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1,457,851

A. F. NESBIT

VOLTAGE REGULATOR

Filed Aug. 27, 1921

Fig. 1.

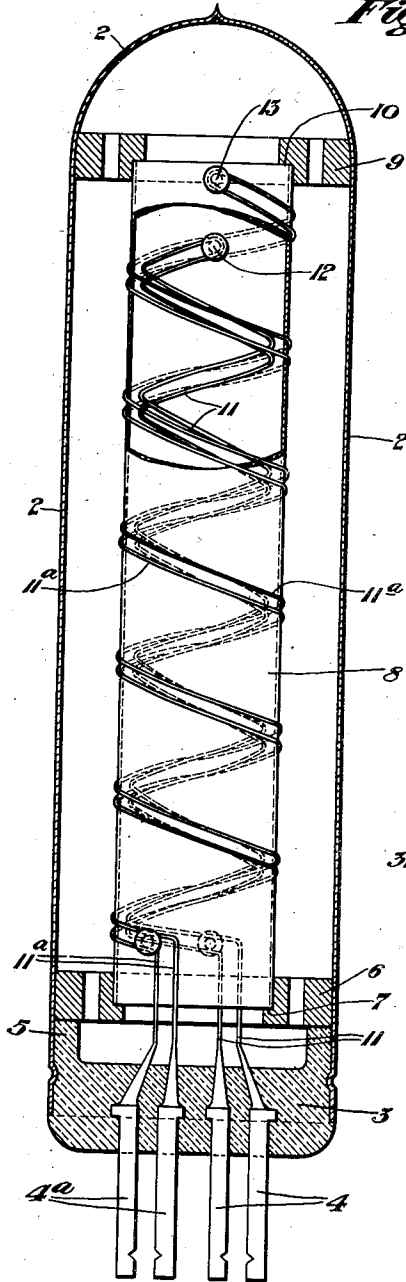


Fig. 2.

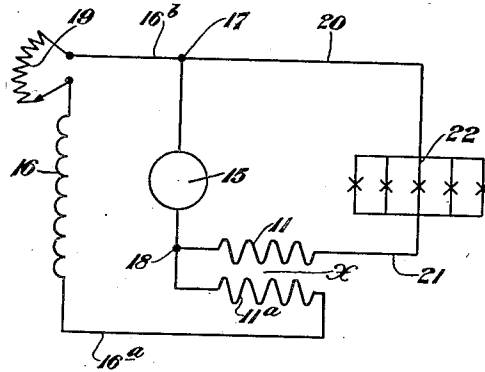
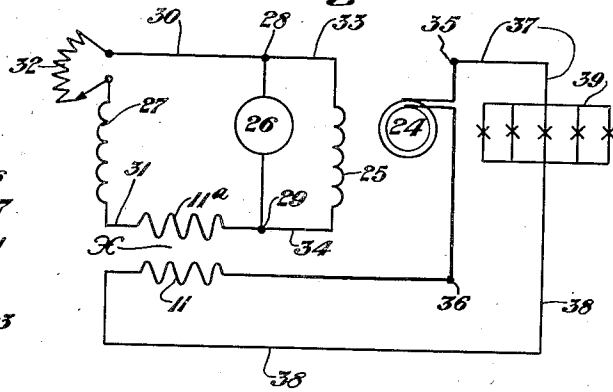


Fig. 3.



Witnesses:
Edwin Truett

Inventor:
ARTHUR F. NESBIT.
By: *D. Anthony Hsina*
his Attorney

UNITED STATES PATENT OFFICE.

ARTHUR F. NESBIT, OF WILKINSBURG, PENNSYLVANIA.

VOLTAGE REGULATOR.

Application filed August 27, 1921. Serial No. 495,992.

To all whom it may concern:

Be it known that I, ARTHUR F. NESBIT, a citizen of the United States, and resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Voltage Regulators, of which the following is a specification.

This invention relates to voltage regulators and more particularly to regulators for controlling the voltage of power circuits, and has for its object the provision of such a regulator that will have no moving parts, and, therefore, will eliminate the making of adjustments as is necessary with the regulators now in use.

Another object is to provide a voltage regulator that will operate without opening or shutting any parts of the circuits of which it is a part.

A further object is to provide a voltage regulator having resistance elements which will operate only through a varying of their conductivity, due to varying temperatures.

The operation, construction and arrangement of parts of the invention are fully described in the following specification, and illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation through a regulator constructed in accordance with this invention.

Figure 2 is a direct current generator wiring diagram showing a regulator constructed in accordance with this invention connected therewith for regulating the output of said generator.

Figure 3 is an alternating current generator wiring diagram showing a regulator constructed in accordance with this invention connected therewith for regulating the output of said generator.

Referring particularly to the drawings, the numeral 2 designates the hollow body of the regulator which may be in the form of a vacuum tube or nitrogen tube. The body portion 2, which may be made of glass, porcelain, or the like, has an open bottom which is closed by a cement base or plug 3, and has leads 4 and 4^a secured therein.

The upper face of the plug 3 is formed dish or concave and has a surrounding rim 5 on which is mounted a disk-like sup-

porting base 6. The disk-like base 6 is provided with a central aperture which has its upper portion enlarged to form an annular shoulder 7. A comparatively thin tubular insulating support 8 is mounted in the apertured portion of disk 6 and supported on the shoulder 7. A second disk 9 having a central aperture which is enlarged for a portion of its depth to form a shoulder 10 is mounted on the upper end of the tubular support 8, and has its side edges abutting the inner surface of said body, and serves to support and hold the upper end of said support rigid.

