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2,058,037

BUILT-IN UNIT VOLUME TUNING ANTENNA

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FIG. 1.

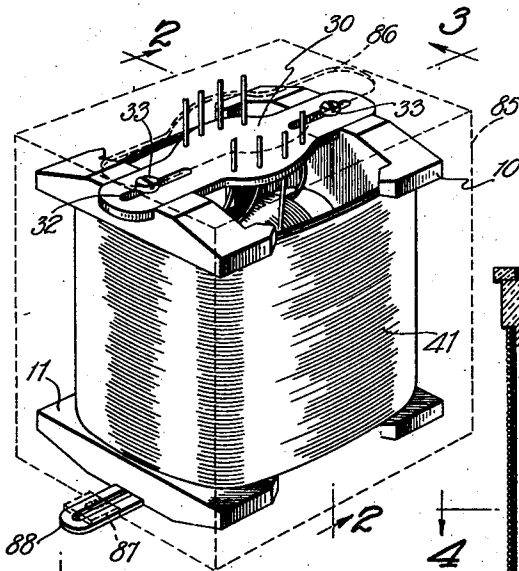


FIG. 3.

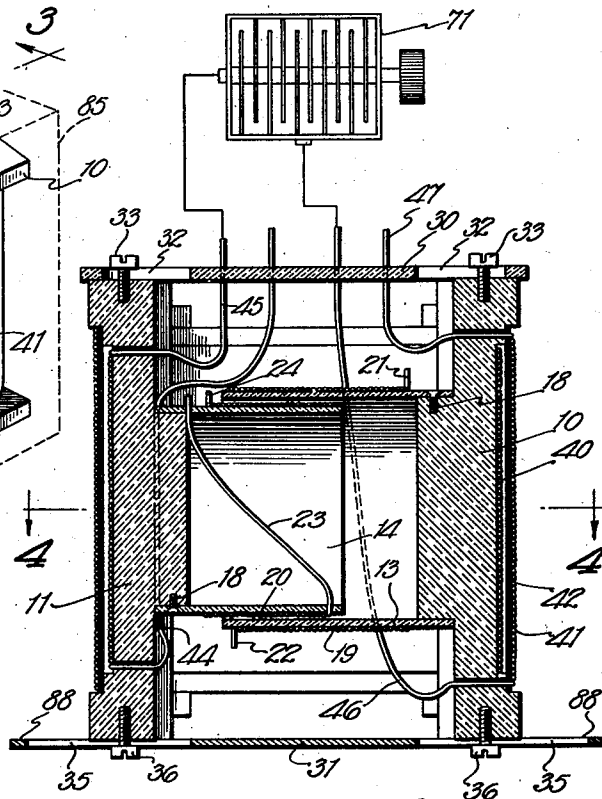


FIG. 2.

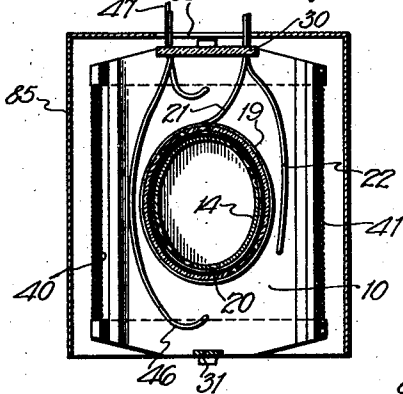


FIG. 4.

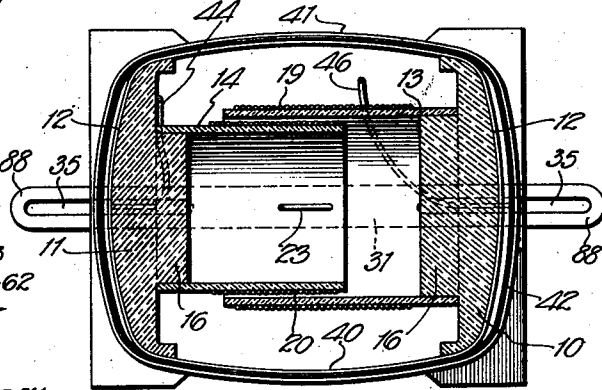
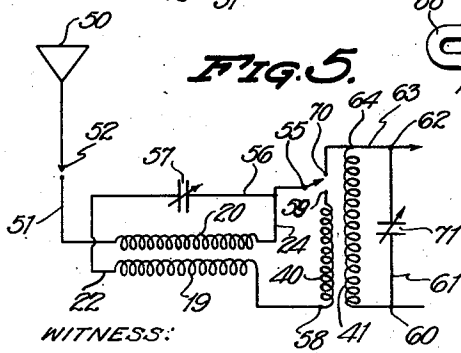


FIG. 5.



WITNESS:

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## UNITED STATES PATENT OFFICE

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BUILT-IN UNIT VOLUME TUNING  
ANTENNA

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5 Claims. (Cl. 175-359)

The present invention relates to new and useful improvements in radio apparatus and more particularly it pertains to a new and novel construction of built in unit volume tuning antenna.

