AN ELECTROSTATIC LOUD-SPEAKER.

Details of a Practical Design in Use in Germany.

By Dr. H. KRÖNCKE.

EUGEN REISZ, who has already become known in wide circles by the marble block microphone named after him, has produced a new electrostatic loud-speaker and also, on the same principle, electrostatic headphones, which, owing to their excellent reproduction, are considerably superior to the electromagnetic telephones and loud-speakers hitherto in general use. Herr Reisz has had the kindness to demonstrate to me his new apparatus, both when connected direct to a telephone line leading to the Berlin transmitting station, and likewise for reception on an aerial with non-reacting detector valve and resistance amplification. Upon hearing reception with the new headtelephones, which weigh only 3½ oz., the first impression was so remarkable that it can hardly be described. Nevertheless, although the intensity of signals was so great that one felt as if one were in the immediate neighbourhood of the music or the speaker, there was not the slightest trace of subsidiary noises, distortion, or weakening of the high and low notes.

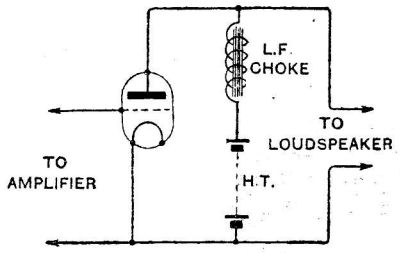

Fig 1.—Circuit showing method of applying fluctuating potentials to the loud-speaker.

The Principle.

The method whereby Reisz has achieved such a result is strikingly simple. Reisz uses a condenser, one plate of which is a fixed one, the second plate being separated from the first by a very thin insulating material. As matters stand at present, a preliminary potential of 200-250 volts is applied to the condenser in the case of the loud-speaker, and 75 volts with the headphones, so that the plates attract each other with a certain force. The force is fairly great, since the insulating material is very thin; thus the capacity of the loud-speaker is about 0.01 mfd. The low-frequency oscillations obtained by means of the amplifier are now superimposed upon the preliminary potential of the condenser plates, the circuit with choke coil, as illustrated in Fig. 1, being used for the purpose. The preliminary potential is therefore supplied direct from the anode battery. In consequence of the fluctuations of the superimposed potential, the power whereby the movable plate is attracted to the fixed plate alternates and produces oscillations of the movable plate which follow the low-frequency electrical oscillations.

There is, of course, nothing especially new in all this. The salient feature of the new Reisz loud-speaker lies in the elaboration of the condenser. It will be understood that the movable plate must be made as light as possible if the production of natural oscillations of audio-frequency is to be avoided. Moreover, the movable plate must be entirely free from internal tension, and some parts of the movable plate must be able to move easily, independently of other parts. Reisz achieves this in a remarkably simple manner. He makes the first plate of aluminium bent slightly convex and having several holes in it similar to a sieve. Over this aluminium plate he places with slight tension a very thin insulating layer—for example, of indiarubber or silk. On the other side of this insulating layer he places a conductor which consists of a number of small granules, which are stuck on this layer side by side. What this material consists of has not yet been stated. Reisz attaches value, however, to fixing the granules in such a way that the conductor layer does not render the insulating surface more rigid than before.

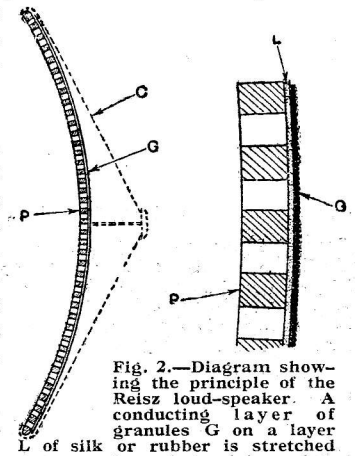

Fig. 2.—Diagram showing the principle of the Reisz loud-speaker. A conducting layer of granules G on a layer L of silk or rubber is stretched over a perforated aluminium plate P which acts as the other electrode.

