June 13, 1933. W. M. HABEN 1,913,544

ELECTRICAL APPARATUS

Filed Feb. 2, 1931

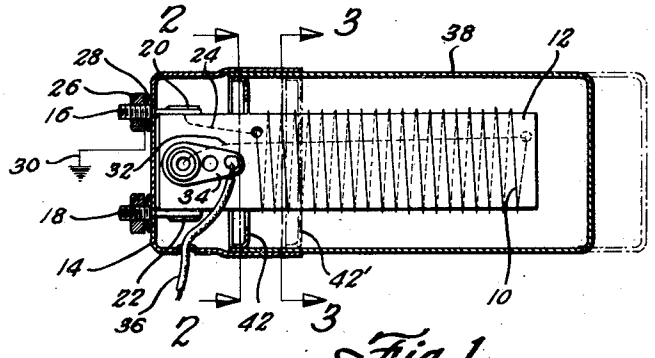



Fig. 1.

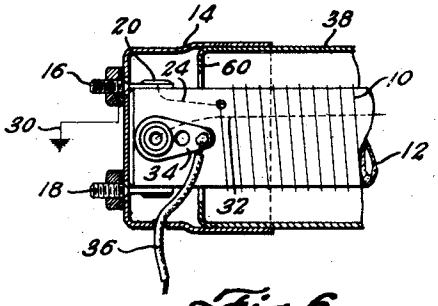



Fig. 6.

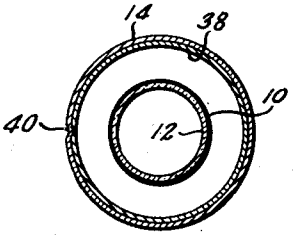



Fig. 3.

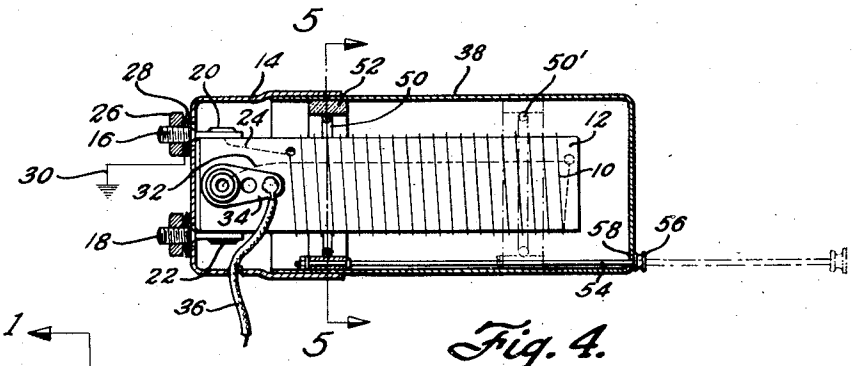



Fig. 4.

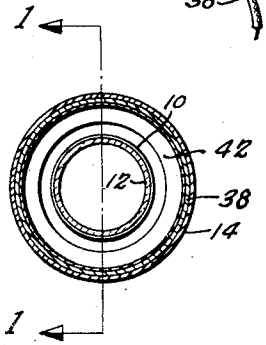



Fig. 2.

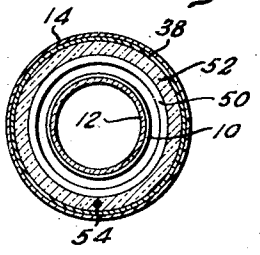



Fig. 5.

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# UNITED STATES PATENT OFFICE

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## ELECTRICAL APPARATUS

Application filed February 2, 1931. Serial No. 512,896.

This invention relates to a reactance unit and in more particular to an inductance coil for a radio receiver.

