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MAGNETIC SHIELD

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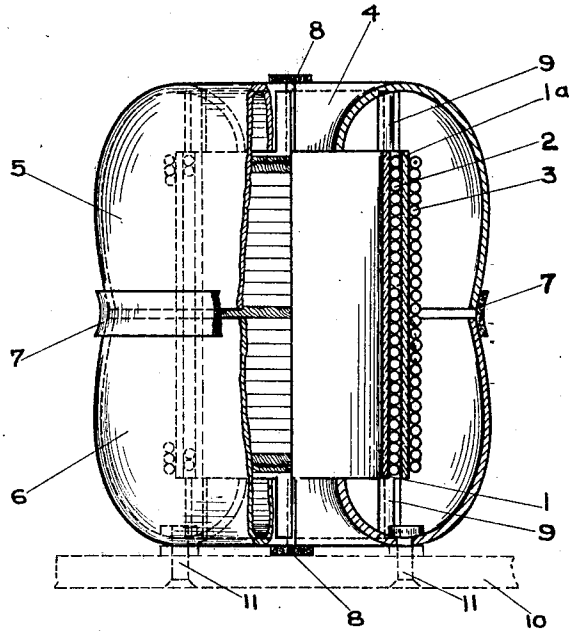


Fig. 1.

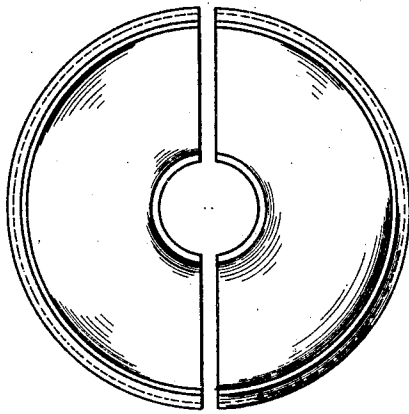


Fig. 2.

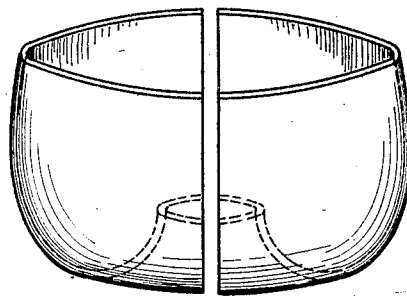


Fig. 3.

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MAGNETIC SHIELD.

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This invention relates to magnetic shields and more particularly to shields for protecting transformers and coils for use in radio transmitting and receiving sets.

5 In radio receiving and transmitting sets it is important that tuning coils, transformers and other delicate apparatus be shielded so that extraneous fields, such as might be set up by local interferences, local broadcasting stations or some adjacent piece of apparatus, be prevented from getting into the coil and adversely affecting its operation. These extraneous fields tend either to increase or to decrease the signal received, depending upon
10 their character, and since they may be strong enough to prevent tuning out of a particular station, some means should be provided for their elimination.

In the prior art, coils have been shielded
20 by enclosing them in some non-ferrous metal casing in such a manner that these extraneous fields produced eddy current flow within the shield. These eddy currents, in turn, set up counter fields which prevent the major part
25 of the extraneous field from getting through the shield into the coil. It was customary to make these shields cylindrical, square and of various other shapes, in some cases being split to prevent the well known short-circuited turn effect. In all these cases, however,
30 eddy current losses were introduced into the shield itself.

It is, therefore, one of the principal objects of this invention to provide an electromagnetic shield so designed that its shape corresponds to the distribution of the magnetic flux leaving the coil.

If points of equal potential be determined and a surface be plotted so that it includes
40 these points, the shield will follow this shape with the result that, since equal potentials are introduced into the shield at all points, no eddy current flow will occur. Therefore,
45 no losses from the shielded coil can be introduced into a circuit by induction into the shield.

In the drawings, wherein is illustrated one form of the invention,

50 Figure 1 is a top view, partly in section, of a coil to which a shield, designed in accordance with this invention, has been applied;

Figure 2 is a plan view of a portion of the shield shown in Fig. 1; and

Figure 3 is a perspective view of a portion of the shield.

In the specific representation shown in the drawings, a core 1, of insulating material having a primary winding 2 is inserted and fit closely in a second core 1^a also of insulating material having a secondary winding 3, the whole being inserted within a shield 4 which is formed of two parts, 5 and 6, so designed as to include in its surfaces substantially all points of equal potential. Since the induced potential at one end of the coil is opposite to that at the other end of the coil, it is preferable to split the shield 4 into two parts. These parts may be joined by any suitable insulating material (for example, paper) 7, by means of rivets or other suitable fastening means (not shown). When low resistance material is used as a shield it is also preferable to further split the shield longitudinally of the core and secure the parts together by means of insulating material 8. By thus
75 splitting the shield the effect of a short-circuited turn is prevented.

Experience has shown, however, that this longitudinal splitting is usually unnecessary in shields of high resistance material.

It is understood, of course, that, in shaping the shield to conform to the surface of equal potential radiated from the coil, no losses due to induction into the shield have been introduced, this being due to the fact that the coil flux shape is the same as the shield. However, in the case of extraneous fields such as might be set up by local interference, local broadcasting stations or some adjacent piece of apparatus, the field set up by these extraneous interferences is always of some shape different from that of the shield and, therefore, the shield will introduce losses into this field which in turn prevent the flow of magnetic lines through the shield into the
95 coil.

In order to maintain the proper relation between the shield and the enclosed apparatus and to impart rigidity to the structure, the core 1 is provided with a plurality of legs 100 9, preferably equally spaced on either end of the core, the legs being of a length sufficient to abut the inner surface of the shield. The coil may be mounted on a panel 10 by two screws 11 extending through the shield 105 4, as shown in Fig. 1.

It is to be further understood that the form of shield represented in the drawings illustrates only one form which this shield may take, since in theory, the shield for each element to be protected will have a separate and distinct shape of its own.

What is claimed is:

1. An electro-magnetic shield for electrical inductance apparatus having a surface including substantially all points at which equal potentials are set up by the flux of said apparatus.

2. A metallic shield for inductance apparatus comprising a plurality of parts so shaped as to include substantially all points at which equal potentials are set up by the flux of said apparatus, said parts being secured together by bands of insulating material.

3. A shield for inductances comprising a surface plotted so as to include in it substantially all points at which exist equal potentials induced therein by the flux set up by said inductance.

4. In combination, an inductance, the electrical energy in which sets up lines of force, a shield surrounding said inductance and located with respect to said inductance so that the lines of force cutting said shield induce therein at all parts of the shield currents of equal potential.

5. A magnetic shield for an inductance element having its surface formed so as to in-

clude substantially all points at which equal potentials are set up by the flux of said element, said shield being formed in a plurality of parts to prevent a continuous flow of current therein.

6. A magnetic shield for an inductance element having its surface formed so as to include substantially all points at which equal potentials are set up by the flux of said element, said shield being split transversely to prevent the flow of current caused by the inducing of a difference in potential at the ends of said shield.

7. A magnetic shield for an inductance element having its surface formed so as to include substantially all points at which equal potentials are set up by the flux of said element, said shield being split longitudinally to prevent the flow of currents induced therein.

8. A magnetic shield for an inductance element having its surface formed so as to include substantially all points at which equal potentials are set up by the flux of said element, said shield being split transversely to prevent the flow of current caused by the setting up of a difference in potential at the ends of said shield, and said shield being split longitudinally to prevent the flow of currents induced therein.

In testimony whereof, I have hereunto set my hand.

MORRIS H. BENNETT.

GEN. SUP'T'S.

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