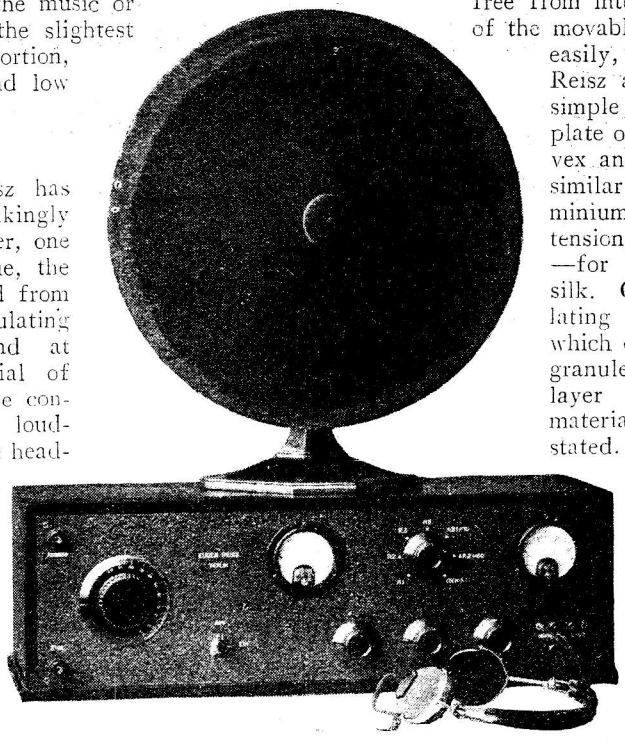

Fig. 3.—The electrostatic loud-speaker and telephones connected to a broadcast receiver.

Fig. 2 shows schematically a section of the loud-speaker. P is the perforated plate on which the insulating layer L is stretched. To the exterior side of this layer adhere the granules which form the

An Electrostatic Loud-speaker.—

movable plate of the condenser. Finally, for the protection of the oscillating surface, there is fixed to the front of the loud-speaker a flat cone, C, of light material. In reality only very slight movements of the conductive layer are necessary in order to produce very considerable tone effects. It is found that the slight unevennesses in the metal plate P are amply sufficient for this and provide a sufficient possibility of movement of the conductive layer.

In addition to the advantage of the exceedingly small compass and slight elastic tension of the movable layer, the electrostatic loud-speaker is superior to the majority of electromagnetic loud-speakers, by the fact that the whole oscillating surface is in the electrical field, with the result that no oscillations can be produced outside that field, so that there is a relatively high damping of the oscillating surface. To this fact also can be doubtless attributed the advantage that the loud-speaker, within the whole range of audibility down to the very lowest notes, has no natural vibrations, and all the oscillations are reproduced with equal strength, at least in so far as can be judged by the ear.

The new loud-speaker, however, has one disadvantage. It needs a higher polarising voltage than the usual small electromagnetic loud-speakers. Reisz, however, is now engaged in developing the new loud-speaker, so that an initial tension of 100 volts will be sufficient to work it. He hopes to achieve this by a further diminution of the magnitude of the insulating layer. To work the loud-speaker, Reisz uses an ordinary amplifier with resistance coupling, in order to avoid the distortions caused by transformers. As the last valve of his amplifier, he uses a power valve with an emission of about 12 milliamperes. It might be assumed that no energy would be consumed in an electrostatic loud-speaker, and, therefore, that a small amplifying valve using a small anode current would be sufficient. This, however, is not the case, since the capacity of the loud-speaker has to be charged and discharged by the electrical currents which produce the attraction and repulsion of the movable plate, and for this a certain current intensity is, of course, necessary.

General Notes.

With reference to our note on page 320 of our issue of February 24th concerning tranmissions from B W5, we understand that this Belgian amateur has been ill and unable to transmit, but that he is now working again on 180 metres, and will welcome reports.

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Mr. F. W. Goff (G 6YG), 102, Woodside Road, Bowes Park, N.22, has been received by C 1DD in Nova Scotia on telephony when using only 5 watts on a 45 metre wavelength.

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Mr. C. F. Bauditz (D 7BZ), Erickshus, Ringkiobing, Denmark, is transmitting on 34, 40 and 60 metres, pure C.W. with an input of 15 watts, and will welcome reports.

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Belgian Amateurs.

We have hitherto refrained from publishing the names and addresses of Belgian amateurs, as we understood that none of their stations was licensed, but, as the following have already appeared in the Flemish publication *Radio*, we print them for the benefit of our readers :

B L1.—Arendonck Radio Club (operates E. Claessen and J. De Pauw), Arendonck, Antwerp, transmits on 75 and 150 metres.

B L2.—"Radio" (J. Vandepitte), Uytkerke, Blankerbenghe.

B L3.—J. de Geest, Motestraat, Roeselaere, transmits on 75 to 150 metres.