In the manufacture of coils especially coils for radio frequency amplifiers it is very difficult to secure uniform reactance of the coils especially when produced in mass production. There are a number of factors that enter into the variation of the reactance of the coil such as the material in the core, the size of the core, the spacing of the windings, the number of the windings, etc. Where the inductances are to be used in radio frequency amplifiers, especially radio frequency tuned amplifiers having the several stages tuned in unison, it is very desirable to have all of the coils uniform that are similarly located in the circuits. This being the case, it is necessary to either manufacture all coils so as to have the same reactance or to provide some type of adjusting means for changing the apparent reactance of the coil.

An object of this invention is to provide means for adjusting the apparent reactance of the coil without changing the coil per se. This has been accomplished by providing a closed annular conductor that is positioned within the shield enclosing the coil so that by adjusting the closed annular conductor with respect to the inductance the apparent reactance of the coil is changed.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawing:

Fig. 1 discloses a longitudinal sectional view taken substantially on the line 1—1 of Fig. 2.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a longitudinal sectional view of a modification.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4.

Fig. 6 is a longitudinal sectional view of another modification.

In the drawing the reference character 10 indicates a coil supported on a tubular core 12 carried on a cup-shaped member 14 and held in position by a pair of studs 16 and 18 provided with eyes 20 and 22 that have been attached to the core 12 by suitable grommets. In the preferred modification one terminal 24 of the coil is electrically connected to the stud 16 and has a nut 26 cooperating with a clip 28 grounded at 30 so that this terminal of the coil has its potential defined. The other terminal 32 of the coil 10 is connected to a clip 34 that is attached to a suitable conductor 36 that may be connected in an electrical circuit as desired.

The cup-shaped support 14 telescopically engages a cup-shaped shield 38 that completely shields the coil 10 electrostatically and electromagnetically. In order to hold the members 14 and 38 in position, member 14 is provided with a detent 40 as best seen in Fig. 3 that frictionally engages the surface of the shield 38.

In the preferred modification disclosed in Fig. 1 an annular flange 42 is carried by the cup-shaped shield 38 near the end of the coil having its potential defined. Instead of having one terminal at the same potential as the shield, this terminal may be at any other potential difference with respect to the shield.

The flange 42 may be press fitted, soldered or otherwise attached to member 38 so as to remain in a fixed relation thereto. It can be readily seen that as the cup-shaped member 38 is moved longitudinally with respect to the axis of the coil 10 the flange 42 will be adjusted along the coil 10 so that the amount of eddy current generated in the flange 42 will depend upon the relative position of the flange 42 with respect to the coil 10 thereby changing the apparent reactance of the coil. In Fig. 1 the flange 42 in the full line position discloses one extreme position and the dot-dash position 42′ another extreme position.

In the modification disclosed in Fig. 4 a

short circuited conductor 50 that may be made from a single loop or a plurality of loops is carried by an insulating annulus 52 slidingly mounted within the shield 38. The apparent reactance of the coil 10 may be adjusted by moving the short circuited conductor 50 from the one position to another as, for example, from the full line position 50 to the dot-dash position 50′ in Fig. 4, by means of a rod 54 provided with a knob 56 and extending through the shield 38 at 58. Although the short circuited conductor has been disclosed as having only one turn, any number of turns may be used. This modification is desirable where sufficient adjustment is not obtained by the modification disclosed in Fig. 1 due to the physical limits of the dimensions of the shields.

In the modification disclosed in Fig. 6, instead of providing an annular flange 42 as disclosed in Fig. 1, a flange 60 is integral with the shield 38 that has been formed by turning the edge of the shield 38 inwardly. This flange may be adjusted along the coil 10 much the same as is the flange 42 in Fig. 1. Although in the modifications disclosed the shield 38 has been provided with the adjustable conductor, the cup-shaped support could carry the conductor. In each of the modifications a single coil has been inclosed within the shield. Instead of the single coil, primary and secondary windings of a transformer can be inserted in the shield and the reactance of either or both of these windings adjusted.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An inductance unit comprising an inductance coil and a device for adjusting the apparent reactance of the inductance coil, including, a cup-shaped support for said coil, a cup-shaped shield telescopically engaging said cup-shaped support, and an annular conducting member carried by said shield and electrically associated with said coil, the position of said conducting member being varied by adjusting the position of the shield thereby changing the apparent reactance of the coil.

