Aug. 1, 1933. L. KÖRÖS 1,920,569

DEVICE FOR KEEPING CONSTANT THE TERMINAL VOLTAGE OF SOURCES OF CURRENT

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Fig. 1

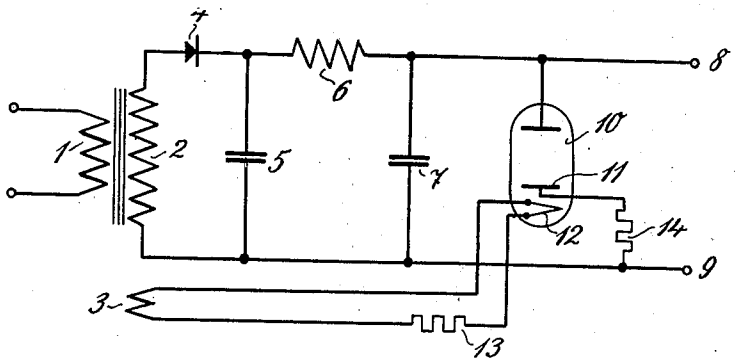


Fig. 2

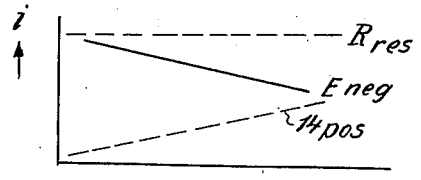
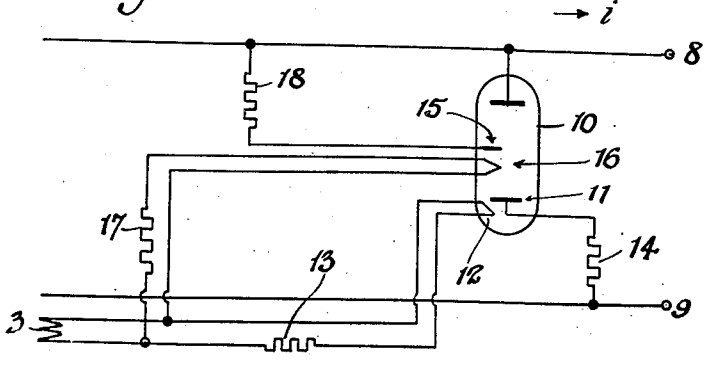


Fig. 3.



Inventor:
Ladislaus Körös
by Paul E. Schilling,
Attorney.

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DEVICE FOR KEEPING CONSTANT THE TERMINAL VOLTAGE OF SOURCES OF CURRENT

Ladislaus Körös, Berlin-Tempelhof, Germany, assignor to N. V. Stabilovolt, 's-Gravenhage, Netherlands

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5 Claims. (Cl. 171—312)

In order to maintain the terminal voltage of sources of current at a constant value, particularly of such sources which possess a relatively high inner resistance, according to the invention a glow cathode discharge tube (electric arc) filled with gas is connected in parallel to the terminals of the sources of current. It has already been proposed to employ a glow-lamp for suppressing fluctuations of voltage, however, the application of glow cathode tubes offers advantages in various respects opposite from that arrangement. The glow-cathode discharge tubes are known per se and up to the present they were used for redressing strong currents only. The arrangement of a glow-lamp mentioned can be employed only with voltages above 70 volts, while according to the invention it becomes possible to maintain even the smallest voltage at a constant value. It is thus easily possible, to keep also the voltage supplied to the heating wires of electronic tubes, amounting to 4 volts and thereabouts, at a constant value. In addition the device according to the invention shows the advantage, that the limit of the intensity of current is not limited towards high figures, as such is the case with glow-lamps, since the discharging distances of the glow cathodes can be loaded substantially higher than glow-lamps. Besides, the glow-cathode discharge tubes employed possess such a high efficiency in smoothing the voltages, that the customary condenser employed for bridging the terminal voltage can be dispensed with.

A further advantage is to be seen in the fact that the working pressure of a glow-cathode discharging tube will change according to the extent of heating, so that by controlling the heating effect the same discharging tube may be used for keeping constant different voltages or the available discharging tube may be accurately adjusted to the voltage required by the consumer, respectively. This latter feature is of special importance, since it is often difficult to produce on a large scale glow cathode discharging tubes for an accurately predetermined voltage.

A mode of execution of the arrangement according to the invention is illustrated in the drawing by way of example.

Figure 1 is a diagram of a suitable connection.

Figure 2 is another diagrammatic view.

Figure 3 is a diagrammatic view of a modification of Figure 1.

Referring now to Figure 1 the source of current having a relatively high inner resistance consists of the transformer 1, 2, 3 connected to the alternating current network, the primary winding of said transformer being connected to an alternating current network while two voltages are drawn from the secondary side, one of which is redressed for the consumer and the other one is to serve for heating the glow cathode discharging tube. The winding 3 serves for this latter purpose.

