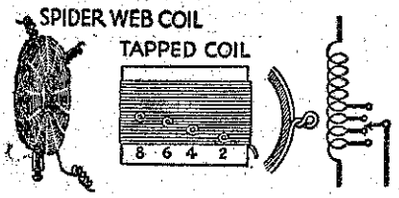
ance, or, if you like, of a certain size, is connected with a condenser of a certain capacity, that coil and condenser can receive only one frequency, and a frequency is what is used by broadcasting stations when they transmit.

If either the coil or the condenser is altered that combination will be ready to receive a wave of a different frequency, and that is how a set is tuned. We generally tune the secondary and its proximity to the primary causes that coil to come under the influence of the secondary and be tuned.

There are occasions when, to get greater strength, we feed back energy from the detector valve into the



secondary coil. Here is the way the current goes. From the top of the secondary it goes to the grid of the valve. From there it is amplified in the valve and goes into the plate. Now, from the plate, a certain amount of that energy is fed back to the tickler coil (found in "regenerative" circuits), where it is picked up by the secondary and passed through the valve again.

To regulate the amount of current that is fed back to the tickler we must have some means of control. We can alter the distance between the tickler and the secondary—called induction control (the familiar swinging coil of the Browning Drake)—resistance control, which controls the amount of voltage on the plate of the detector, or, what is more usual, the condenser. Lately the differential condenser has become very popular with constructors, for it is an admirable means of controlling the amount of energy fed back to the tickler coil.

On the valve base coil illustrated there are only two windings. This particular coil can be used either for a set that does not have any amplification before the detector and one in which the aerial is brought straight in on to the secondary coil (in which case the other coil would be the tickler) or it could be used for a stage that goes before the detector (radio stage), in which case there is no need to use the tickler coil. The coils would be a primary and a secondary.

The spider-web coils are wound in that peculiar fashion to reduce what is known as self-capacity. They are, however, going out of date.

The tapped coil is used generally in experimental sets and sometimes in crystal sets. It provides a means of connecting two circuits so that the optimum coupling between the two can be obtained by varying the tapping. Thus, if this coil is used as the first in the set, it might be found that it will be better with the aerial brought into "2" than if brought anywhere else.

Generally speaking, in commercial-wound tuning-coils, enamelled wire is used, and the sizes are kept very small. In amateur construction, it is usual to use d.s.c. or d.c.c. wire, of a gauge varying between 24 and 30 and on formers ranging from 1in. to 3in.

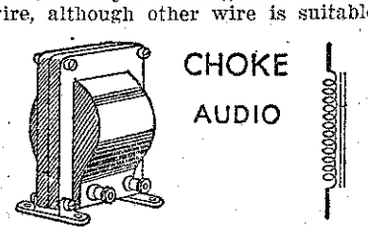
Choke Coil

A CHOKE coil is a winding of wire which will allow low frequency current to pass, but will block the high frequency. It is the reserve of the condenser, so that the reader can see there are many possibilities with condenser and choke coil combinations. Technically speaking, a choke coil is one of great reactance or impedance. Its purpose is to limit the flow of alternating current at certain frequencies through the part of circuit in which the choke is placed. It is really a valve (not a wireless one). There are two types of chokes, radio (R.F.C.) and audio (A.F.C.). The radio choke can pass the highest frequency pulsations, but the audio choke will allow the lower frequency ones to pass. The high frequency or radio frequency chokes are usually of an air core type, that is to say, they are wound on a former like an ordinary coil and have no iron about them. For broadcast purposes a choke coil has about 1000 turns on a small former of about 1in.,

but for shortwave 100 is ample. The main thing to see in purchasing a choke coil is that it has a sufficiently high inductance; 2500 microhenries is not too little for a good radio frequency choke.

Audio Frequency Choke

AUDIO frequency chokes always have an iron core. They are generally formed of layer windings of enamelled wire, although other wire is suitable.

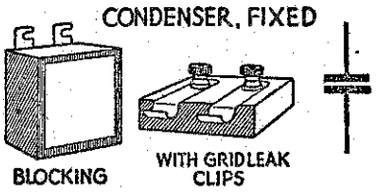


The gauge of wire is determined by the current to be passed. Their inductance varies between 25/500 henries according to their use. When built up they generally resemble an audio transformer. A smoothing choke, used in power packs, is usually made with heavy wire, and has an inductance ranging between 25/100 henries. The iron used for the core is not continuous; in other words, it has a "gap" which varies in thickness between 1-32in. and 3-16in. Its function, like that of the "Radio Choke," is to keep the a.c. out of certain portions of the circuit.

Fixed Condensers

A CONDENSER is a piece of apparatus that can receive and hold an electrical charge. It is the only apparatus that can do so. A battery cannot, it merely changes the form of the electricity. A condenser consists of two sets of plates arranged so that they cannot touch one another. The set connected with the power are the positive plates, and the others, which usually go to the ground or some other similar point, are known as the negative plates.

In ordinary fixed condensers, such as those illustrated, the plates are really long strips of tinfoil, and to prevent them from touching, waxed paper is placed in between them. All four (the



two plates and the two lots of waxed paper) are wound spirally on a machine and then placed in the case pictured. The amount of plate determines capacity—in other words, the capacity is an indication of the amount of current that a condenser can hold. The distance the plates are apart, or the material used for separating them, determines the voltage at which the condenser breaks down. By "breaking down" we mean the puncturing of the insulating substance (called the dielectric), and consequently the ruination of the condenser. To be on the safe side condensers are always tested for a higher voltage than they actually have to work with. Here are some of the uses for condensers:—

1. Blocking condensers. Although this name does not strictly apply to one class, it usually means condensers of a fairly big capacity, that is, .001 to perhaps 2 mfds., used for preventing the flow of direct current in any portion of a receiver. It is a remarkable fact that though a condenser will stop a flow of ordinary electric current (D.C. or low-frequency A.C.), it will allow radio waves to pass or, as we call them, high-frequency currents. Thus, if we put a condenser in a stream of direct or low-frequency A.C. current in which is present high-frequency current, the high-frequency will go through the blocking condenser, but the ordinary current will be blocked. Thus we call this type of condenser a blocking condenser, although it is really no different from the others. Examples: Filter circuits, a.f. coupling condensers in r.c. amplifiers.

2. Smoothing condensers. These are usually large capacity condensers, from 1 to 2000 or more mfds. used in power apparatus such as eliminators, to smooth out the ripple and make the supply pure. These have usually a high break-down voltage, often many thousands of volts.

3. By-pass condensers. These may be of any capacity from .0005 up, and usually do not have a very high break-down voltage. They are used in many different places in the circuit to provide a channel for unwanted high-frequency current to pass round some obstacle such as a choke or battery. Examples: Across batteries, transformers, resistances, etc.

4. Grid condensers. A condenser of suitable capacity usually between .0001 and .0003. If one of these is placed in the grid circuit of a valve and a grid leak is associated with it that valve becomes a detector and will pass current in one way only.

All condensers are shown by the one theoretical symbol—two thick lines. When sets are hard to stabilise by-pass condensers placed in the right place will do much to steady them.