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SIGNAL AMPLITUDE RESPONSIVE TRIGGER CIRCUITS FOR QUANTIZING

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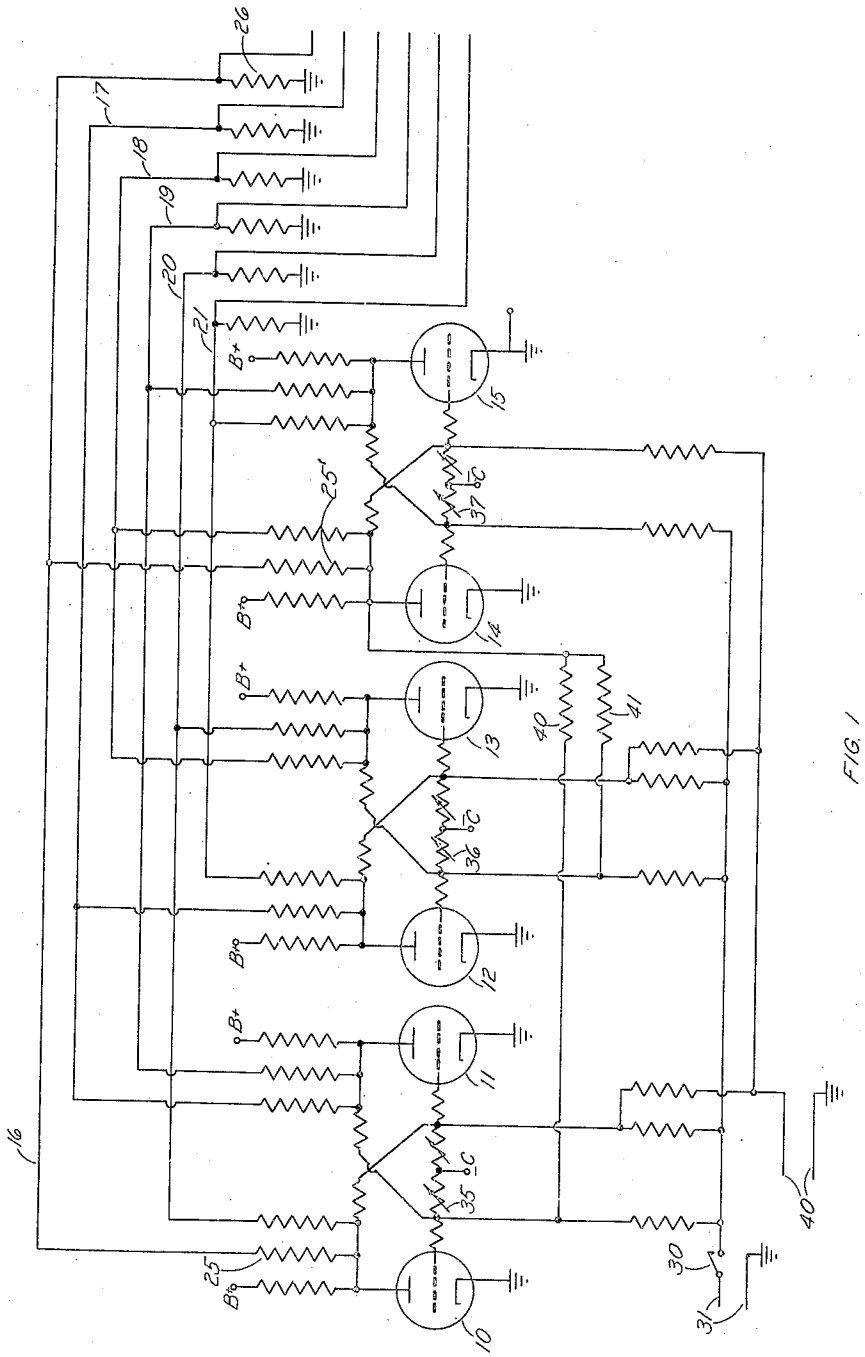


FIG. 1

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SIGNAL AMPLITUDE RESPONSIVE TRIGGER CIRCUITS FOR QUANTIZING

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4 Claims. (Cl. 250—27)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention is in electrical apparatus and particularly is a novel quantizing circuit.

