

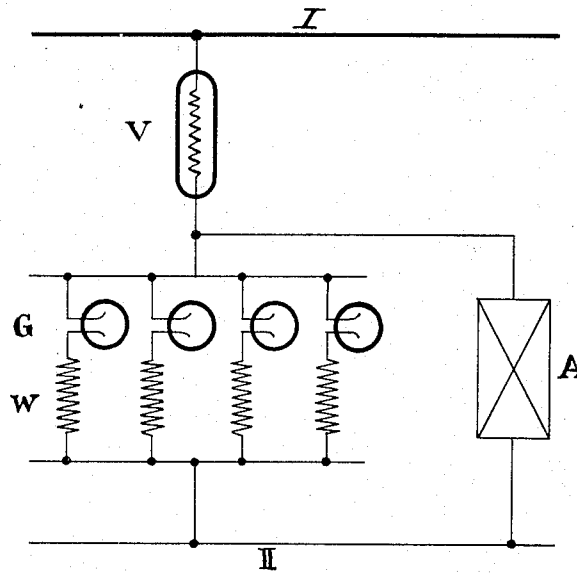
July 9, 1929.

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1,720,352

METHOD OF AMPLIFICATION

Filed Dec. 24, 1924



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METHOD OF AMPLIFICATION.

Application filed December 24, 1924, Serial No. 757,854, and in Germany November 20, 1923.

Applications covering the subject matter of this invention have been filed in Germany on November 20, 1923, and November 24, 1923.

5 My invention relates to a new system of amplification and to a method of obtaining the desired supply line conditions for the use of such systems.

10 In many electric circuit installations it is desirable to avoid the effects of voltage variations in the apparatus connected therein. This is especially true in systems of amplification.

15 My invention provides a system of connection for amplifying alternating currents having no connection between the source of supply voltage and the source of current to be amplified and with only one connection between the voltage supply source and
20 the amplified circuit.

Furthermore, it is desirable to use gas discharge tubes such as glow lamps in systems of amplification of alternating current but in such systems heretofore in use it has
25 not been possible to secure the proper line voltage conditions to permit effective use of such lamps.

30 One object of my invention is to provide a system of connections that will stabilize the voltage supplied to the amplifying circuit employing glow discharge tubes.

35 It is a further object of my invention to provide an amplifying circuit employing a glow discharge lamp, with suitable connections thereto of such a nature as to achieve the desired amplification.

40 By my invention, a stable voltage supply is obtained through the provision of a divided circuit having a ballast resistor in one leg thereof and having in the other leg thereof one or more glow discharge lamps each having a resistor in circuit therewith. By this arrangement the current voltage function in the ballast resistor is such that the current
45 is maintained practically constant and the current voltage function in the glow discharge lamps is such as to maintain the voltage constant.

50 For the higher potentials and currents it may be necessary to employ a group of ballast resistors connected in parallel and arrange the two parallel circuits in series relation between the opposite sides of the supply line.

55 By this arrangement a practically invari-

able voltage exists on the terminals of the glow lamps and if the apparatus to be operated is connected thereacross, a uniformity of voltage will be impressed thereon.

60 With this means of obtaining a substantially constant supply voltage, it is possible to achieve amplification of a current without the use of extraneous filtering means. The system may make use of a glow discharge device not of the filament type.

65 One embodiment comprises the use of a glow discharge tube having an anode and a cathode and two control electrodes. The anode and cathode are connected to the source of supply and the current to be amplified is connected to the control electrode. The tube is connected to a transformer of the receiving apparatus and through a potential divider that is connected across the
70 supply line.

75 My invention may be best understood by reference to the accompanying drawings, wherein, the drawing is a diagrammatic illustration of the circuit arrangement for obtaining a stabilized voltage in accordance
80 with the principles of my invention.

Referring to the drawing, reference characters I and II represent the supply lines or net work. A ballast resistor V is connected to one side of the line. Connected to
85 the other side of the line are a plurality of glow lamps G each having in series therewith a resistance W, the glow lamps and associated resistances being connected in parallel. The parallel connected glow lamps
90 are connected in series with the ballast resistor V between the opposite sides of the supply line.

