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C. E. LANE

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ADJUSTABLE INDUCTANCE COIL

Filed July 11, 1928

FIG. 1c

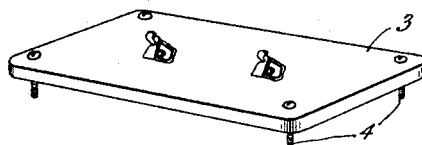


FIG. 1B

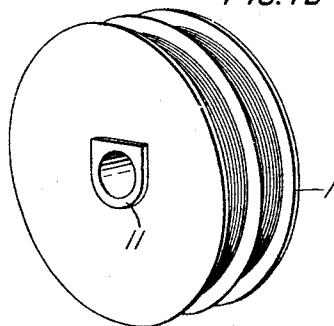
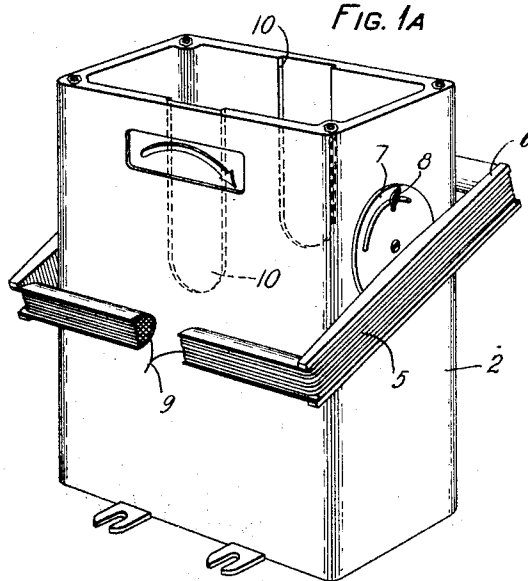


FIG. 1A



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ADJUSTABLE INDUCTANCE COIL

Application filed July 11, 1923. Serial No. 291,713.

This invention relates to inductance coils and especially to those capable of having their inductance accurately adjusted.

An object of the invention is to effect an adjustment of the inductance of an encased coil within a range equivalent to a small percentage of the mean inductance value of the coil.

Another object is to adjust the inductance of an encased solenoidal coil without appreciably affecting its ratio of inductance to resistance at any given frequency.

A feature of the invention resides in means for adjusting the inductance of an encased solenoidal coil by means of an associated short-circuited coil whose ratio of inductance to resistance is such that no appreciable change is effected in the corresponding ratio of inductance to resistance of the solenoidal coil over a given frequency range.

Another feature of the invention resides in an encased solenoidal coil whose inductance is adjusted by means of an associated short-circuited coil whose ratio of inductance to resistance is not less than one-third the ratio of inductance to resistance of the solenoidal coil.

Still another feature of the invention resides in a short-circuited ring or loop comprising a plurality of turns of wire wound upon a frame or yoke and pivoted externally of the casing of an encased solenoidal coil to adjust its inductance.

In the copending application of William L. Casper, Serial No. 291,932, the desirability is emphasized of having a coil capable of being adjusted over a small range in order to secure accuracy in the value of its inductance. The encased coils which comprise filter elements are of this type and the following description read in conjunction with the accompanying drawing illustrates one method whereby the above objects may be accomplished in this type of coil.

In the drawing Figs. 1—A, 1—B and 1—C an exploded view of an encased coil is shown. When assembled, the solenoidal coil 1 wound with either single or balanced winding is encased in a bakelite or other phenol fibrous container 2. Slots 10 are provided in the

casing walls for accommodating the lugs 11 on the coil 1 and for furnishing a guide for properly positioning and supporting the coil. The coil 1 is impregnated to prevent the access of moisture to the windings and a lid or cover 3 is provided for the casing which is firmly secured in position in some suitable manner, as for instance by the screws 4 which fasten into the corners of the bakelite casing.

In the specific embodiment of the invention shown the coil 1 is of the air-core type having a high ratio of inductance to resistance. For purposes of description this ratio will be called the Q of the coil. It is desirable that the Q of the main coil be altered as little as possible by the adjusting means. This result is obtained in accordance with the methods of this invention by pivoting a short-circuited coil 5 spun upon yoke 6, on the outside of the case 2. The yoke 6 may be made of the same material as the casing since it is desirable that as little metal as possible be used in addition to that in the coil windings. In order to obtain the best results the coil 5 is laminated to secure low resistance over the high range of frequencies used. Proper lamination of the coil may be obtained by using a few turns of stranded wire, but in the preferred form of the invention a large number of fine single strands is used, the ends of which are connected together as shown at 9. This permits the Q of the auxiliary coil to have a large value, a condition necessary for preventing the Q of the main coil 1 from being varied by the auxiliary coil 5 beyond the allowable limits.

Since the coil 5 is magnetically coupled to the coil 1 it follows that the inductance of the main coil 1 may be adjusted by rotating the yoke 6 which supports the coil 5. The range through which the coil 5 is capable of varying the inductance of the coil 1 is sufficiently large to compensate for the tolerances in the values of inductance of the coils which must be allowed under ordinary manufacturing conditions.

When the inductance of the main coil has been adjusted by rotating the auxiliary coil 5 through the proper angle, as determined by

testing, some means is provided, as for instance, a quadrant 7 and thumb screw 8 for locking the coil in position.

In a specific filter installation in which such a coil as the one herein described was used it was found that an auxiliary coil which had a Q of not less than $\frac{1}{3}$ that of the main coil, gave a sufficiently large adjustable range of inductance without appreciable effect upon the Q of the main coil.

Although the invention has been described in connection with specific embodiments thereof, it is capable of many forms within the spirit of the invention and it is to be limited therefore only by the scope of the appended claims.

What is claimed is:

1. A casing, an inductance coil completely within said casing and inaccessible from outside the casing, in combination with means wholly external to the casing for adjusting the value of said inductance, said means comprising a short-circuited coil mounted for adjusting movement relative to the encased coil and having a ratio of inductance to resistance at least one-third that of the encased coil.

2. An inductance comprising an air core coil, a non-magnetic casing for completely enclosing said coil, an adjusting coil mounted on the outside of said casing for angular movement relative thereto, said adjusting coil comprising a short-circuited winding of a large number of turns of fine wire, sufficient to provide a ratio of inductance to resistance at least $\frac{1}{3}$ of that of the encased coil.

In witness whereof, I hereunto subscribe my name this 9th day of July, 1928.

CLARENCE E. LANE.