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R. H. NOYES

1,938,607

FLUID COOLED INDUCTANCE

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Fig. 1

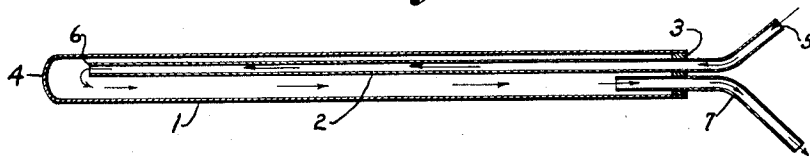
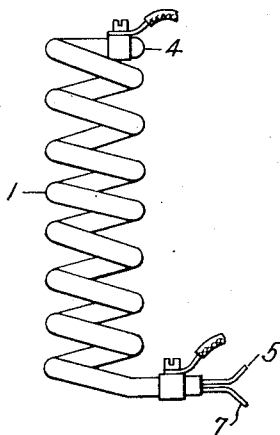


Fig. 2



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FLUID COOLED INDUCTANCE

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3 Claims. (Cl. 175—359)

(Granted under the act of March 3, 1883, as
amended April 30, 1928; 370 O. G. 757)

This invention relates to an inductance, more particularly an inductance that may be cooled by a circulating fluid.

Whenever one end of an inductance is at a very high radio frequency potential, it is exceedingly difficult to conduct a cooling liquid into or out of the inductance at that point due to the effect of the radio frequency field upon the material through which the cooling liquid flows. It is necessary that the material be an insulator. It has been found that rubber or phenolic condensation product tubes will crack or burst and thus allow the cooling liquid to escape. Borosilicate glass tubes are not applicable due to their inability to withstand intense radio frequency fields. The present invention is concerned with the elimination of cooling fluid leads to an inductance or other conductor at points having or that may have different electrical potentials thereon.

An object of this invention is to provide a fluid cooled tubular inductance in which the fluid inlet and outlet means are arranged closely adjacent one another and at points having substantially the same electrical potential.

Another object of the invention is to provide a fluid cooled inductance unit in which the differential expansion caused by various parts of the conductor being at different temperatures will be substantially eliminated.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts as will be described more fully hereinafter.

Referring now to the drawing Figure 1 shows in cross section a conductor or inductance unit in accordance with the present invention. Fig. 2 shows in perspective a helical coil composed of a tubular member made in accordance with Fig. 1.

In the drawing, reference numeral 1 denotes a conductive tubular member comprising the main conductive elements of the inductance, while 2 is a tube of smaller diameter disposed within the tube 1 and adapted to form a path for supplying cooling fluid to the inside of tube 1. 3 is a closing member for closing the end of the tube 1 at which the tube 2 enters therein. The opposite end of tube 1 is closed at 4. An outlet member 7 is provided extending through the closing member 3 into the interior of the tube 1. The cooling fluid is supplied to the tube 2 at its orifice 5 and travels therealong to the end 6 thereof where it is discharged into the tube 1. It then flows down tube 1 in a reverse direction to its

direction of flow in tube 2 and is discharged through the orifice of outlet member 7.

For the sake of simplicity only one form of coiled inductance unit in addition to an element of the inductance unit is shown in the drawing. It is to be understood, however, that the assembly as shown in Fig. 1 of the drawing is intended to be coiled into any form in which the inductance is increased and the space occupied thereby is decreased. The inductance may take the general form illustrated in Gebhard Patent 1,753,408 or in Gebhard 1,789,229 or the form shown in Fig. 2.

When the inductance unit of this invention is used in high frequency circuits, it is seen that the inlet and outlet fluid connections are at a point on the inductance normally having the same electrical potential. For this reason the fluid supply leads of the inductance may be at one end thereof as shown in the drawing, or these leads may be intermediate the ends and arranged to occupy a nodal voltage point.

It is to be understood that the above description and accompanying drawing comprehend only the general and preferred embodiments of my invention, and that various changes in the construction, combination and arrangement of parts may be made within the scope of the appended claims, without sacrificing any of the advantages of this invention.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalty.

I claim:

1. A fluid cooled inductance comprising an electrically conductive tubular member, means closing each end of the tubular member, one of said closing means being provided with a pair of passages therethrough, a second tubular member of smaller diameter than the conductive tubular member extending through one of the passages in said closing means within said conductive tubular member, means for supplying cooling fluid to one end of one of the tubular members, and means for discharging the fluid from one end of the other tubular member at a point closely adjacent the point of fluid supply.

2. A fluid cooled inductance, comprising in combination an electrically conductive tubular member provided with closing members at each end thereof, one of said closing members being provided with a pair of passages therethrough, a second tubular member of small diameter than the conductive tubular member extending through one of the passages in said closing member and

within said conductive tubular member for the greater part of its length, and means for supplying cooling fluid to one end of one of the tubular members whereby the fluid is caused to travel
 5 through both of the tubular members.

3. An inductance, comprising a metallic tubular member closed at one end, means for supplying cooling fluid to said tubular member at said

closed end comprising a second tubular member extending into the conductive tubular member spaced therefrom, and means for discharging the cooling fluid from said metallic tubular member at a point adjacent the point at which said second tubular member enters said metallic tubular member.

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