

March 1, 1949.

R. C. HENNIKER
VARIABLE INDUCTOR

2,463,105

Filed Nov. 26, 1946

2 Sheets-Sheet 1

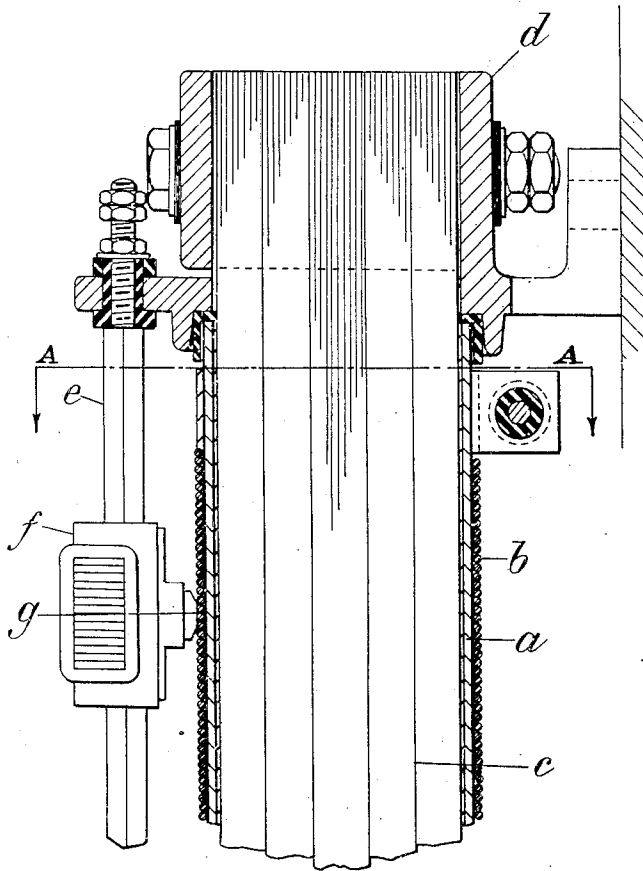


Fig. 1.

Inventor

R. C. Henniker

*By Glascock Downing Reith
Attys*

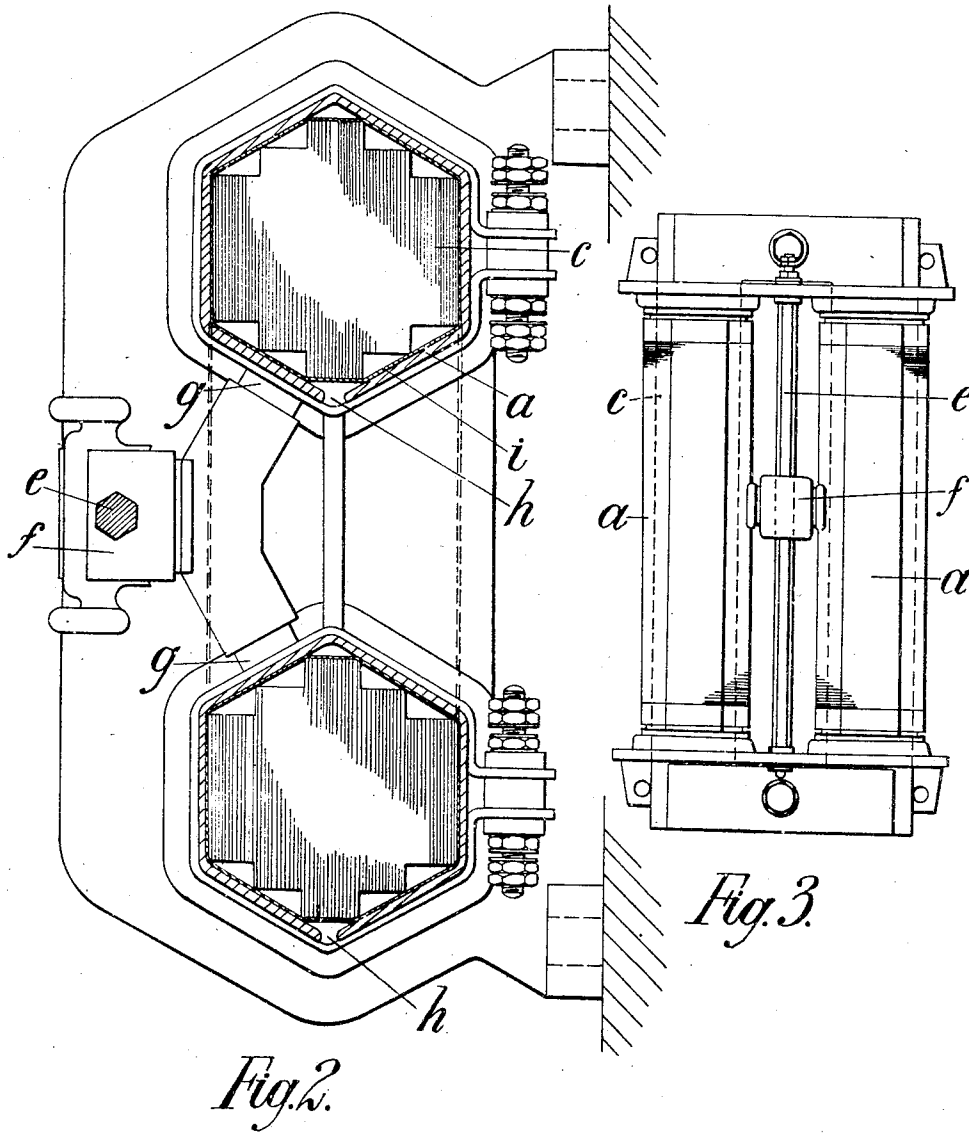
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INVENTOR
R. C. HENNIKER
BY
Clasewick, Downing & Seebold.