95 A ballast resistor responds promptly to fluctuations in the line voltage and tends to maintain the current practically constant but the range of voltage regulation afforded thereby has been found to be insufficient when used alone. By connecting a ballast resistor in series with one or more glow
100 discharge lamps, the desired voltage regulation is obtained.

Accordingly, apparatus may be so connected across the line through this potential divider circuit that variations of line voltage are without effect thereon.

105 As an instance of this operation supposing the line voltage is 220 volts and the glow discharge tube is to be operated at 180 volts, a ballast resistor is preferably used which
110

will operate from 20 to 60 volts and will pass a practically constant current. In this manner it is possible to compensate for fluctuations of the net work voltages from 200 to 240 volts, or about plus or minus 10%. The resistance of the ballast resistor at cold state causes then a drop of voltage of at the most 20 volts so that even the lowest line voltage of 200 volts would give 180 volts at the terminals of the glow discharge apparatus which is a voltage sufficient for operation.

The heat inertia of the ballast resistor ought to be evidently as small as possible in order that the ballast resistor should respond instantaneously to the fluctuations of the line voltage. As the heat inertia of the ballast resistor decreases with the strength of current that can be carried by it and for which it is designed, it is preferable when dealing with large currents to connect several ballast resistors in parallel. When a suitable ballast resistor is used, the strength of current varies from the average value only about 3% for the largest range of regulation. Such a regulation is, however, insufficient. According to this invention, there is secured a practically constant voltage, which is achieved by connecting in series with one or several ballast resistors one or several lightly loaded glow discharge tubes.

When loaded in this manner within the range of the normal operation voltage fluctuations of plus or minus 1% would cause in an ordinary glow discharge lamp variations in the strength of current of about 10%. If, however, the strength of current as explained above is maintained within 3% by means of the series ballast resistors, then the terminal voltage of the glow discharge tubes will vary at the most only .3%.

It will be seen that the above arrangement is taking over the function of an electric filter which is generally employed when a line voltage is to be used with amplifying devices.

The above described arrangement permits arranging an alternating current amplifying circuit at A as represented in the drawing.

While my invention has been described as using glow discharge devices, it is equally applicable to other electron emitting devices, whether for purpose of amplification or detection.

Such modifications and others may be made within the spirit and scope of my in-

vention and all such modifications are intended to be covered by the appended claims.

I claim:

1. A circuit arrangement comprising a source of varying electromotive force, a translating device to be operated from said source, and an interposed network, said network comprising a plurality of similar combinations, each combination consisting of a resistance and a glow discharge tube connected in series with each other, the individual combinations being connected in parallel, and a ballast resistor connected in series with the parallelly connected combinations, whereby the variations of the electromotive force are rendered substantially negligible.

2. In combination, a source of power that may fluctuate, a translating device to be operated from said source, and a network for smoothing out the fluctuations of said power supply including a current stabilizer in series with said translating device and a voltage regulator comprising a glow discharge device in parallel with said translating device and a resistance in series with said glow discharge device.

3. The method of operating translating devices from a source of electric current subjected to variations and fluctuations, consisting of passing such current through a current stabilizing device, and shunting by a glow discharge device a portion of said current from said translating device to smooth out said variations.

4. In a power supply system a plurality of independent circuits each including a glow discharge tube and a resistance element connected in series, a power supply line, a connection between one side of said line with one terminal of each of said resistance elements, a connection between one side of each of said glow discharge tubes and the other side of said line, said last mentioned connection including a ballast resistor and connections to a load in parallel to said plurality of independent circuits.

5. The method of operating an electric amplifying device from a source of electric current subjected to variations and fluctuations, consisting of passing such current through a current stabilizing device and shunting by a glow discharge device a portion of said current from said amplifying device to smooth out said variations and fluctuations.

In testimony whereof I affix my signature.
JOHANNES MICHAEL SCHMIERER.