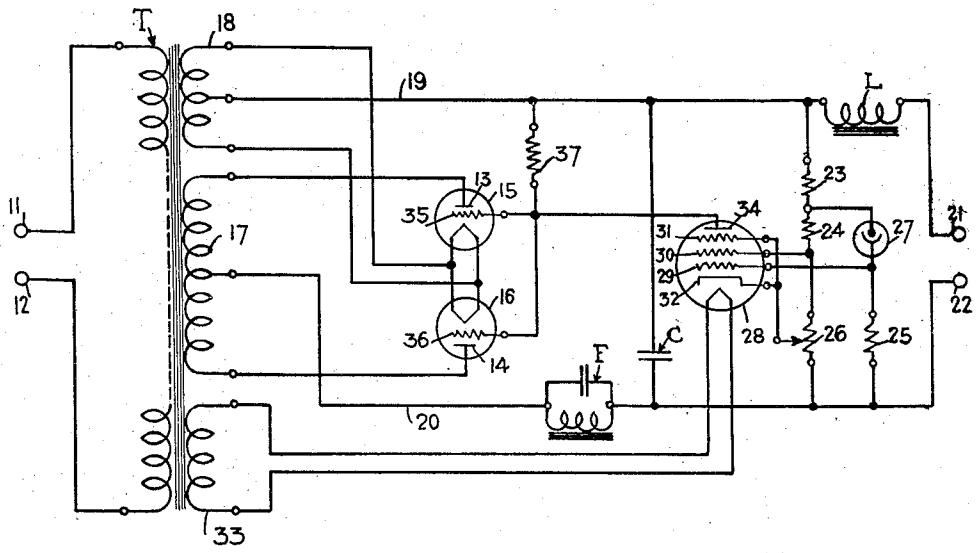
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VOLTAGE REGULATION FOR RECTIFIERS

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VOLTAGE REGULATION FOR RECTIFIERS

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4 Claims. (Cl. 175—363)

This invention relates to the electrical art and deals with voltage regulation on rectifiers for converting alternating current into direct current.

In using rectifiers of the above nature, it is often required that they be capable of delivering a variable load and maintaining a steady potential within limits. Rectifiers for this purpose are usually provided with a voltage regulating section which heretofore has consisted of an auxiliary control tube in the positive side of the direct current line arranged so that all the current must flow through the tube, the resistance of this tube in turn being controlled by a second tube. In my invention I eliminate the auxiliary control tube and the customary two electrode rectifiers and in place of these tubes I use the plate and filaments of triodes for rectifiers and control the internal resistance of the triodes by their grids, which in turn are connected to the plate of the second tube that previously was used to control the auxiliary tube. The advantages of such an arrangement are obvious; first, the direct current does not flow through an auxiliary control tube, thereby reducing some of the resistance in the direct current line; second, I can eliminate one tube; and, third, I may use ordinary triodes of high conductance as rectifiers.

Other objects and advantages will become apparent as the description proceeds in conjunction with the drawing, in which the figure shown is a diagrammatic circuit embodying my invention.

As shown in drawing, the rectifier comprises an input transformer generally designated T. This transformer may be connected by terminals 11 and 12 to an alternating current of any suitable source. On the output side of the transformer T, I connect the plates 13 and 14 of triode tubes 15 and 16 respectively to section 17. The filaments of the said tubes are connected in the conventional manner to another section 18 of the transformer T. The midtap of section 17 is connected to line 20 which is the negative side of the rectified current, and the midtap of section 18 is connected to line 19 which is the positive side of the direct current output. A filter F may be installed in line 20 if desired and a filter embodying condenser C and inductance L may be incorporated in the circuit between the rectifier tubes and the load in the usual manner. The load is connected to output terminals 21 and 22.

