

A Crystal Set with Unusual Volume

(By "Pentode")

WITH the advent of the commencement of the "Crystal Corner" in this issue of the "Radio Record," the writer will endeavour to interest readers with the description of one or two crystal receivers, that may be justly claimed to be a little out of the ordinary. These sets are a little more expensive to build, but no doubt there will be many cases where readers have a "junk" box containing sundry components which will find good use if built into one of the following circuits. These sets are of special use to listeners situated just too far away from a broadcast station to be able to comfortably hear the broadcast on the usual type of crystal set. Also, for those constructors who reside close to a powerful transmitter and wish to receive on the loudspeaker without the aid of any amplifier. No guarantee, however, for speaker reception from any crystal set can be made, but the writer can tune in the local station any evening, quite loud enough on the speaker for domestic entertainment. Situation, length and height of aerial, efficiency of earth connection are important factors in the performance of crystal receivers. The only energy available to operate a crystal receiver is that given out by the transmitter, and it behoves one to collect as much energy as possible and not waste any by using poor insulation and absorption by having the aerial or lead-in too close to buildings, trees, etc.

Crystal receivers are essentially all the same. There are hundreds of crystal sets described in the various periodicals and journals, but when analysed, they can all be reduced down to some form of tuning system and a detector.

The tuning system may consist of the coil and condenser, variometer, or

merely a solenoid coil arranged with a slider. The circuit may include two or more coils loosely coupled. The chief advantage of this is to increase selectivity. Or an untuned aerial coil may be arranged more or less tightly coupled to a tuned secondary coil in which circuit is included the crystal detector and phones.

Rectification.

VARIOUS types of crystal detectors can be employed, but each attributes its action to the fact that it will allow a current of electricity to pass in one direction and retard the flow in the opposite direction. Thus the incoming signals being alternating current are rectified by the detector to pulsation of direct current to operate the reproducing mechanism, whether phones or speaker.

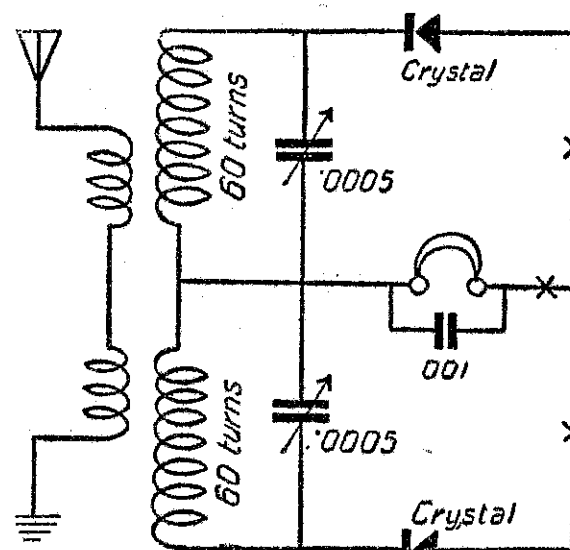
Now, in receivers using only one detector, one half of the cycle is suppressed and is, as it were, wasted. The other half-cycle is used only to operate the phones. Therefore, in the usual single detector circuit there is a certain amount of energy that is not being used. A more detailed description of the theory of reception will be given in later articles in the "Radio Record" and the reader is advised to read them over, as it explains in a simple way just what happens when you are tuned into a station and the reason that audible sounds can be heard miles from their origin. A brief outline was given last week in "Our Crystal Corner."

Returning to the subject under discussion. If this waste energy could be turned round to flow in the same direction as the rectified current, then the signal strength would be increased

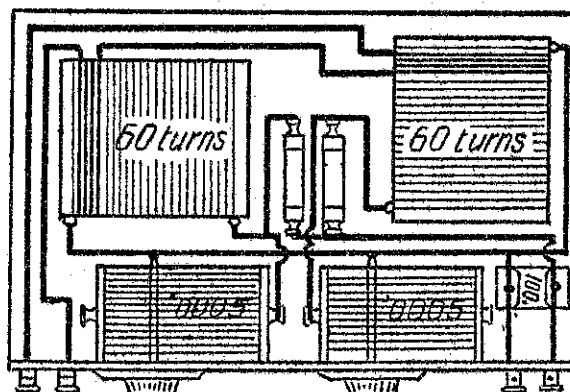
with the increase of current fed into the phones.

Dual Tuning System.

THE most satisfactory way to do this is to employ two tuning systems, two crystal detectors and either arrange the circuit so that available energy from both sets operate a single pair of telephones, or feed both the outputs into a transformer which has two primaries and one secondary. Below is given a circuit diagram showing the former method, although instructions are given for using with the extra output transformer.



Theoretical Diagram



Wiring Diagram

As will be seen, two separate crystal sets are employed. These must be kept quite separate by placing the coils at right angles. Although it is quite possible to only use one tuning coil, the results are not quite so good as when using the arrangement shown.

Two separate condensers are shown, but two gauged together will do quite well, but care must be exercised to see that both tuning coils are identical with regard to number and spacing of turns, gauge of wire, diameter of coil former, etc., otherwise one of the sets will be constantly out of tune and no advantage will be gained. Although two fixed crystals are used by the writer, two cat's whisker types will do quite well and can be mounted on the front panel.

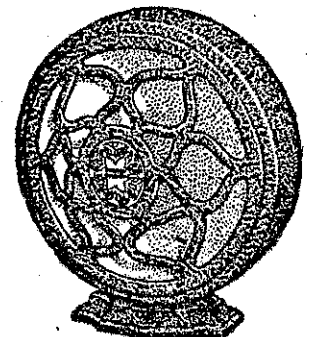
The Coils.

THE coils are the only components needing much attention. In the ebonite or cardboard former, drill two small holes, 1-8 in. from each end, on the same side to fix down to the baseboard. Two small wooden blocks can be made with holes drilled down the centre so that when a screw is passed through the former and this block, the

former will stand about an inch from the baseboard. Both coil formers are treated in the same way and are wound with exactly the same number of turns in each case. Starting from one end, wind on 60 turns of the 22 s.w.g. DCC wire and fasten the wire by passing in and out of two small holes drilled in the former. Note which is the beginning and end of each coil, and over the wire at the beginning end wrap a strip of brown paper 1 1/2 in. wide and about 2 ft. 6 in. long. This will give three layers and can be given a liberal coating of shellac varnish or celluloid solution. Over these layers of brown paper wind 20 turns of the 22 DCC wire, fastening each end by tying with cotton. Leave about 9 inches free wire and this can be used to fasten direct on to the terminals.

Mount these two finished coils on a baseboard 11 in. x 7 in., toward the back

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