

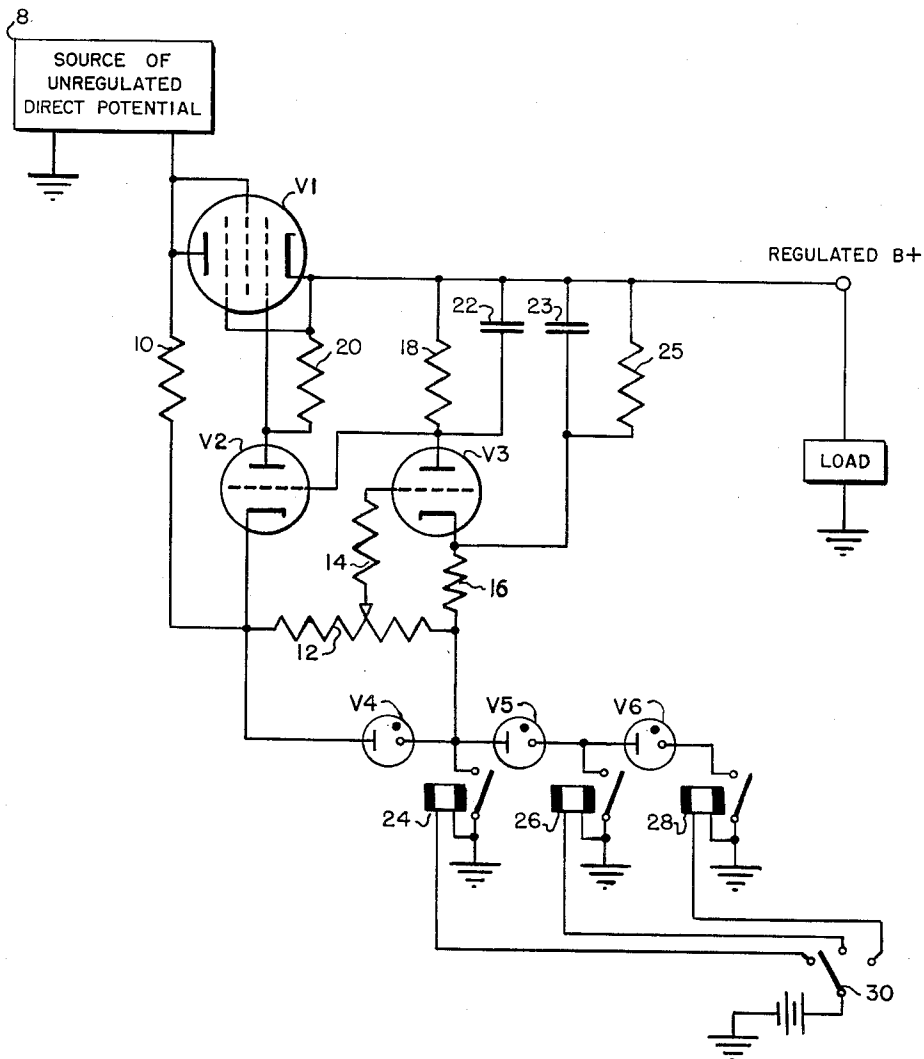
Oct. 1, 1957

D. L. JAFFE

2,808,560

VOLTAGE REGULATOR WITH REMOTE CONTROL

Filed Oct. 14, 1953



INVENTOR,
DAVID LAWRENCE JAFFE
BY

Harry M. Saragovitz
ATTORNEY.

2,808,560

VOLTAGE REGULATOR WITH REMOTE CONTROL

David Lawrence Jaffe, Maspeth, N. Y., assignor to the United States of America as represented by the Secretary of the Army

Application October 14, 1953, Serial No. 386,143

1 Claim. (Cl. 323—22)

This invention relates to voltage regulating devices for electrical systems. One object of the invention is to provide a device for maintaining a voltage substantially constant regardless of variations in the supply voltage or in the load.

A further object of the invention is to provide means for accurately increasing or decreasing a controlled voltage by predetermined amounts.

A still further object of the invention is to provide means for remotely adjusting a controlled voltage.

The invention may be readily understood from the illustrated embodiment in the accompanying drawing.

The single figure of the drawing is an illustration of the preferred embodiment of the invention.