UNITED STATES PATENT OFFICE

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VARIABLE INDUCTOR

Reginald Charles Henniker, Ponders End,
England

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2 Claims. (Cl. 171-777)

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This invention relates to voltage regulating apparatus of the kind in which one or more turns of an inductive winding are short-circuited by a movable brush.

The invention has for its object to provide improved and relatively simple means of varying the number of turns in a winding, without the necessity of employing contact brushes so shaped, or constructed of such material, that the electrical losses due to the resistance of the brush and the short-circuited turns are reduced to a minimum.

In order to conduct heat away from the short-circuited turns a winding of such apparatus is carried by a longitudinally split steel or other thermally conductive material whereby heat generated by circulating current in the short-circuited turns is conducted away.

In the accompanying drawings Figure 1 is a fragmentary longitudinal sectional view of one form of the invention, Figure 2 being a cross section along the line A—A in Figure 1 but showing the contact brushes arranged slightly different, and Figure 3 being a front elevation of the apparatus.

In carrying the invention into effect in one convenient manner as illustrated in the drawings, a voltage regulator is provided comprising an elongated rectangular core composed of laminations of transformer steel and on the parallel long arms of which steel tubes (*a*) are fitted which are split longitudinally as shown at *h* so as not to constitute short-circuited turns and are insulated from the internal cores *c*, as by vitreous enamel conveniently sprayed into position on the exterior of the tubes or a layer *i* of other suitable insulating material. These split and insulated steel tubes are employed to support the windings (*b*), which are concentrically disposed about the tubes and their internal cores (*c*), as constituted by the said long arms, which may be of hexagonal shape in cross section and the laminations of which at the corners of the core frame are interleaved with the laminations of the transverse short arms of the frame.

The core frame is itself supported upon a framework (*d*), which may consist of transverse end frames or castings having lugs or other means by which the regulator can be secured in the required position upon a floor, wall or other location and which framework serves to support a conductor bar (*e*) disposed to extend parallel with and between the transversely shaped long arms of the core. This conductor bar carries a housing (*f*) for two brushes (*g*) each of which is arranged to make contact with the turns of

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one of the windings, as shown either in Figure 1 or Figure 2, and which can be moved readily along the bar in order to cause the brushes to make contact with the desired turns in the windings.

The rectangular core provides a path for the magnetic flux set up by the application of an electromotive force or voltage to the whole or a part of the windings, which are connected in such a way that they mutually aid each other in carrying the current, while the steel tubes or formers conduct heat away from the portions of the windings which are short-circuited by the moving contacts or brushes, to parts of the apparatus which are at a relatively lower temperature, thus keeping the short-circuited turns at a temperature sufficiently low to prevent damage to the material of which the windings are constructed or insulated.

I claim:

1. A voltage regulating apparatus comprising an inductive winding and a contact brush adapted to move along the said winding for changing its inductance and short-circuiting some of the turns of the winding, a core of magnetic material inside the said winding and a longitudinally split tube of thermally conductive material between the core and the winding, the latter being mounted directly on the said tube whereby the heat generated in the short-circuited turns is conducted away by the said tube.

2. A voltage regulating apparatus comprising a core of magnetic material of rectangular form having two parallel long arms and two parallel short arms, a longitudinally split tube of thermally conductive material on each one of the long arms, a winding distributed over and in direct contact with the said two longitudinally split tubes and two contact brushes arranged to move along the winding distributed over the two longitudinally split tubes respectively and short-circuiting some of the turns of the winding whereby the heat generated in the short-circuited turns is conducted away by the said tubes.

REGINALD CHARLES HENNIKER.

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