The Construction of Tuning-Coils

For all Purposes

By "MEGOHM"

TUNING coils for radio receivers are now seldom made greater than three inches in diameter, whilst for valve sets particularly there is now a great tendency toward 2½ and 2-inch coils. In short-wave receiverers the diameter may be as little as 1¼in., as illustrated by the valve-base coils now so much in use, and from which high efficiency is obtained.

Short-wave coils have few turns of wire, even when of small diameter, but as reducing diameter increases the number of turns necessary to tune to a given wave-length, too great a reduction in the diameter of broadcast coils is not always desirable, because in order to avoid a great number of extra turns, a wire of comparatively thin gauge must be used. Radio-frequency currents travel only on the surface of conductors, so that a wire giving the most outside surface presents least resistance to such currents. A hollow metal tube is just as good a conductor for r.f. currents as a solid conductor of the same diameter.

In order to increase the "skin" surface of wire it is sometimes made up of strands of thin enamelled wire, the whole being then silk-covered. For radio-frequency coil construction this wire may be composed of, say, twenty strands of 36's wire, and is known as "Litzendraht" wire. This wire is expensive, and though efficient on the broadcast band, but on account of the increased capacity introduced by the strands, it is not suitable for use on short-wave coils.

For the average aerial or secondary tuning-coil, wire ranging from 20 to 24's, s.w.g., is suitable. Where it is desired to get the most from a crystal set, a low-loss coil wound with 20's wire is suitable, but for local reception up to a few miles, and where selectivity is not required, cotton-covered or enamelled wire of any gauge above-mentioned, and wound without spacing, may be used. The use of cotton-covered wire has the advantage of automatically spacing the conductor by virtue of the two thicknesses of covering intervening between the turns, although close wound.

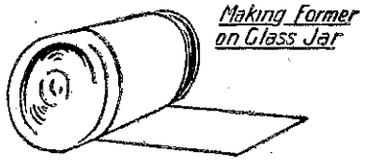
The inductance of a coil is stated in "microhenrys," or millionths of a henry, which latter is the unit of inductance. The average constructor does not need to deal with this measurement, so suffice to say that the inductance of the average broadcast coil is between 150 and 325 microhenrys.

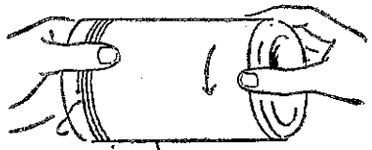
Types of Induction Coils.

THE type of coil now most used in radio receivers is that known as a "solenoid," which consists of turns of insulated wire wound in one layer upon a cylindrical former, the turns being wound either close together, or slightly spaced apart, from a half to the full diameter of the wire.

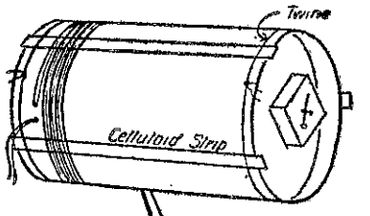
The honeycomb coil, once popular, is now little used. It is a compact type of coil, made to plug into a suitable holder; the turns are wound in-and-out on spokes radiating from a central hub, the spokes and hub being afterwards withdrawn and a plug-in block attached. Spider-web coils are a simpler but rather less efficient type of compact coil. They are wound in slots around a flat celluloid or cardboard former. These are also called "basket-coils." Formers of cardboard or other material upon which to wind these coils may be obtained at the dealers for a small sum.

In the construction of any coils wound in slots or over pins or spokes, there must always be an odd number of slots or spokes.





Winding on the Wire



Winding Low-Loss Coil

In following specifications given in descriptions of valve receivers, constructors should keep as nearly as possible to the measurements given, as to diameter, turns to the inch, and the total number of turns. If the winding is spaced a greater amount than specified, the range of the coil and associated condenser will be reduced, with the consequence that 7ZL, 3AR, and even 2FC, all high wavelengths, may not be received. The usual remedy in such a case is to add turns to the coil or coils.

The spacing of turns makes the recevier more "selective," which means that it will tune sharply, making it an easier matter to tune out stations on a wavelengh not many degrees away from that being received.

Actual Construction.

THE simplest coil for a beginner making up a crystal or small valve set is the solenoid of double cotton-covered copper wire on a cardboard former. Cylindrical or ribbed formers made of various materials may be purchased at any radio dealer's, the required length being supplied. Any of these are suitable for coil construction. If the constructor desires to make his own former, this may easily be done.

Thin white cardboard that will roll up easily should be procured from a printer or elsewhere. The white card known as "4-sheet" or "6-sheet" is suitable, and will be in sheets measuring 25 by 20 inches.

From a table get the number of turns to the inch of the wire to be used, and from this calculate the total length across the required number of turns. These tables are given in "Listeners' Guide." Add to this one inch to allow a half-inch clear at each end. We shall suppose the total length of the cylindrical former is to be five inches. A strip this width and 25 inches long is to be cut from the sheet of card. A cylinder slightly under three inches in diameter is now required upon which to build the former. A round bottle is good, if one of the correct size can be found. This should be covered with one thickness of thin paper to prevent accidental sticking of the former. The paper is only to fasten to itself by its adjacent edges, and not to the bottle; be sure of this. The measurement around the bottle will be about 10 inches, so that a 25-inch strip will go round 2½ times. The finished thickness should not be less than 1-16in., so unless the card is sufficiently thick a further strip must follow the first when constructing. Seccotine is a good adhesive to use.

One end of the card is rolled round the bottle and secured with a sparing amount seccotine where it meets the other portion of the card. Strips of seccotine are applied at frequent intervals, rolling up the card, and when the necessary thickness is built up, a waste piece of card should be wrapped round the outside, and the whole bound up with twine and put aside to set for a few hours. When set, a coat of shallac, dissolved in methylated spirits, will be an improvement, though not an actual necessity. Its function is to keep dampness away.

The former should be kept on the bottle during the process of winding, but should be tested to ensure that it is removable.

Wire of standard gauge (s.w.g.) is now required, according to the specifications being followed. Wire is sold by the pound, or quarter and half-pound, and as a guide to the quantity likely to be required for a coil, the following quantities are given. When ordering wire it is always best to order more than the exact amount required, as any surplus will always come in useful for connections.

On a 3in. former, quarter-lb. 20's d.c.c. wire will suffice for 70 turns, and enamelled a few more turns. The same