

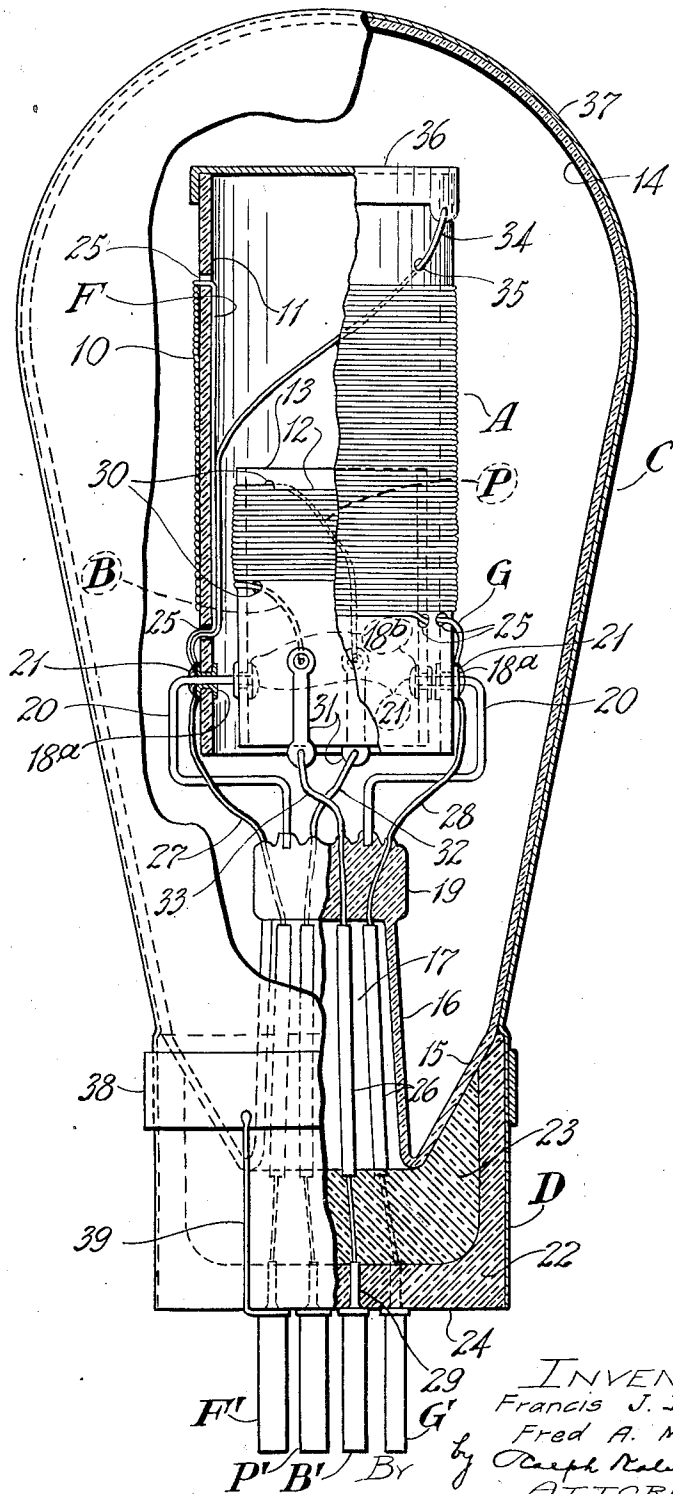
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ELECTROMAGNETIC DEVICE

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ELECTROMAGNETIC DEVICE

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This invention relates generally to electro-magnetic devices and, more particularly, to a certain new and useful improvement in electro-magnetic devices of a type especially adapted for use, as in radio, in the sending or receiving of electro-magnetic waves.

Our invention has for its prime object the provision in a device of the type stated of an inductance unit characterized by being electrically and mechanically protected and contained in an impermeable moisture-free vessel, so as to have a calibrated electro-magnetic constant or constants.

Our invention has for another object the provision in a device of the type stated of means for adjustably varying the fundamental of the windings and to calibrate the same during the process of manufacture to assure that any one transformer will match any other having the same intended inductance value.

Our invention has for a further object the provision in a device of the type stated of shielding means disposed on the walls of the vessel and associated with its contained windings in fixed relation thereto, whereby the electro-magnetic constants of the device may be permanently calibrated.

Our invention has for a still further object the provision in a device of the type stated of means whereby the inductance unit may be easily and quickly incorporated in its associated circuit or circuits, as by "plugging" the unit in, for example, a standard tube socket or like receptacle.