As a means of regulating the output voltage of the rectifier, I use a voltage divider across the output consisting of resistors 23, 24, 25, variable resistor 26, and a gas filled regulator tube 27 which functions as a source of reference potential. As will be observed, the tube 27, which in this case is a neon lamp, and the resistor 25 parallel resistors 24 and 26. A control tube 28 is connected in the following manner to the voltage dividing system just described. The control grid 29 is connected to the lower side of the neon lamp 27. The screen grid 30 is connected to the line between resistors 24 and 26 and the suppressor grid 31 and cathode 32 are strapped and are connected to a sliding contact on variable resistor 26. The filaments of the tube are connected in the usual manner to a section 33 of the transformer T. The plate 34 of the tube 28 is direct coupled to grids 35 and 36 of the triode tubes 15 and 16 respectively and is then connected to the positive side 19 of the rectified current line through resistor 37, thus providing the proper bias on these grids. From the foregoing, it can be seen that as soon as a load is put across the output terminals 21 and 22, the voltage will drop between the lines 19 and 20. There will be a corresponding drop across the resistor 25 and the neon lamp 27. The voltage drop across the lamp 27 remaining nearly constant for load current variations, substantially all the voltage fluctuations will appear across resistor 25 which will be reflected in grid 29. The result will be that less current will flow through the plate 34 with a corresponding less drop in voltage across the resistor 37 which will swing the grids 35 and 36 more positive. The internal resistance of the tubes 15 and 16 is thereby decreased, with a resultant larger flow of current through the tubes that takes care of the current through the load. As soon as sufficient current is supplied to the load, the voltage is held constant and the rectifier is thus able to take care of increases in load with only a slight drop in output voltage. In actual practice the rectifier is capable of delivering from zero to one hundred and fifty milliamperes with a maximum variation of one volt in two hundred volts.

A device of the character has been found useful in supplying direct current with a regulated voltage for use with fine equipment, such as sound recording, which demands varying loads with substantially uniform voltage.

I claim:

1. A full wave electrical rectifier comprising a pair of triode vacuum tubes arranged with their respective plates and filaments to convert alternating current into a direct current supply, there

being three electrical flow paths across the output of said D. C. supply, the first of said paths having substantially linear resistance and a vacuum tube in series, the second of said paths comprising substantially linear resistance only, the third of said paths comprising substantially linear resistance and a substantially constant resistance to varying current flows in series, a connection between the control grid of said last mentioned vacuum tube and a point in said third path below said substantially constant resistance and above said substantially linear resistance to control the flow of current through said first path, a connection from the cathode of said last mentioned tube to an intermediate point on the substantially linear resistance of said second path to bias said cathode with respect to said grid, and a connection from a point below the substantially linear resistance and above the vacuum tube in said first path to the grids in said triodes to control the internal resistance thereof by voltage fluctuations across the output of the D. C. supply.

2. A full wave electrical rectifier comprising a pair of triode vacuum tubes arranged with their respective plates and filaments to convert alternating current into a direct current supply, a vacuum tube shunted across said direct current supply, a connection from said vaccum tube to the control grids of said triodes for regulating the flow of current through said triodes inversely proportionally to the flow of current through said vacuum tube, means for controlling the flow of current through said vacuum tube by the fluctuation of the voltage in said direct current supply, said means including a substantially linear resistant shunt path across said direct current supply for regulating the potential on the cathode of said vacuum tube in response to voltage fluctuations in said direct current supply and a second shunt path across said direct current supply for supplying the bias on the control grid of said vacuum tube, said last mentioned path having a resistant element therein characterized by a substantially uniform resistance to varying current flow therethrough for variably biasing said grid with respect to said cathode in response to voltage fluctuations in said direct current supply.

3. A full wave electrical rectifier comprising a pair of triode vacuum tubes arranged with their respective plates and filaments to convert alternating current into a direct current supply, a vacuum tube arranged to shunt current across said direct current supply, means for biasing the control grids of said triodes in response to current flow through said vacuum tube, means for controlling the flow of current through said vacuum tube by the voltage fluctuation in said direct current supply, said means including a substantially linear resistant shunt path across said direct current supply for regulating the potential on the cathode of said vacuum tube in linear accordance with said voltage fluctuations, and a non-linear resistant shunt path across said direct current supply for variably biasing the control grid of said vacuum tube with respect to the cathode of said tube in response to voltage fluctuations in said direct current supply.

4. A full wave electrical rectifier comprising a pair of triode vacuum tubes arranged with their respective plates and filments to convert alternate current into a direct current supply, a vacuum tube arranged to shunt current across said direct current supply output, means for supplying a potential to the cathode of said tube by the volttage in said direct current supply, said potential varying linearly in accordance with any fluctuation in said voltage, means for supplying a biasing potential to the control grid of said tube by said voltage that varies non-linearly in accordance with fluctuations in said voltage, said first mentioned means including a substantially linearly resistant electrical path across the output of said direct current supply and the second mentioned means comprising an electrical flow path across said direct current supply output having substantially linear resistance and a substantially constant resistance to varying current flow in series.

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