5 It is the object of the invention to provide a new and novel coil assembly and construction which may be built directly into a radio receiving set and thereby eliminate the use of external aeri-  
als or antennae.

10 It is a further object of the invention so to construct the device that it may be adjusted and tuned to meet local requirements and particular set conditions.

15 With the above and other objects in view, reference is had to the accompanying drawing, in which;

Figure 1 is a perspective view of a coil assembly constructed in accordance with the present invention,

20 Figure 2 is a transverse sectional view taken substantially on the line 2-2 of Figure 1,

Figure 3 is a longitudinal sectional view taken substantially on the line 3-3 of Figure 1,

25 Figure 4 is a horizontal sectional view taken substantially on the line 4-4 of Figure 3, and;

Figure 5 is a diagrammatic view.

Referring to the drawing by reference characters, the device comprises two coil supporting members 10 and 11. These coil supporting members, as best illustrated in Figure 4, have substantially curved outer faces 12 the purpose of which will be hereinafter more specifically described. The coil supporting members 10 and 11 are adapted to be positioned in face to face spaced relation and each is provided upon its inner face with a coil carrying member, these coil carrying members being designated 13 and 14, respectively. The coil carrying members 13 and 14 are preferably tubular in form and of such a size that when the coil supporting members are positioned in operative position, one of said coil carrying members, for example, the one designated 14 is receivable within the other in telescoped relation therewith. While these coil carrying members 13 and 14 may be supported from their respective coil supporting members in any desired manner, I prefer to provide the coil supporting members with projections such as 16, upon their inner faces, which projections are received in the ends of the coil carrying members and the latter may be secured in position upon their respective projections by screws or the like 18. It is to be understood, however, that various other means of attaching the coil carrying members to the coil supporting members may be employed.

Formed upon the coil carrying member 13, there is a winding 19 and upon the coil carrying member 14, there is a winding 20. The leads from the winding 19 are designated 21 and 22, the leads from the winding 20 being designated 23 and 24. These windings 19 and 20 provide an induction coil of which I prefer to make the inner winding 20 the primary winding.

The coil supporting members 10 and 11 are adapted to be rigidly maintained in adjusted spaced relation to each other in order that an adjustment of the windings 19 and 20 relative to each other may be maintained, and for this purpose I provide two members which I term strap members, and which are designated 30 and 31. The strap member 30 is provided with slots 32 through which pass bolts 33, which bolts have threaded engagement with the coil supporting members. This strap member 30 is provided with a plurality of openings in which the various leads from the windings are mounted to carry them from the coil assembly. The strap member 31 is likewise provided with slots 35 in which are received bolts 36, which also have threaded engagement with the coil supporting members. By this construction it is apparent that if the bolts 33 and 36 are loosened, the coil supporting members may be adjusted toward and away from each other the desired distance and that by tightening the bolts 33 and 36, relative movement of the coil supporting members is prevented for the purpose of holding them in the adjusted position.

Surrounding the coil supporting members 10 and 11 there are two windings 40 and 41. The winding 40 constitutes an inner winding and these windings 40 and 41 are separated by a suitable insulating material 42. One lead from the winding 40 is designated 44, the other one being designated 45, while the leads from the winding 41 are designated 46 and 47. By reference to Figure 3 it will be noted that these leads also pass through openings in the strap member 30. The two windings 40 and 41 provide an induction coil and it is to be understood that these windings will be of such character that relative movement between the coil supporting members 10 and 11 may be had throughout the extent of adjustment without rupture to the coils. One manner in which this result can be obtained consists in coating the coils or windings 40 and 41 with a suitable binder such for example as paraffin, shellac or the like.

I prefer to embody the entire structure in a shield such as indicated by the reference character 85. This shield is preferably in the form of

an open ended housing which surrounds the coil structure and is shown in dotted lines in Figure 1, and in full lines in Figure 2. The shield has an opening 86 which conforms in shape and size to that of the strap 30 through which the various leads may be passed after they leave said strap. As illustrated in Figure 1, projections 87 may co-operate with extensions 88 of the strap 31 to retain the shield in operative position relative to the coil.

From the foregoing it will be apparent that the present invention provides a new and improved form of coil structure in which a plurality of induction coils are embodied in a single unit in a novel form, in such a manner that interference between the coils is prevented, the device resulting therefrom providing an element capable of being built into a receiving unit as a substitute for extraneous aeriels or antennae.