And with the above and other objects in view, our invention resides in the novel features of form, construction, arrangement, and combination of parts hereinafter described and pointed out in the claims.

In the accompanying drawing, the figure illustrates one form of an electromagnetic device embodying our invention, parts thereof being shown in section and other parts being broken away to disclose the construction of the device.

Referring now more in detail and by reference characters to the drawing, which illustrates a preferred embodiment of our invention, our improved inductance unit may in-

clude a transformer A comprising an associated group of inductances or electro-magnetic windings sealed in an impermeable vessel or chamber C preferably made of a dielectric, such as glass, having a moisture free content, as by being evacuated or filled with a dry, inert gas, and for convenience in handling and mounting the unit we may affix a base D to the bulb C, said base preferably carrying contact members connected to the transformer A and adapted to mate with a standard tube socket (not shown).

The transformer A may include a secondary inductance 10 wound on an insulating form 11, and a primary inductance 12 wound on an insulating form 13 inserted within and preferably complementary to the form 11, with the outer or battery terminal B of the winding 12 adjacent one or the grid terminal G of the winding 10, thus disposing the high potential terminals of the respective inductances in efficient relationship for maximum magnetic coupling consistent with minimum capacity leakage between the windings.

The forms 11 and 13 may be of circular, octagonal, square or other cross-section, and may be of tubular or skeleton construction, but we prefer to employ, as shown, circular tubular forms.

It is obvious that one, two, or more windings may be employed, disposed suitably on one or separate forms, at the option of the person constructing the device. The inductances may be wound for use in radio-frequency or audio-frequency circuits, and other dispositions and arrangements of the several windings, in addition to that shown on the drawings, will be obvious to those skilled in the art.

The moisture free vessel or chamber C includes a glass or like impermeable dielectric bulb 14 preferably formed at one or the base wall 15 thereof with an inwardly presented integral transformer support 16, preferably having a chamber 17 opening at its outer end through said base wall 15.

The vessel C may have an egg-shape, as shown in the drawing, or it may have the shape of a spheroid, an ovaloid, or other conformation, and preferably is made moisture-

free by being evacuated by any of the means well known to the art, moisture being removed during said evacuation in the usual manner, but a like result may be attained by filling the bulb with a suitable dry inert gas, as nitrogen, and immersing the inductance in said gas.

Having one end supportingly passed through pairs of alining ferrules 18a, 18b, disposed oppositely in and suitably crimped or otherwise secured to the respective forms 11 and 13, and the other end embedded in a cap 19 forming the inner end of the inductance support 16 and the endwall of the chamber 17, are opposing inductance supporting members or arms 20, suitably bent as best seen in the drawing, and fixed in the ferrules by any suitable means, although we prefer to employ solder, as at 21, whereby the transformer A is firmly endwise supported as a unit in the vessel C.

By thus supporting and sealing the transformer A in the closed vessel or chamber C, the windings 10, 12, are protected from atmospheric influences, such as hygroscopic moisture, and particularly variations in the humidity of the atmosphere, the contents of said vessel or chamber being also moisture-free, thereby effectually preventing, from any cause, the formation of aqueous films on the windings, as well as at the same time preventing the deposition on the windings of films of dust or fume or the like. Such several films have the deleterious effect of increasing the inter-turn capacity leakage of the windings, and of also increasing the high-frequency resistance loss of the transformer, and as they vary from time to time, their growth and decay seriously deranges the constancy of the inductance value of windings exposed to their influence.

Furthermore, the windings being thus permanently and rigidly disposed in the containing vessel C, the latter forms a protecting envelope to prevent mechanical derangement or damage from handling or like causes.

The base D includes a molded cup or like structure 22 of insulating material, having a filling of suitable insulating adhesive compound 23, in which is seated and secured the wall 15 of the bulb C, said wall 15 preferably having a frusto-conical shape as shown, presented interiorly said cup 22. Endwise presented from one or the bottom wall 24 of the cup 22 for mating with a suitable socket (not shown), such as a standard tube socket well known to those skilled in the art, are contact prongs F', P', B' and G', adapted, respectively to be connected with appropriate filament, plate, battery and grid or other leads of the circuit with which the inductance is associated.

