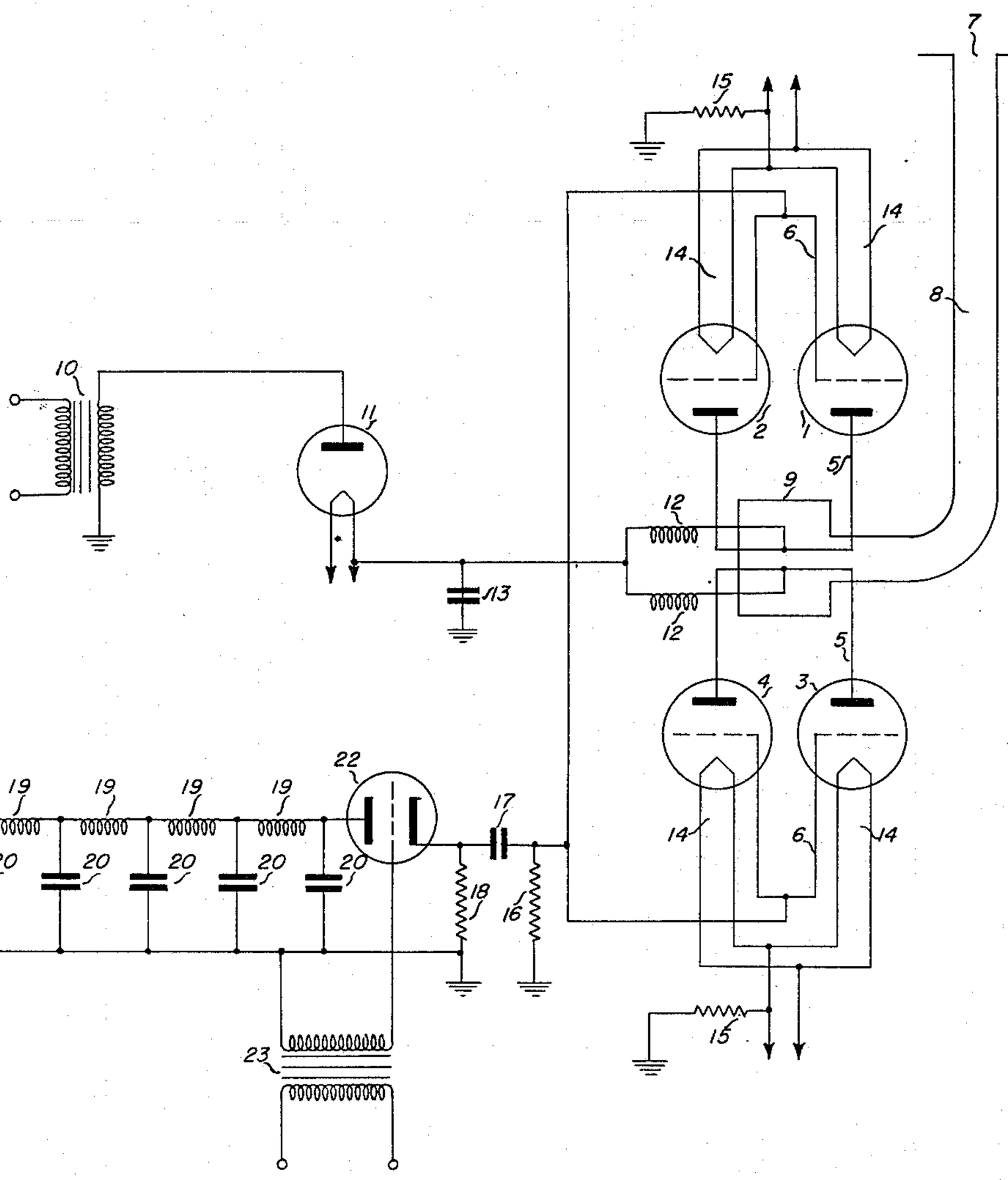

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IMPULSE GENERATOR

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1

This invention relates to intermittently operative oscillators for generating radio frequency pulses. Such pulse generators may be employed in radio echo ranging devices. For such use, and for other purposes, it is desirable that the operation of a pulse generator be stable under variation in load conditions.

It is accordingly an object of the invention to provide for stabilization of pulse length and pulse rate in a high frequency pulse generator.

It is another object of the invention to provide a pulse generator operating under substantially constant grid bias during the pulse.

The invention will be further understood with reference to the drawing which discloses a circuit diagram of a pulse transmitter embodying the present invention.