2. A reactance unit comprising in combination, an inductance coil and a device for adjusting the apparent reactance of the inductance coil, said unit having the potential of one terminal defined, said device including, a cup-shaped conducting member for supporting the coil, a cup-shaped electrostatic and electromagnetic shielding member telescopically engaging said supporting member, said members having their potential defined, a short circuited movable conductor electrically associated with said coil, said conductor being carried by one of said members, and means for adjusting the position of said conductor with respect to said coil whereby the apparent reactance of said coil may be varied.

3. A reactance unit according to claim 2 in which the short circuited conductor is insulatingly mounted within one of said members.

4. An inductance unit comprising, an inductance coil, and a device for adjusting the apparent reactance of the coil, including a shield member and a support member therefor, and a short circuited conductor telescopically engaged by one of said members and electrically associated with the inductance coil, means to vary the position of the conductor by adjusting the position of the shield, thereby changing the apparent reactance of the inductance coil.

5. An inductance unit comprising an inductance coil, and a device for adjusting the apparent reactance of the inductance coil, including a support for said coil, a cup-shaped shield and an annular conducting member which comprises an integral part of said shield and is electrically associated with said inductance coil, said coil and shield being relatively adjustable and thereby providing means for changing the apparent reactance of the inductance coil.

6. An inductance unit comprising an inductance coil, and a device for adjusting the apparent reactance of the inductance coil, including a shielding member, a supporting member for said shield, said members having their potential defined, a short circuited movable conductor electrically associated with said coil, said conductor being carried by one of said members, and means for adjusting the position of said conductor with respect to said coil by adjustment of the shield and support, whereby the apparent reactance of said coil may be varied.

7. An electrostatic or electromagnetic shielding unit for an inductance coil, including a cup-shaped supporting member, a cup-shaped member which telescopically engages with said supporting member, and an inwardly projecting conducting member carried by one of said cup-shaped members for varying the apparent reactance of said inductance coil.

8. An electrostatic or electromagnetic shielding unit for an inductance coil, including a cup-shaped supporting member, a cup-shaped member which telescopically engages with said supporting member, and an annular flange forming an integral part of one of said members for varying the apparent reactance of said inductance coil.

9. An electrostatic or electromagnetic shielding unit for an inductance coil, including a cup-shaped supporting member,

a cup shaped member which telescopically engages with said supporting member, and a short circuited conducting member insulatingly mounted within one of said cup shaped members.

10. An electrostatic or electromagnetic shielding unit for an inductance coil, including a supporting member, a shielding member engaging within the supporting member, and means for varying the apparent reactance of said inductance coil, said means comprising a short circuited conductor mounted peripherally within one of said members and being adjustable by movement of one of said members.

11. An electrostatic or electromagnetic shielding unit for an inductance coil, including a supporting member, a shielding member shiftably engaged by said support; and a short circuited conductor insulatingly mounted within one of said members for varying the apparent reactance of the inductance coil.

12. An electrostatic or electromagnetic shielding unit for an inductance coil, including a supporting member, a cup-shaped shielding member, and a ring-like element of conducting material insulatingly telescoped within one of said members for varying the apparent reactance of the inductance coil.

13. An electrostatic or electromagnetic shielding unit for an inductance coil, including a supporting member, a cup-shaped shielding member, and a circular member of conducting material telescoped within one of said members for varying the apparent reactance of the inductance coil.

14. In an inductance coil shielding unit, a flanged annular ring adapted to be mounted peripherally within the unit and electrically associated with the inductance coil, said ring comprising means for varying the apparent reactance of the inductance coil.

15. In an inductance coil shielding device having an inductance coil, and a shield therefor, the combination comprising means for varying the apparent reactance of the inductance coil, and a support for said means, said means including a part formed from said shield.

In testimony whereof I hereto affix my signature.

WARNER M. HABEN.