June 5, 1934. H. RODER 1,961,783

INDUCTANCE COIL

Filed Nov. 23, 1933

Fig.1.

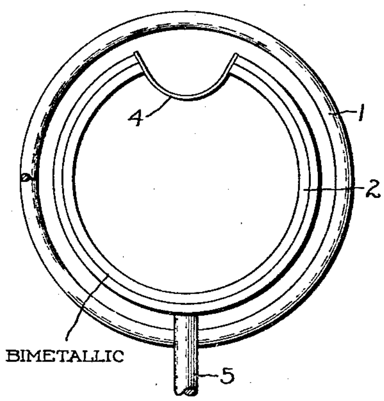


Fig.2.

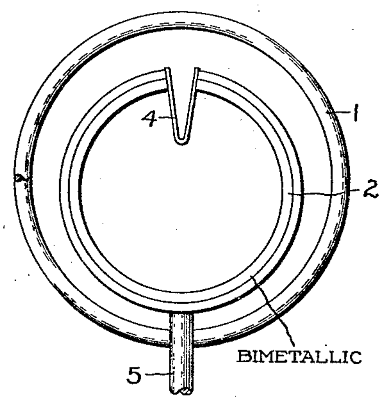
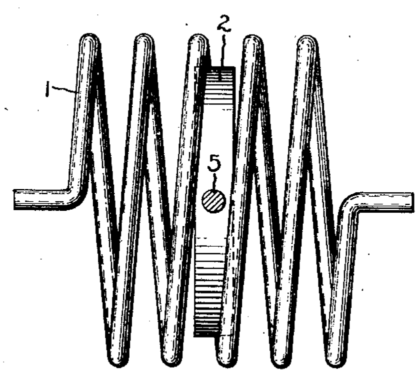


Fig.3.



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UNITED STATES PATENT OFFICE

1,961,783

INDUCTANCE COIL

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9 Claims. (Cl. 171—242)

My invention relates to inductance coils and more particularly to means compensating for variations in inductance of such coils caused by temperature variations.

It has for one of its objects to provide improved means for compensating for variations of coils caused by change in mechanical dimensions thereof due to temperature variation.

Another object of my invention is to provide an inductance compensating device for inductance coils the operation of which is affected by the magnitude of current flowing in the coil.

A further object of my invention is to provide an inductance compensating device for inductance coils, which is of simple and economical construction, which may be readily installed in a coil where the variation of the inductance of which is to be compensated, and which, if desired, may be independently manufactured, as a separate article of manufacture, for use in coils requiring temperature correction.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with the accompanying drawing in which Figs. 1, 2 and 3 show coils provided with a temperature compensating device in accordance with my invention, Fig. 1 representing a sectional view of the coil in its cold condition, Fig. 2 representing the same in its hot condition, and Fig. 3 representing a sidewise view of the coil.

Referring to Fig. 1, I have shown therein a coil 1 having arranged concentrically within it a second coil 2, the second coil comprising a single turn, made up of a bimetallic strip, the ends of which are joined together by means of a flexible strip 4 having low impedance and which may, desirably, be of bronze or copper braid. As thus constructed the coil 2 comprising the bimetallic strip constitutes a short-circuited turn on the coil. While it is shown as comprising but a single turn it is understood that it may comprise additional turns. This bimetallic strip, of course, comprises two strips of metal having different coefficients of expansion, one disposed within the other, the metal having the higher coefficient of expansion being arranged on the outside, whereby upon heating of the strip it is caused to flex inward the ends of the turn approaching each other and reducing the area of the coil. When so flexed due to temperature rise the closed circuited bimetallic coil becomes less closely associated with the main coil 1, with the result that its inductive effect thereon is reduced. By proper construction of the coil 2, and proper choice of metals employed, this reduction in inductive effect may be made just sufficient to compensate for any change in the inductance of the coil 1 which is produced by change in physical dimensions of the coil due to the temperature rise.

A device constructed in accordance with my invention possesses the advantage that it not only responds to the temperature within the space enclosed by the coil 1 but in addition the bimetallic strip 2 carries a current which is proportional to the current in the coil 1. Thus the losses in the strip 2 are proportional to the losses in the coil 1 with the result that the heating of the coil 2 with respect to the coil 1 may be made such that accurate compensation for the inductive change in the coil due to heating by the current flowing through it, and variations in ambient temperature may be effected. In addition if the coil 1 be connected in circuit with some additional reactive device, such as a condenser, the reactance of which varies due to change of mechanical dimensions with change in temperature, the bimetallic strip may be adjusted to compensate for the combined effect produced by the coil and additional reactance.

Fig. 3 shows a sidewise view of the coil with the short-circuited bimetallic turn in the position in which it has maximum effect. If the coil 2 be turned at right angles to the position shown, i.e. if it be turned to be in a horizontal plane, the short-circuit turn would then have its minimum compensating effect, and of course in any intermediate position it will have intermediate amounts of compensating effects. Thus the degree of compensation which is effected by the device may be very readily adjusted simply by rotating the coil 2 about the axis represented by the shaft 5 which is shown attached to the periphery of the bimetallic coil.

While I have shown a particular embodiment of my invention it will of course be understood that I do not wish to be limited thereto since various modifications may be made. I contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An inductance coil having a substantially

short circuited turn comprising a bimetallic strip, said strip being arranged to flex in response to changes in temperature.

2. In combination, an inductance coil, and means to compensate for changes in inductance of said coil due to temperature variation, said means comprising a closed circuited coil inductively associated with said first coil, and means to vary the area of said last coil in response to said changes in temperature.

3. A coil having end portions secured together through a low impedance path, said coil comprising a bimetallic member whereby said coil changes in shape due to changes in temperature.

4. A bimetallic strip curved to form a closed loop the ends of the loop being connected through a low impedance path.

5. A coil having a closed circuited turn, said turn comprising a bimetallic strip formed into a loop and having its ends connected through a low impedance path.

6. A coil having a closed circuited turn, said turn comprising a bimetallic strip formed into a loop and having its ends connected through a low impedance path, said loop being positioned within said coil in inductive relation thereto and proportioned to compensate for changes in inductance of the coil due to temperature variation.

7. In combination, a coil comprising a plurality of turns, a bimetallic member curved substantially in the form of the coil and arranged within the coil, the ends of said member being connected through a conductive member yieldable in response to flexure of said member due to temperature variations of said coil.

8. An inductance coil having a substantially short circuited turn comprising a bimetallic strip, said strip being arranged to flex in response to changes in temperature, and means to adjust the position of said short circuited turn with respect to said inductance coil to render the inductance of said coil substantially independent of temperature variations.

9. A coil having a closed circuited turn, said turn comprising a bimetallic strip formed into a loop and having its ends connected through a low impedance path, said loop being positioned within said coil in inductive relation thereto and proportioned to compensate for changes in inductance of the coil due to temperature variation, and means to rotate said loop about one of its diametrical axes thereby to alter the degree of compensation effected thereby.

HANS RODER.