The principal object of this invention is to provide a novel circuit which will sample a fluctuating direct current voltage at intervals and provide an output on one of a plurality of lines, the selection of the line being dependent upon the value of the input signal at the instant of sampling.

Other objects will be apparent from a reading of the following specification and claims.

The single drawing is a schematic wiring diagram of the quantizing circuit of my invention.

The circuit comprises six triode tubes 10—11, 12—13, and 14—15 direct-coupled together in pairs in Eccles-Jordan fashion. An output lead 16 is connected to the plates of tubes 10 and 14 through decoupling resistors 25 and 25' and to ground through resistor 26.

Output leads 17 through 21 are provided for tubes 10 through 15, each output serving two tubes in a fashion similar to that just described for tubes 10 and 14.

It should be understood that the circuit herein shown and to be described is intended to sense only six different levels in an input signal. Should it be desired to sense more than six levels, more tubes will be used, but the principles of construction and operation will be identical.

When triodes 10 and 14 are in a conducting condition, the voltage developed across resistor 26 is at its minimum value. When either 10 or 14 is conducting but not both tubes, an intermediate voltage value is developed across resistor 26. When neither of the said triodes is conducting, a maximum voltage for the circuit is developed across the indicated resistor, and the desired signal appears on output lead 16.

The circuit is intended to be exposed to the input voltage for a short period of time only by closing switch 30 in line 31. In practice, manually operable switch 30 will ordinarily be replaced by a mechanical or electronic switch, but no such switch forms a part of this invention.

With the circuit in zero or initial condition and also when the input voltage represents the first step level value of the six possible values, triodes 11, 13, and 15 are conducting, and triodes 10, 12, and 14 are thus cut off as a result of the Eccles-Jordan coupling. The grids of triodes 10, 12, and

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14 are biased increasingly negative by means of variable resistors 35, 36, and 37 so that a larger positive input voltage is required to fire tube 12 than tube 10, and a larger positive input voltage still is required to fire tube 14.

The absolute values of grid resistance for tubes 10, 12, and 14 are determined by the sizes of the steps to be indicated on the output line.

As mentioned, when the input signal value is at the first step level, triodes 11, 13, and 15 are conducting. Under these conditions, neither triode 10 nor triode 14 conducts, and, since both are connected to output line 16, a maximum value output appears on this line. No other output line connects with more than one nonconducting triode.

Should the input signal rise to the second step level value, the bias on tube 10 is reduced to such a point as to produce conduction therein, and tube 11 is extinguished. For this condition, output lead 17 alone carries a maximum value signal since neither triode 11 nor 12, both of which are connected to the said output, is conducting, whereas at least one tube on every other output line is in a conducting condition. As the input voltage reaches the third step level, triode 12, as well as triode 10, is caused to conduct, and triodes 11 and 13 are thereby cut off so that the output line associated with tubes 13 and 14, namely line 18, carries a maximum signal. An input signal of the next highest value will produce conduction in triodes 10, 12, and 14, and thereby cut off triodes 11, 13, and 15. Output line 19, associated with triodes 11 and 15, now carries a maximum signal.

When the input signal value rises to another level, as the fifth, triode 14 continues to conduct, and a negative biasing voltage is coupled back to triodes 10 and 12, through resistors 40 and 41, respectively. This bias voltage is not large enough to cut off either of the last mentioned tubes at the fourth step level of input voltage, but, with an increase in the input, triode 10 is unable to hold tube 11 cut off; thereupon triode 11 conducts and triode 10 is cut off so that output line 20, associated with triodes 10 and 13, carries the maximum output voltage.