The filament terminal F and the grid terminal G of the secondary winding 10 are, respectively, secured to the form 11 preferably

by being passed through suitable apertures 25 therein, and are connected to the respective ferrules 18a, preferably by the solder 21. Embedded in the cap 19 and filling 23 and passed through suitable insulating tubes 26 disposed in the chamber 17, are conducting leads 27, 28, respectively connecting the terminals F and G to the corresponding terminal lugs 29 of the prongs F' and G' embedded in and extending through the wall 24 of the base D.

In like manner, the plate terminal P and the battery terminal B of the primary winding 12 are, respectively, passed through suitable apertures 30 provided in the form 13 and are connected to connection lugs 31 secured to the form 13. Conducting leads 32, 33, formed and disposed similarly to the leads 27, 28, connect the terminals P and B through their respective lugs 31 to the terminal lugs 29 of their corresponding prongs P' and B'.

Preferably mounted on the form 11 adjacent to the filament end of the winding 10 and connected to the terminal F by a conducting lead 34 passed through an aperture 35 in said form 11, is a metallic capacity element or absorption plate 36, which acts to reduce the fundamental of the secondary winding. In manufacturing the device, the plate 36 may be adjusted suitably to alter the inductance value of the unit to match a predetermined standard value, so that any several transformers each having an associated group of inductances will have the same calibrated value in, for example, milli-henries, a condition referred to in the art as "matched inductances."

Exteriorly applied in a continuous conducting film, by electro-depositing, painting, spraying or dipping, to the exposed surface of the vessel C and base D, is a metallic paint or like material 37, said paint being omitted from the wall 24, however, in order not to short-circuit the several prongs presented therefrom. A band 38 encircles the base D, contacting said conducting film 37, and is preferably connected to the filament prong F' by a lead or conductor 39, said prong F' being commonly associated with the negative or grounded side of the circuit in which the transformer is intended to be incorporated.

We prefer to form the film 37 of aluminum paint forming an electro-magnetic absorption medium, whereby the transformer A is effectually shielded from exterior magnetic fields, while the induced lines of force of the transformer itself are confined within the shield, thus preventing intercoupling of the transformer with other apparatus thereto adjacent, and the shield being fixed with respect to the windings, the magnetic field of the transformer has a constant extent and value.

In the use of our invention, the several windings may be employed in, or associated

with, any desired circuit in the usual manner well known to the art, the base D, having the several contact prongs, providing a convenient and practical means of connecting the windings to their appropriate parts of the circuit by simply "plugging" the device into a suitable socket or receptacle provided in the apparatus incorporating the circuit.

Thus it will be seen that we have provided a simple, neat, and convenient inductance unit or transformer, the windings of which are disposed in permanent and fixed relation in a moisture-free impermeable chamber or vessel, whereby the inter-turn capacity leakage of the windings is minimized, the windings are protected from corrosion or like deleterious influence of moisture, from the deposition of dust or fume or the like, and from mechanical derangement or damage in handling, hence the calibration of the transformer or inductance unit, once effected, remains thereafter at a constant value, an important and vital feature in radio-receiving or sending apparatus.

It is to be understood that changes in the form, construction, arrangement, and combination of the several parts of our new device may be made and substituted for those herein shown and described without departing from the nature and principle of our invention.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. In combination, a base of insulating material, a sealed evacuated glass bulb having a conical endwall presented into and secured to said base, an interiorly presented supporting member integrally extending from said endwall, a pair of spaced arms having one end embedded in said support, a pair of electro-magnetically associated inductance windings rigidly supported on the other ends of said arms, a plurality of contact prongs exteriorly presented from the end wall of said base, conducting members connected to said contact prongs and sealed through said supporting member for establishing electrical connection between said prongs and the respective terminals of said windings, a coating of conducting material applied to the exposed walls of said base and said bulb, said prongs being insulated from said coating, a conducting band encircling said base for electrical contact with said coating, and means for electrically connecting said band with one of said prongs.

2. In combination, a base of insulating material, a sealed evacuated glass bulb having an end wall presented into and secured to said base, an interiorly presented supporting member extending from said end wall, a pair of spaced arms having one end fixed to said support, a plurality of electro-magnetically associated inductance windings rigidly sup-

ported on the other ends of said arms, a plurality of contact prongs exteriorly presented from the end wall of said base, conducting members connected to said contact prongs and sealed through said supporting member for establishing electrical connection between said prongs and the respective terminals of said windings, a coating of conducting material applied to the walls of said base and said bulb, said prongs being insulated from said coating, a conducting band on the base for electrical contact with said coating, and means for electrically connecting said band with one of said prongs.

In testimony whereof, we have signed our names to this specification.

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