The high frequency transmitter as shown in the drawing, may include four triodes comprising two push-pull pairs 1 and 2, 3 and 4, in parallel. Each pair is provided with a plate tank 5 and grid tank 6. These tanks constitute high frequency resonant line sections. The antenna 7 is fed by transmission line 8 inductively coupled to the plate tanks by loop 9. Plate potential is supplied by power transformer 10 and rectifier 11 which feed to the plate tanks through R. F. chokes 12. A storage capacitor 13 is connected between the output of rectifier 11 and ground.

The filaments of the oscillator tubes are energized through lines 14 and are grounded through self-biasing resistors 15.

The pulsing characteristics of the transmitter are determined by the grid circuit components, now to be described. Grid tanks 6 are connected in parallel and returned to ground through resistor 16. In parallel therewith is condenser 17 and resistor 18.

The transmitter is normally held inoperative by bias developed across condenser 17 and grid resistor 16. Pulse generation is effected by the periodic establishment of a keying voltage across resistor 18 for decreasing the grid bias. This is accomplished by discharging an artificial line through the resistor.

The line comprises series inductances 19 and parallel capacitances 20, and is charged from a source of positive potential through isolating resistor 21. The means for switching the line across the resistor is vacuum tube 22, which preferably contains gas, but which may be a high vacuum tube.

The control element of tube 22 is keyed by a voltage supplied from a control source of desired frequency through transformer 23.

2

The pulse frequency is therefore that of the control source. The pulse length depends on the electrical length of the artificial line. For maintaining substantially constant bias on the transmitter during the pulse, resistor 18 should be approximately the characteristic impedance of the line, so that discharge of the line produces a square voltage wave across the resistor. Condenser 17 normally is of a large value so that the potential thereon varies only a limited amount by the flow of grid current during the pulse and the time constant thereof with resistor 16 is greater than the recurrence period.

The operation of the circuit is now apparent. Upon application of a positive keying alternation to the control element of tube 22, the line is discharged across resistor 18, decreasing the negative grid cathode bias on the transmitter and holding substantially this voltage thereon during the pulse. On completion of the discharge, the voltage developed across resistor 18 abruptly terminates and the transmitter is blocked. The tube 22, if gas filled, deionizes; and if a high vacuum tube, ceases conduction. Its control grid electrode receives cut-off bias on the negative alternation of the control frequency, and consequently the line is recharged through the isolating resistor 21. Cycles recur successively as described.

It has been determined that by positively controlling the grid potential by the means described, pulse generation substantially independent of loading conditions can be effected.

Although I have shown and described certain and specific embodiments of the invention, I am fully aware of the many modifications possible thereof. This invention is not to be restricted except insofar as is necessitated by prior art and the spirit of the appended claims.

The invention described herein 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:

1. In a high frequency oscillator, means for controlling the grid bias comprising an impedance in the grid-cathode circuit, an artificial line, switch means for periodically connecting the line across said impedance for discharging the same and developing a bias control voltage in the grid cathode circuit.

2. A high frequency impulse generator including an oscillator, a resistance in the grid-cathode circuit thereof, and an artificial line, means for charging said line and switch means for peri-

odically discharging said line through said resistance; said resistance being substantially equal to the characteristic impedance of the line.

3. In a vacuum tube circuit, a grid-cathode circuit including an impedance, an artificial line, and switch means for periodically connecting the artificial line across the impedance for controlling the grid-cathode bias.

4. In a high frequency impulse oscillator, means biasing the oscillator against oscillation, and means for periodically establishing an operating bias including an impedance, an artificial line, means for charging the line, and switch means for periodically discharging the line across the impedance.

5. Means for keying a high frequency impulse generator including an artificial line, means for charging the line, a resistance in a control circuit of the generator approximating the characteristic impedance of the line, an electron discharge tube connected between said line and said resistance, and control means for said tube operative periodically to render said tube conductive and to discharge the line through the resistance.

6. In combination, a high frequency oscillator including an electron discharge device having a control grid, means normally applying a blocking bias on said control grid, an artificial line, means charging said line, an impedance having a value substantially equal to the characteristic impedance of said line in the circuit of said control grid, and switch means periodically discharging said line through said impedance to periodically apply a substantially constant unblocking bias on said control grid so that said oscillator periodically produces oscillations of substantially constant amplitude of a duration determined by the electrical length of said line.

7. In combination, a high frequency oscillator, blocking means included in the control circuit of the oscillator normally biasing said oscillator against oscillations, an artificial line, means charging said line, an impedance having a value substantially equal to the characteristic impedance of said line connected in the control circuit of the oscillator, and switch means discharging said line through said impedance to apply a substantially constant unblocking bias in the control circuit so that said oscillator produces oscillations for a period of time determined by the electrical length of said line.

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