case when working with a 25-1 transformer from 80 to 90 turns on the moving coil would be sufficient.

If any constructor wishes to make his speaker to suit the parts he has on hand, if he will write in stating the transformer ratio, the valve to be used in the last stage, and the anode voltage applicable to it, details will be furnished him whereby he can construct his speaker to match his components.

Difficult to Neutralise.

"I AM unable to neutralise my Browning Drake, which has been made strictly to specifications. The turning on of the light switches causes the set to burst into oscillation, which can be stopped only by turning the rheostat controlling the radio frequency valve to a position where music is inaudible. The batteries are O.K."—"Muggins" (Gisborne).

A.: See the reference to "A" battery wiring in screened sets dealt with by "Pentode" this week.

Detector Voltage Too High.

MY 5-valve neutrodyne has not been going too well for some time. A crackling noise is noticeable in the speaker, and on two different pairs of 'phones. On turning up the rheostat the noise increases. The voltage on the two radio frequency and two audio frequency valves is 90, and I have been using this on the detector. Can you help me to remedy the trouble? asks "C.E.H." (Ngaio).

A.: Check over all "A" battery connections, and apply the test to the transformers as described in Our Beginner Corner some time ago. Reduce the detector voltage to about 30 volts, as a high detector voltage will quite likely cause trouble of this nature.

Oscillation Trouble.

I HAVE a home-made all wave 3-valve receiver, writes "M.C.W." (Auckland), the second stage of which works unsatisfactorily, especially on the short-wave. When tuning in on the long waves the trouble is very slight, except on very loud signals, when it is inclined to mushiness. I am using good components, and have shunted a .001 mfd. capacity condenser across the primary of the second transformer. This has stopped a high pitched whistle when using the 3 valves. Tone and clarity on 2 valves are almost perfect. My "B" batteries are good, but should I use the heavy duty type? The set delivers ample volume, and 4YA comes in on the speaker at good strength, 2YA fills the house on 2 valves, but both 1YA and 2YA become slightly distorted when using the 3 valves.

Would the eliminator described in the "Record" March 23, 1928, be suitable for an all-wave set?

A.: Try ½ meg. grid leak in series with the grid leads of both the L.F. valves. Space the transformers correctly, well apart if possible, so that the axis of one is at right angles to the axis of the other, or use choke impedance coupling for the last stage, as described in the "Radio Record."

The failure of the set to handle volume may be attributed to very many causes, the most probable being that the last valve cannot handle the output. PM4 is used, whereas it would be advisable to try PM254. Then, again, the speaker may be unable to handle the output, for a good speaker is required to deliver the output of 3 valves from the local station. An eliminator would be unsatisfactory for short-wave work. Heavy duty batteries would be more satisfactory.

Dynamic Cone Speakers.

"C. H." (Wellington) requests information on the following points to guide him in purchasing a moving coil loudspeaker:

(1) Which is the best type?

A.: Those operated directly from the lighting mains will repay amply the extra expenditure.

(2) What would such a speaker cost per week to run, say if it were being used for 15 hours?

A.: As it consumes only 20 watts per hour, this would be 1.8 pence at Wellington rate.

Some questions propounded by various writers form the basis of a special article by "Pentode" on page 28, to which these correspondents are referred.

(3) Operated from an A battery, what is the amount of current used?

A.: .6 of an ampere.

(4) What is the best make, and where can I obtain same.

A.: Good makes have been frequently advertised in the "Radio Record."

(5) Do you consider that the extra cost is warranted over the average speaker?

A.: Providing a good amplifier can be used in conjunction with the speaker, yes.

(6) Will they deliver the same volume as a small cone speaker on the same output?

A.: No, they are not as sensitive, but repay in quality.

Push-Pull Amplification.

"C.C.K." (Geraldine), writes: I wish to build an audio amplifier to use with an electric pick-up so that I can use at least two speakers at fair volume. Which of the two amplifiers described in the "R.R." would you advise me to try, Pentode's push-pull or Megohm's amplifier, with super components. If either of these do not happen to be suitable, could you advise me as to the most suitable type?

A.: If from 90-135 volts are available, the push-pull amplifier described by "Pentode" would admirably suit the purpose. A better amplifier would be one working directly from the electric mains, but this would be both difficult and dangerous to construct, unless an electrician could do the constructional work.

The Beverage Aerial.

"H.N.B." (Hokianga) asks regarding the Beverage aerial described in our issue of March 22, "Would the 600 yards of aerial (18 times the length of an ordinary aerial) would affect the tuning.

A.: Under the conditions described in that issue the tuning was not affected. Providing the aerials are directional, tuning is quite sharp, and the whole band covered by the receiver can be tuned in with ease.

(2) Are the cross wires supporting the aerial insulated or connected to earth?

A.: They should be insulated, otherwise the effect of the aerial would be lost.

(3) Could you tell the wavelength of 2ZM, Gisborne?

A.: 260 metres, with power 60 watts.

For Beginners

Plate Voltage of Valves.

A CORRESPONDENT this week has had trouble presumably because the voltage on his detector was too high, and this raises the all-important point of the voltages on the plate of valves (anode voltage). In general, very high voltage is needed only in the last, or at most, in the last two stages, for it is only in these valves that a great amount of current has to be handled, and where this is the case adequate voltage has to be provided in order that the set work perfectly.

Most power valves require 150 volts on the plate, and if true reproduction is to be obtained, and the bass notes brought out with all fidelity, full votage is necessary. This is best supplied through a battery eliminator. If the 250 type of valve can be obtained, and about 350 volts applied to its plate, a tremendous output of 2350 milliwatts can be obtained. This would permit of almost perfect reproduction providing it were used with a suitable amplifier.

With the detector, however, the case is different, and if good reproduction is wanted, voltage should be kept from 20 to 40 volts, and this should in no wise be exceeded. Exceeding this will mean that the set is difficult to neutralise, and the tone is harsh and unnatural. Signals may, of course, be slightly louder, but loudness without tone has little in its favour.

The voltage on the radio frequency valves should be intermediate, unless the screen grid type is used; 90 volts without grid bias is a safe medium, and is that usually recommenced by makers for used in the R.F. stages.

Push Pull Amplification.

THE purpose of push-pull amplification is to obtain a great increase of volume without overloading the valves. The necessity for push-pull amplification has been lessened with the advent of power valves, for they were able to furnish great volume without distortion, and a single valve only is required, whereas with push-pull two are used in one stage. They are not connected directly in parallel, but are used with transformers of a special design so that one of the valves amplifies one-half of the signals wave, and the other valve amplifies the other half.

For real quality tone, however, there is very little to excel this type of amplifier. Whereas the power valve requires a very high voltage on its plate, the push-pull amplifier will give equal if not better results on a very much lower voltage. Thus, for the owner who is operating his set from dry batteries, the push-pull amplifier will still have a great appeal. With 135 volts on the plate of each of the valves in the last stage, tone and volume equal to that of 180 volts applied to a single valve can be realised.

A push-pull amplifier can be made to replace the existing audio amplifier of the set, or it can be made up separately and used to boost up weak signals. Again, it can be used in conjunction with the gramophone pick-up, and will give reproduction that is equal to that of a very expensive machine.

HONG-KONG'S new broadcast station, it is reported, is to work on 300 metres, using the call GOW, as Hong-Kong is a British colony. In addition to local programmes, the plan is to relay London programmes transmitted by 5SW, Chelmsford, England.