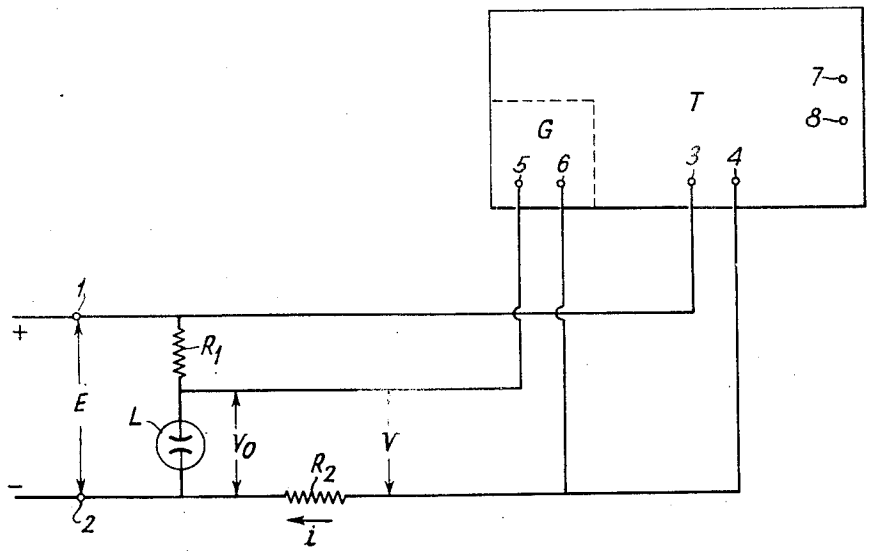
April 5, 1949. L. BLOK 2,466,299

CIRCUIT FOR BALANCING POTENTIAL FLUCTUATIONS

Filed March 23, 1943



INVENTOR
LOURENS BLOK
BY H. S. Grover
ATTORNEY

Patented Apr. 5, 1949

2,466,299

UNITED STATES PATENT OFFICE

2,466,299

CIRCUIT FOR BALANCING POTENTIAL FLUCTUATIONS

Lourens Blok, Eindhoven, Netherlands, assignor to Hartford National Bank and Trust Company, Hartford, Conn., as trustee

Application March 23, 1943, Serial No. 480,185
In the Netherlands September 17, 1940

Section 1, Public Law 690, August 8, 1946
Patent expires September 17, 1960

3 Claims. (Cl. 171—119)

1

Apparatus for the supply of receiving sets, amplifiers and other aggregates operating with discharge tubes supply a direct voltage whose value does generally not fluctuate inappreciably with the voltage of the electric lighting mains, the temperature etc. The result is that the output of the aggregate supplied is subjected to similar fluctuations and this is in some cases inadmissible, for example in the case of a low-frequency oscillator to be used for measuring or adjusting purposes.

For stabilizing supply voltages it is known to use glow discharge lamps which are operated in the substantially flat part of the current-voltage characteristic curve. Thus, however, complete compensation is not obtained and moreover it is necessary for a sufficiently large regulating range to choose the current that passes through the lamp so as to be at least as high as the supply current, the efficiency being thereby interfered with.

The present invention meets the said two difficulties.

According to the invention, one of the terminals of the source of direct voltage between which fluctuations may occur is connected to the point of connection between two impedances having a differently large differential resistance which are supplied in parallel from the source of direct voltage across series resistances and the balanced voltage is obtained between the free ends of the said impedances.

In this circuit arrangement the balanced voltage is determined indeed by the difference between the voltages between the ends of each of the two impedances and by a suitable choice of the differential resistances of these impedances care may be made sure that the degree of compensation or over-compensation of the potential fluctuations which is desired for any case is reached.

If therefore the output of a direct voltage as constant as possible is, for example, required a 100% compensation will have to be provided for.

If, however, the point in question is the direct-current supply of an aggregate comprising a plurality of discharge tubes it is preferable to over-compensate and to supply only part of the said tubes, if possible only one, with the (over)-compensated voltage and all the other tubes with

2

the non-compensated voltage. In the case of sufficient over-compensation the same effect is thus nevertheless achieved as though all of the tubes were supplied with a perfectly constant voltage, and there is by now the additional advantage that the current and hence the loss of energy in the regulating impedance may remain small.

In this manner it is possible, for example with a low frequency oscillator, to provide for an output which is independent of potential fluctuations of the electric lighting mains, in that only one of the two oscillators, whose difference frequency constitutes the desired low frequency, is supplied with the overcompensated direct voltage, but the other oscillator and the amplifier with the non-compensated voltage.