I will now proceed to describe the manner in which the device is embodied in a receiving set. In Figure 5 the reference numeral 50 designates an aerial which is connected to a lead-in wire 51 by means of a switch 52. By this construction either an extraneous aerial or antenna may be used by closing the switch 52 or may be cut out by opening said switch. The lead 51 is electrically connected to one of the leads of the winding 20, the other lead of the winding 20, for example the lead 24, is connected to a switch 55. One lead, for example, the lead 22 of the winding 19, is connected as at 56 to the lead 24, and interposed in this line there is a variable condenser 57. The other lead of the winding 19, which winding constitutes the secondary winding of the induction coil, is connected as at 58 to one of the leads of the winding 40 and the other lead of the winding 40 terminates as at 59 in a switch point for co-operation with the switch 55 heretofore mentioned. One of the leads of the winding 41 is connected as at 60 to a conductor 61, the other end of which is connected as at 62 to a conductor 63 this line including a variable condenser 71 and the other lead of said winding 41 is connected as at 64 to the conductor 63.

By this construction and arrangement it is obvious that when the switch 52 is closed and the switch 55 in engagement with a switch point 70, the aerial 50 will be connected to the receiving set not shown, the induction coil comprising the windings 40 and 41, being cut out. When, however, the switch 52 is opened, the aerial 50 is cut out and under these conditions the switch 55 would be engaged with the switch point 59. Under these conditions the winding 40 constitutes the primary winding of the induction coil which embodies the windings 40 and 41, and the two coils together constitute a built-in tuning antenna, the volume and tuning of which may be varied by condensers 57 and 71.

From the foregoing it will be apparent that the present invention provides a new and improved coil assembly especially adapted for use in connection with aerial or antenna circuits and radio receiving sets, which coil assembly is capable of being built directly into a receiving set in such a manner that it may be substituted, under certain conditions, for the ordinary aerial and antenna circuits commonly employed in such sets.

While I have described the invention in its preferred form, it is to be understood that it is not to be limited to the specific construction herein shown and that it may be constructed in other forms without departing from the spirit thereof.

Having thus described the invention, what is claimed as new, is:

1. An inductance coil assembly comprising in combination a pair of spaced coil supporting members, slotted straps connecting said coil supporting members, screws passing through the slots of said straps and engaging the coil supporting members to provide means for securing the coil supporting members in predetermined spaced relation, tubular coil carrying members projecting from the inner opposed faces of the coil supporting members, said coil carrying members having spaced telescopic relation with each other, a coil carried by each of said tubular coil carrying members, and a plurality of coil windings extending around the coil supporting members, the axis of said last mentioned coils extending substantially at right angles to the axes of the coils carried by the coil carrying members.

2. An inductance coil assembly comprising in combination, a pair of spaced and adjustable coil supporting members, means for permanently securing said coil supporting members in fixed spaced relation, a plurality of coils carried by said coil supporting members upon the inner opposed faces of the coil supporting members, a portion of one of said coils embracing a portion of the other of said coils, a plurality of coils extending about the coil supporting members and arranged in a plane substantially at right angles to that of the first mentioned coils, leads extending from the several coils, and means for concentrating said leads at one point upon the coil structure.

3. An inductance coil assembly comprising in combination, a pair of spaced coil supporting members, slotted strap members for permanently securing said coil supporting members in adjusted fixed spaced relation, a plurality of coils carried by said coil supporting members upon the inner opposed faces of the coil supporting members, a portion of one of said coils embracing a portion of the other of said coils, a plurality of coils extending about the coil supporting members and arranged in a plane substantially at right angles to that of the first mentioned coils, leads extending from the several coils, and means for concentrating said leads at one point upon the coil structure, said last mentioned means comprising a plurality of openings in one of the slotted strap members, there being one opening for each lead of each coil.

4. An inductance coil assembly comprising in combination, a pair of spaced coil supporting members, slotted straps supporting said coil supporting members, screws passing through the slots of said straps and engaging the coil supporting members to provide means for permanently securing the coil supporting members together in pre-determined spaced relation, telescoping tubular coil carrying members carried by and projecting from the inner opposed faces of the spaced coil supporting members and adjustable relatively to each other by adjustment of the coil supporting members, coil windings carried by each of said tubular coil carrying members, primary and secondary coil windings carried by the coil supporting members, and a shield completely enclosing said coil assembly and having an opening in that side wall adjacent one of the slotted straps.

5. An inductance coil assembly comprising in combination, a pair of spaced convexly curved coil supporting members, tubular coil carrying members carried by and projecting from the inner opposed faces of said semi-circular coil sup-

10 porting members, one of said tubular coil carrying members being smaller than the other whereby the tubular coil carrying members may telescope one within the other, a coil winding carried by each of said tubular members, slotted straps connecting said convexly curved coil supporting members, screws projecting through the slots of said straps and engaging the coil supporting members to provide means for adjusting the telescopic relation of the tubular coil supporting members and for fixedly securing said coil supporting members in adjusted position, primary and secondary coil windings carried by the convexly curved coil supporting members and en-

closing the coil windings of the tubular coil carrying members, means for insulating the primary and secondary coil windings from one another, leads extending from the several coil windings, means for concentrating said leads at one point upon the coil structure, said last mentioned means comprising a plurality of openings in one of the strap members, there being one opening for each of said leads, and a shield enclosing said coil structure, said shield having an opening in one of its side walls corresponding in shape to the contour of one of the slotted strap members substantially as described.

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