In the drawing a source of unregulated, filtered direct potential 8 is connected to a load through a thermionic tube V1. The tube V1 is shown as a pentode and could, for example, be a type 6Y6. The tube could, however, be a tetrode or a triode of suitable current carrying capacity and amplification factor and, if necessary, a plurality of tubes could be connected in parallel to obtain the necessary current-carrying capacity. The tube V1 is connected for triode operation, as shown in the drawing. The voltage drop across the tube V1 depends on its bias which in turn depends on the voltage drop across resistor 20. The bias on tube V1 will be the voltage drop across resistor 20.

The voltage drop across resistor 20 depends on the anode current of tube V2. The anode current of tube V2 depends on the bias on its control grid, which is in turn controlled by tube V3. Tubes V2 and V3 are shown as separate triodes but could of course be replaced by a dual triode such as a type 6SL7.

The anode of V2 is connected directly to the control grid of V1 and is connected to the cathode of V1 through resistor 20. The cathode of V2 is connected to the unregulated potential through resistor 10 and to ground through one or more voltage regulator tubes V4, V5 and V6. The three regulator tubes are connected in series and the cathode of each tube is connected to ground through a normally open relay. The relays 24, 26 and 28 are selectively controlled by switch 30, which may be located any desired distance from the relays. The grid of V2 is directly connected to the anode of V3. The anode of V3 is connected to the regulated potential through resistor 18. The resistor 18 is shunted by capacitor 22. A potentiometer 12 is connected across tube V4 and the movable contact of the potentiometer is connected to grid of V3 through resistor 14.

The cathode of V2 is held at a fixed potential with respect to ground by means of the voltage regulator tubes. The fixed potential at the cathode may be adjusted in predetermined steps by means of switch 30 which controls the number of regulator tubes effectively in series. The resistor 10 is of such a value that the current through the voltage regulator tubes remains within the normal operating range for the regulating tubes even when some of the tubes are shorted out.

2

The potentiometer 12 is used to adjust the potential on the grid of V3, and thereby the bias on tube V1, to obtain small variations in the regulated potential. The potential on the grid of V3 does not vary with changes in the regulated potential.

The cathode of tube V3 is connected to the regulated potential by resistor 25 and capacitor 23 in parallel. It can be seen that any change in the regulated potential would cause a change in the potential at the cathode of tube V3. In the event of a quick change in the regulated potential, the capacitor 23 permits the full charge to appear instantly at the cathode of V3 to obtain maximum correction.

An increase in the regulated potential would increase the potential at the cathode of V3. This would decrease the anode current of V3 and increase the anode potential of V3. This would make the grid of V2 more positive and increase the anode current of V2. The increase in anode current would decrease the anode potential of V2 which would in turn make the potential on the grid of V1 less positive and would increase the voltage drop across V1. It can readily be seen that the voltage drop across V1 will tend to change in such a manner as to keep the voltage at the cathode of V1 substantially constant.

The above described circuit readily permits the accurate control of the regulated potential at any one of several predetermined values from a remote point. The switch 30 could obviously be connected to the relays through a long cable and as many regulating tubes could be used as necessary to give any desired number of fixed values. The positive side could be at ground potential rather than the negative side as shown.

I claim:

A voltage regulator circuit for producing a plurality of regulated output voltages from a source of unregulated D. C. voltage comprising a series voltage regulator tube having an anode, a cathode and a control grid, with its anode connected to said source of unregulated D. C. voltage and its cathode connected to a regulated voltage output lead, first and second amplifier stages each having an anode, cathode and control grid, the anode of said first stage being connected to the control grid of said second stage and the anode of said second stage being connected through a resistor to the cathode of said regulator tube and directly connected to the control grid of the series regulator tube, a voltage divider connected at one end to the cathode of said second stage and at the other end electrically connected to the cathode of said first stage, a voltage regulator tube connected across said divider, a movable contact on said voltage divider connected to the control grid of said first stage, a resistor connected between the anode of said series voltage regulator tube and the cathode of said second stage, a plurality of voltage regulator tubes connected in series to the end of said divider remote from the cathode of the second stage and means for selectively connecting different ones of said series connected voltage regulator tubes to a source of ground potential whereby the cathode of the second amplifier stage may be maintained at any one of a plurality of fixed voltages with respect to ground potential.

References Cited in the file of this patent

UNITED STATES PATENTS

2,409,151	Rogers	Oct. 8, 1946
2,468,850	Trucksess	May 3, 1949
2,502,342	Quirk	Mar. 28, 1950
2,579,816	Gluyas	Dec. 25, 1951
2,632,143	Goodwin	Mar. 17, 1953