This arrangement will be given the preference in most instances, since the network current can be directly used for heating purposes, in that an indirectly heated electrode of a high heat-inertia is employed, and in addition by this method the alternating current components of the heating circuit will not be transferred to the circuit of the consumer. To the secondary winding 2 is connected the rectifier or redresser 4 and a filter circuit known per se, consisting of the capacities 5, 7 and the inductivity 6. In order to maintain the voltage at the terminals 8 and 9, to which the consumer is supposed to be connected, at a constant value independently of the changes of load, a glow cathode discharging tube 10 filled with gas is inserted between said terminals, the cathode 11 of which tube is heated by the heating winding 12 connected to the second secondary winding of the transformer by way of the regulating resistance 13.

As an increase of the load, for instance, from 2 milli-amperes to 2 amperes in the glow cathode discharging tube will involve only a very slight change of voltage, for instance of 5 per cent, it follows, that the discharging tube exerts a powerful action of smoothing the voltage, as such is characteristic of a condenser of very large capacity. For that reason the discharging tube is also excellently adapted for doing the work of the condenser 7, and so the latter may be dispensed with without any injurious consequences.

As the glow cathode discharging tube 10 possesses an inclining characteristic, an ohmic resistance 14 is connected in series with said tube. For this case Figure 2 illustrates more fully the conditions. If in a coordinate system the terminal voltage e is changed in dependency on the intensity of current i, there follows for a glow cathode discharging tube the inclining curve E negative, a characteristic which is known as negative resistance characteristic. If a resistance with positive characteristic is connected in series with the discharging device, the line 14 positive in Figure 2 shown in broken lines will apply for said resistance. As the negative and positive characteristics will sum up in the total circuit, there follows the sum R resistance shown in broken lines in Figure 2. It is thus possible

with a suitable selection of the positive resistance to obtain at the terminals 8 and 9 any desired course, that is to say also an alternating current resistance, equal to zero.

As discharging tubes having two electrodes will be difficult to be ignited at a reduced voltage, auxiliary electrodes supplied with high voltage may be arranged within the discharging tube for facilitating the ignition, in order to ionize the gas filling by means of these auxiliary electrodes. It is also possible to simultaneously heat the auxiliary electrodes by heating the main cathode.

A preferable arrangement is shown by Figure 3, the tube 10 having an auxiliary electrode 15 provided with a heating winding 16 energized by the coil 3 of the transformer, through a regulating resistance 17. Preferably, a resistance 18 is interposed between the electrode 15 and the line so that the voltage of the auxiliary and main electrodes of the tube will be the same. This auxiliary electrode is able to start the discharge in the tube so that the gas therein will be ionized to insure a discharge between the main electrodes upon increase in voltage.

I claim:

1. A device for maintaining uniform potential difference between two conductors carrying continuous current and comprising an arc discharge gap and a resistance bridged in series between said conductors, said discharge gap having a negative voltage characteristic and the resistance having a positive voltage characteristic balancing the negative voltage characteristic of the discharge gap whereby the algebraic sum of the effects of such characteristics is zero.

2. A device for maintaining uniform potential difference between two conductors carrying continuous current and comprising a discharge gap between the terminals of which discharge takes place as an arc and a resistance bridged in series between the conductors, said discharge gap having a negative voltage characteristic and the resistance having a positive voltage characteristic, said resistance being variable whereby the positive voltage characteristic of the resistance may be caused to balance the negative voltage characteristic of the gap and the algebraic sum of the effects of such characteristics may be caused to be zero.

3. A device for maintaining uniform potential difference between two conductors carrying continuous current and comprising a discharge gap between the terminals of which discharge takes place as an arc, and an ohmic resistance bridged in series between the conductors, said discharge gap having a negative voltage characteristic and the resistance having a positive voltage characteristic, said resistance being variable whereby the positive voltage characteristic of the resistance may be caused to balance the negative voltage characteristic of the gap and the algebraic sum of the effects of such characteristics may be caused to be zero.

4. A device for maintaining uniform potential difference between two conductors carrying continuous current and comprising an arc discharge gap and a resistance bridged in series between said conductors, said discharge gap having a negative voltage characteristic and the resistance having a positive voltage characteristic balancing the negative voltage characteristic of the discharge gap whereby the algebraic sum of the effects of such characteristics is zero, said discharge gap having spaced electrodes, and means independent of said conductors for heating the field surrounding said electrodes.

5. A device for maintaining uniform potential difference between two conductors carrying continuous current and comprising an arc discharge gap and a resistance bridged in series between said conductors, said discharge gap having a negative voltage characteristic and the resistance having a positive voltage characteristic balancing the negative voltage characteristic of the discharge gap whereby the algebraic sum of the effects of such characteristics is zero, said discharge gap having spaced electrodes, and means independent of said conductors for heating the field surrounding said electrodes, said heating means including a regulating resistance.

LADISLAUS KÖRÖS.