At the sixth input level, not only is triode 10 unable to cut off or to hold cut off triode 11, but triode 12 is likewise unable to prevent conduction in triode 13. Triodes 11 and 13 thereupon, aided by the biasing voltage coupled back to tubes 10 and 12 from tube 14, hold tubes 10 and 12 cut off, and the maximum voltage appears on lead

21, this lead pairing the outputs of tubes 12 and 15.

After a predetermined time interval, or whenever desired, the circuit may be restored to its initial condition by applying large positive pulses to tubes 11, 13, and 15 from line 40 to produce conduction therein.

The foregoing description is in specific terms, and many modifications will readily suggest themselves. The invention should not, in other words, be considered as limited to the exact apparatus shown and described, but, instead, for the true scope thereof, reference should be had to the appended claims.

I claim:

1. In a circuit of the nature described including a plurality of output lines, means for selectively energizing said lines according to the amplitude of an input signal comprising a plurality of trigger circuits each having two conditions of electrical stability and each including a first tube and a second tube all of said tubes having a plate, a cathode, and a grid element, a power supply connected to the plates of said tubes, a source of biasing voltage and means connecting the same to the grid elements of said tubes to condition the said first tubes for conduction at a predetermined input signal level and to condition the said second tubes for conduction at progressively different input signal levels, means for applying an input signal to all of said grid elements in parallel excepting the grid element of one of said first tubes, and means for restoring said circuit to its initial condition after its condition has been altered.

2. In a circuit of the nature described including a plurality of output lines, means for selectively energizing said lines in accordance with the amplitude of an input signal comprising a plurality of trigger circuits each having two conditions of electrical stability and each including a first tube and a second tube all of said tubes having a plate, a cathode, and a grid element, a power supply connected to the plates of said tubes, a source of biasing voltage and means connecting the same to the grid elements of said tubes to condition the first tubes for conduction at a predetermined signal level and to condition the said second tubes for conduction at progressively different input signal levels, means for applying an input signal to all of said grid elements in parallel excepting the grid element of one of said first tubes, connecting means between each of said output lines and a plurality of said tubes no two tubes so connected being within the same trigger circuit, and means for restoring said circuit to its initial condition after its condition has been altered.

3. In a circuit of the nature described including a plurality of output lines, means for selectively energizing said lines in accordance with the amplitude of an input signal comprising a plurality of trigger circuits each having two conditions of electrical stability and each including

a first tube and a second tube all of said tubes having a plate, a cathode, and a grid element, a power supply connected to the plates of said tubes, a source of biasing voltage and means connecting the same to the grid elements of said tubes to condition the said first tubes for conduction at a predetermined input signal level and to condition the said second tubes for conduction at progressively different input signal levels, means for sampling an input signal and applying the instantaneous voltages thereof to all of said grid elements in parallel excepting the grid elements of one of said first tubes, and means for restoring said circuit to its initial condition after its condition has been altered.

4. In a circuit of the nature described, the combination of a first trigger circuit, a second trigger circuit, and a third trigger circuit each of said trigger circuits including two tubes and having two conditions of electrical stability one tube of each trigger circuit being initially conducting and the other tube of each trigger circuit being initially off the off tubes of said first, second, and third trigger circuits being biased progressively more heavily to prevent conduction therein, a plate voltage supply for said tubes, means for applying a fluctuable input signal to said tubes excepting the initially conducting tube of the third trigger circuit, an output line connected to the initially off tubes of said first and third trigger circuits, a second output line connected to the initially on tube of the first trigger circuit and the initially off tube of the second trigger circuit, a third output line connected to the initially on tube of the second trigger circuit and the initially off tube of the third trigger circuit, a fourth output line connected to the initially on tube of the first trigger circuit and the initially on tube of the third trigger circuit, a fifth output line connected to the initially off tube of the first trigger circuit and the initially on tube of the second trigger circuit, a sixth output line connected to the initially off tube of the second trigger circuit and the initially on tube of the third trigger circuit, means for coupling back the output of the initially off tube of the third trigger circuit to the inputs of the initially off tubes of the first trigger circuit and the second trigger circuit, and means for extinguishing said initially off tubes.

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