The disadvantage of this scheme is that it weakens the low frequencies as well as the high. If the amplifier as a whole, or the pick-up, has too high a peak, this can be reduced by inserting at R an extra resistance of 10,000 to 20,000 ohms.

The second scheme is for reducing the high frequencies by alternatively placing the extra resistance in the grid return of the transformer secondary. This resistance may be from 50,000 to 250,000 ohms to suit the pick-up and transformer. This method does not reduce the low frequencies, but should not be used with detector valve input, or the high frequencies will be practically lost.

A diagram is given of the usual volume control, also showing the position of a scratch filter should it be required. A variable resistance of not less than 50,000 ohms should be used for the control.

In the other diagrams a potentiometer control is shown, the resistance of which must be high—500,000 ohms if the detector is used as amplifier.

In cases where the leads from the pick-up to amplifier are lengthy, an input transformer should be provided at the amplifier. This is already provided for in a transformer-coupled amplifier.

As a general rule, the best results with the lower frequencies will be obtained when the pick-up is connected to a transformer primary of high impedance, and this applies particularly to the case where a dynamic speaker with baffle-board is employed.

Scratch-Filters.

IT is not likely that with efficient apparatus there will be sufficient needle scratch noise to be objectionable. Such trouble is more likely to be encountered when the pick-up signals are fed to the grid of a detector valve, as this method is very much in favour of high frequencies.

Should it be considered necessary to provide a scratch-filter, a honeycomb inductance and fixed condenser are connected as shown in the diagram. A 150-turn honeycomb coil will be suitable, and may have a small amount of iron or stalloy placed in its centre in order to slightly broaden the bypassed waveband. With a fixed condenser of .008 mfd., the filter tunes to about 5500 cycles, so that most of the scratch noise is cut out without affecting to any extent the quality of the music.

Selecting a Pick-up.

MANY different makes of pick-up are now to be obtained, and probably all may be classed as good, but at the same time there is a variation in their characteristics, chiefly with regard to volume, and as to whether the high or low frequencies are most emphasised. Low-note response should be sought, as the high frequencies are rarely subordinated.

Prices are now so reasonable for a reliable article that no attempt at construction is advised. The factory-built pick-up is a collection of a vast amount of research and experience, enabling very perfect reproduction to be effected. The home-made variety is usually a "tinny" sounding production requiring liberal "damping" with rubber, a condition which puts severe wear upon the records, causing their rapid deterioration.

Electric Turntables.

ALTHOUGH a good double-spring motor will do its work well, an electrically driven turntable is a great convenience, obviating the necessity for continual winding. Several good makes of turntable, governor and motor combined may be purchased. In some of these a smooth-running motor is geared silently to the turntable, whilst another type, scarce at present in New Zealand, runs by an induction motor using alternating current. In this type there is no gearing of any kind, but on the spindle of the turntable there is a copper disc about five inches in diameter, running between electro-magnet poles, which impart to it the necessary rotary motion.

Here, too, the constructor is warned against attempting electric driving with an unsuitable motor. There are upon the market some small motors selling at a pound or less. Some of these, running on six volts, have sufficient power to run a gramophone, but they are not constructed for lasting service, and after a few days' work the spring brushes wear through, necessitating replacing by carbon brushes if too frequent renewal and undue sparking are to be avoided. The commutator is another source of trouble in this type of motor—it soon wears out. Another great objection is the noise created, and unless this can be properly subdued, quality of reproduction will suffer.

The only satisfaction to be obtained by fitting a separate electric motor to an existing turntable is by purchasing a well-made, quiet-running motor and coupling it to the machine by a true-running rubber pulley bearing against either the governor pressure-disc or the underside of outer edge of turntable. The former method is much the better if the speed works out satisfactorily.

A brake is hardly necessary with the electric drive, as only a few revolutions will be run after the current is switched off.

An interesting problem for experimenters is to devise a simple cut-out switch to automatically stop the motor when the tone-arm reaches the end of the record. This may take the form of a light arm with adjustable stop, resting on the tone-arm. When the latter touches the stop it pushes a lever which cuts off the current, a small mercury-cup making a very suitable contact.

The instalment of electric reproduction on your gramophone will give the instrument a new lease of life, particularly now that radio claims the premier place in so many homes. The improvement in reproduction over the old style will be a pleasant surprise to many, and records per medium of the loudspeaker will become a very popular adjunct to radio.

Laboratory Jottings

Blue-Spot Pickup.

THE Rodger Importing Co. Ltd., 159 Manchester Street, Christchurch, have forwarded a "Blue-Spot" pickup from the first shipment received, and we have been able to make a thorough test of this. It is a high-grade instrument giving excellent volume, and good response over the entire musical scale even to very low frequencies. The pickup, tone-arm, and volume control form one complete unit, the control being situated in the pedestal upon which the tone-arm swivels. It is nickel-plated and well finished, in keeping with its performance.

Technical Tips

ONE advantage of the cone-type loudspeaker as compared with the horn type is that from an artistic point of view its appearance can be made much more pleasing.

WITH a moving-coil loudspeaker it is necessary to use a wooden baffle board of at least 2 or 3ft. in diameter, if the low notes are to be reproduced properly.