In order that the invention may be clearly understood and readily carried into effect this embodiment of the invention will now be described more fully with reference to the accompanying drawing, in which one example is diagrammatically shown.

Between the terminals 1 and 2 of a source of direct voltage, for example an anode tension supply unit, there is a voltage E which may vary in consequence of supply voltage fluctuations and/or temperature fluctuations.

A low frequency oscillator T is supplied from the terminals 1 and 2 with the interposition of a resistance R_2 and is provided for this purpose with connecting terminals 3 and 4. The oscillator part G is, however, precluded from this supply and separate connecting terminals 5 and 6 are provided for its supply.

In view of the latter terminals, the terminal 6 is connected to the right hand end of the resistance R_2, whereas the terminal 5 is connected to the point of connections between a resistance R_1 and a glow discharge lamp L which are connected in series between the terminals 1 and 2.

In these circumstances potential fluctuations between 1 and 2 will become manifest in comparatively unweakened condition between 3 and 4 so that if the output T has to remain unaltered the voltage between 5 and 6 will have to manifest similar but oppositely directed potential fluctuations. This result may be obtained by means of the illustrated circuit arrangement by a suitable

choice of the resistances R_1 and R_2, as will be set out in greater detail.

The resistance R_1 is naturally to be chosen so that at the mean value of E the lamp L operates about centrally in its regulating range so that the value of the said resistance is thus fixed.

If designating the instantaneous voltage across the glow discharge lamp by V_0, that between the terminals 5 and 6 by V and the current in the resistance R_2 by i we have the ratio:

$$V=V_0-R_2i$$

and in the case of low variations of E:

$$\Delta V+\Delta V_0=R_2\Delta i$$

Now it is possible to insure by a correct choice of the value of R_2 the ΔV becomes almost or entirely equal to zero or else obtains a negative value. In the latter case we have the overcompensation desired in the example under consideration.

A practically serviceable circuit arrangement is obtained for example, by means of the following values:

E_{mean}	volts	300
R_1	Ω	1600
R_2	Ω	1000
i_{mean}	ma	55

Potential variations of E up to about 15% can be balanced completely by means of this circuit arrangement.

Instead of using the glow discharge lamp L, use may of course be made of other impedances provided that their differential resistance is lower than R_2 or than the differential resistance of the circuit element which would take the place of R_2.

I claim:

1. In combination with a source of direct current voltage subject to fluctuation and an electrical system provided with two pairs of energizing terminals, a first resistor and solely a single glow lamp connected in series across said voltage source, a second resistor having a resistive value substantially less than the magnitude of the first resistor, said second resistor being connected in a series circuit with said first resistor and glow lamp between one pair of said energizing terminals, and said lamp and second resistor being connected in a separate series circuit between the second pair of energizing terminals.

2. In combination with a source of direct-current potential subject to fluctuation and an electrical system provided with two pairs of energizing terminals, a circuit for balancing potential fluctuations at said terminals comprising a first resistor, a single potential-regulating glow lamp having a predetermined operating range connected in series with said first resistor to said source of potential, the resistance of said first resistor having a value at which at the mean potential value of said source of potential said glow lamp operates in a central portion of said predetermined range, a second resistor, means connecting one of said two pairs of terminals in series with said second resistor to said glow lamp, and means connecting the other of said two pairs of terminals in series with said second resistor to said source of direct-current potential.

3. In combination with a source of direct-current potential subject to fluctuation and an electrical system provided with two pairs of energizing terminals, a circuit for balancing potential fluctuations at said terminals comprising a first resistor, a single potential-regulating glow lamp having a predetermined operating range connected in series with said first resistor to said source of potential, the resistance of said first resistor having a value at which at the mean potential value of said source of potential said glow lamp operates in a central portion of said predetermined range, a second resistor, means connecting one of said two pairs of terminals in series with said second resistor to said glow lamp, and means connecting the other of said two pairs of terminals in series with said second resistor to said source of direct-current potential, the resistance of said second resistor having a value at which the potential fluctuations appearing at said one pair of terminals are of equal magnitude but oppositely directed with respect to the potential fluctuations appearing at said other pair of terminals.

LOURENS BLOK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,835,121	Rentschler	Dec. 8, 1931
2,210,394	Braden	Aug. 6, 1940
2,304,552	Deerhake	Dec. 8, 1942
2,320,237	Hopper	May 25, 1943

FOREIGN PATENTS

Number	Country	Date
558,031	Great Britain	1943