B L4.—G. Vermandere, Zuidstraat 55, Roeselaere, transmits on 75 to 150 metres.

B L5.—F. Callebert, Ooststraat 29, Roeselaere, transmits on 75 to 150 metres.

B L7.—M. E. Geeraert, Ondernemerstraat 67, St. Amandsberg, Gent.

B L8.—Gaston Vits, Brusselsche Steenweg 25, Melle, transmits on 65 and 200 metres.

B L9.—R. Bloeykens, Florastraat, Meirelbeke.

B L10.—H. Deceuninck, Reeperstraat 16, Emelghem, Iseghem.

B L11.—G. Blancquaert, Uytbergen (Oost. VI.), transmits on 100 to 135 metres.

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New Call Signs Allotted and Stations Identified.

G 2ARZ.—B. R. Clarke, 5, Fox Hill Gardens, Upper Norwood, S.E.19.

G 2AZL.—W. Paylor, 54, Town Street, Beeston, Leeds.

G 2BNJ.—H. F. B. Sharp, Hill of Tarvit, Cupar, Fife.

G 2BNK.—G. H. Henshall, 19, Greenvale Road, Eltham, S.E.9.

G 2BOM.—E. D. Dunn, 184, Crewe Street, Derby.

G 2BPI (Art. A.).—L. W. Gardner, 10, Ludlow Road, Coventry.

G 2BQK (Art. A.).—W. P. Dolphin, 178, Langham Road, South Tottenham, N.15.

G 2BQN (Art. A.).—R. E. Fisher, 356, Clarkston Road, Cathcart, Glasgow.

G 2DA.—"Popular Wireless," Experimental Station, Dulwich.

G 2JB.—J. C. Bird, 1, Stapleford Road, Wembley (change of address).

G 2JD.—J. L. Summerfield, 218, Thorold Road, Ilford, Essex, transmits on 23, 45 and 150-200 metres.

G 2TK.—K. H. Thow, 35, Footscray Road, Eltham, S.E.9 (change of address).

G 5AN.—E. W. V. Butcher, 16, Manor Gardens, Purley.

G 5CG (portable). — D. Shannon, Wyvern Grange, Sutton Coldfield, Birmingham.

G 5CX.—C. R. Pill, 17, Brundenell Grove, Hyde Park, Leeds, transmits on 90 and 150-200 metres C.W. only. (This call sign was formerly held by A. Higson, Colne, Lancs.)

G 5GQ.—B. G. Wardman, 5, Pollards Hill South, Norbury, S.W.16.

G 5JQ.—W. B. Sydenham, Torquay Secondary School, Barton Road, Torquay, transmits on 150 metres.

G 5MY.—J. E. Montgomery, Felsted School, Essex, transmits on 23, 45, 90 and 150-200 metres.

G 5TD.—T. A. Studley, 6, Rutland Road, Harrow, transmits on 45 and 90 metres.

G 5TG.—W. J. Tarring, 70, Cranmer Road, Forest Gate, E.7, transmits on 90, 160, and 180 metres. (This call sign was formerly owned by F. R. W. Stafford, Dovercourt.)

G 5ZU.—H. B. Gardner, Heysham, King's Road, Barnet (change of address).

G 6MB.—A. J. Buttress, 7, Limekilns Field, Hill Top, Bolsover, nr. Chesterfield.

G 6OO.—T. Woodcock, "Santos," 8, George Street, Bridlington, E. Yorks, transmits on 45 and 150-200 metres.

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The call sign allotted to Mr. R. T. Colebourn, "Ardchalligan," Selborn Drive, Douglas, is 6IA, and not 2IA, as printed on page 264 of our issue of February 17th. G 2IA is still retained by Mr. L. F. Ostler, 19, Windsor Terrace, Penarth, Glam.

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B C44.—A station at Schaerbeck, QSL *via* Reseau Belge.

D 7BZ.—C. F. Bauditz, Erikshus, Ringkiobing, Denmark.

F 8CL.—Mme. Lebaudy, 19, rue du Mangnan, Paris VIII.; operator A. M. de Vanelot, transmits on 35-50 metres (change of address).

F 8DA.—Albert Saumont, Cornin, Aix-les-Bains, Savoie (change of address).

I 1AT.—Alfonso Marcello, *via* 20 Settembre 89, Rome.

PE 6YX (Palestine). — Flight-Sergt. Macey, Command Headquarters, Bir Salem, Palestine.

TRANSMITTING NOTES AND QUERIES.