Suitable metal resistance strips 11 and 11^a are secured to the leads 4 and 4^a respectively. The strip 11 has its ends secured to the leads 4 and is wound spirally around the interior surface of the tubular support 8 and secured to or looped around a button 12 adjacent the top of said tube. The strip 11^a has its ends secured to the leads 4^a and is wound spirally around the outer surface of the tubular support 8 and secured to or looped around a button 13 adjacent the top of said tube. The convolutions of the strips 11 and 11^a follow a parallel course along the support 8 so that the outer strip 11^a overlies the inner strip.

In the operation of the regulator the temperature of the resistance strips which are connected in different circuits will vary, and the rise or fall of temperature of one strip will be transmitted through the thin wall of the tubular support 8 to the other strip, and since the conductivity or resistance quality of the strips vary with their temperature, the current value of one circuit will control the current value of the other.

In Figures 2 and 3 a regulator constructed in accordance with this invention is shown connected for regulating direct and alternating generators, respectively, according to the load placed on the power circuits from said generators.

In Figure 2 the numeral 15 designates the armature of a direct current generator which has a field 16 connected across the terminals 17 and 18 by wires 16^a and 16^b to provide an exciting circuit. A rheostat 19 is in circuit with the wire 16^b from the terminal 17, and the resistance strip 11^a is in circuit with the wire 16^a from the ter-

minal 18. It will be noted, however, that the rheostat 19, after being set to a specific load, is locked in position and all variation in the load is controlled by the regulator X, constructed in accordance to this invention. The current output or lead circuit from the generator passes from the terminals 17 and 18 through wires 20 and 21 to the lamps 22 or other load, and the resistance strip 11 of the regulator X is connected in circuit with the wire 21, so that as the load is increased the strip 11 will become heated, such heat being transmitted to the resistance strip 11^a, and decreasing its resistance quality or increasing its conductivity so as to increase the exciting current to the field 16. If the load should suddenly drop, the reverse action will take place. That is, the resistance strip 11 will suddenly cool, thus allowing the strip 11^a to cool and increase its resistance quality or decrease its conductivity, so as to decrease the value of the field exciting current.

In Figure 3 the regulator X is shown for controlling an alternating current generator having the armature 24 and field 25. The field 25 is excited from a direct current generator having armature 26 and field 27. The field 27 is connected across the terminals 28 and 29 of the armature 26 by wires 30 and 31. A rheostat 32 is in circuit with the wire 30 leading from terminal 28 and the resistance strip 11^a is in circuit with the wire 31 leading from the terminal 29. The exciting current to the field 25 of the alternating current generator, passes from the terminals 28 and 29 through wires 33 and 34. The load current passes from the terminals 35 and 36 of the alternating current generator through wires 37 and 38 to the lamps 39 or other load, and the resistance strip 11 of the regulator X is connected in circuit with the wire 38 so that as the load is increased the strip 11 will become heated, such heat being transmitted to the resistance strip 11^a and decreasing its resistance quality or increasing its conductivity so as to increase the exciting current to the field 27 of the direct current generator or exciter. If the load should suddenly drop or decrease, the reverse action will take place. That is, the resistance strip 11 will cool, thus allowing the strip 11^a to cool and increase its resistance quality or decrease its conductivity, so as to decrease the value of the current to the direct current exciter field 27.

While only one specific embodiment of this invention has been illustrated and described, various modified forms and designs will readily suggest themselves to those skilled in the art, and, therefore, it is to be expressly understood that I do not wish to be limited to that form illustrated and described, since various modifications may be

made without departing from the spirit of the invention as described in the appended claims.

I claim:—

1. A voltage regulator comprising a hollow air tight body portion, a thin tubular insulating support rigidly mounted in said body portion, a metal resistance strip coiled around the interior surface of said support, a second metal resistance strip coiled around the outer surface of said tubular support, said strips having their convolutions arranged in a parallel course along said support so that said outer strip overlies said inner strip, said strips being formed of such metal that their conductivity will vary as they become heated, and said tubular insulating member being adapted to readily transmit the heat from one strip to the other, leads secured to said strips, and each of said strips being adapted to be connected to separate electrical circuits.

2. A voltage regulator comprising a hollow air tight body portion, a tubular insulating support rigidly mounted in said body portion, a metal resistance strip coiled around the interior surface of said support, a second metal resistance strip coiled around the outer surface of said tubular support, said strips having their convolutions arranged in a parallel course along said support so that said outer strip overlies said inner strip, said strips being formed of such metal that their conductivity will vary as they become heated, and said tubular insulating member being adapted to readily transmit the heat from one strip to the other, each of said resistance strips being adapted to be connected to separate electrical circuits.

3. A voltage regulator comprising a hollow air tight body portion, a tubular insulating support rigidly mounted in said body portion, a metal resistance strip coiled around the interior surface of said support, a second strip coiled around the outer surface of said support, leads secured to said resistance strips and extending outwardly through said body portion, each of said resistance strips being adapted to be connected to separate electrical circuits, said strips being formed of such metal that their conductivity will vary as they become heated by the current variations in said circuits, and said strips being so arranged with relation to each other that the heat from one strip will be transmitted to the other strip to vary its conductivity.

4. A voltage regulator comprising a hollow air tight body portion, an insulating support rigidly mounted in said body portion, a metal resistance strip coiled around and secured to the interior surface of said support, a second strip coiled around and secured to the outer surface of said sup-

port. leads secured to said resistance strips and extending outwardly through said body portion, each of said resistance strips being adapted to be connected to separate electrical circuits, said strips being formed of such metal that their conductivity will vary as they become heated by the current variations in said circuits, and said strips being so arranged with relation to each other that the heat from one strip will be transmitted to the other strip to vary its conductivity. 10

In testimony whereof I have hereunto set my hand.

ARTHUR F. NESBIT.