Magazine for October, Dr. N. W. McLachlan and G. A. V. Sowter give the results of a fairly complete experimental research on this type of apparatus for reproducing speech and music. They have found that when the edge of a diaphragm is reinforced so as to prevent radial modes of vibration at low frequencies, the lower register appears to be missing. This is due to the enhanced output in the upper register. Thus, although the diaphragm behaves as a rigid structure at low frequencies, it breaks up at the higher frequencies. To equalise the output, therefore, it is necessary to introduce a resonant member to assist the lower register. One method of doing this is to suspend the diaphragm from an annulus of suitable material and dimensions. The annulus acts as an auxiliary diaphragm at low frequencies and improves the reproduction. The upper register can be increased by the use of coils of small mass. This suggested the use of thin sheet metal; but experiments with aluminium sheet were not successful, as a large fraction of the register lying above 200 cycles per second was relatively weak. The reproduction lacked volume and was unpleasant to listen to. This shows the difficulty in obtaining a uniform register of wide compass owing to the load on the acoustic system being small and the acoustic resonances being numerous. In the exponential horn type the acoustic loading is relatively high and gives large damping. The horn is a scientific but not at the moment an economical solution of the problem of sound reproduction.

Rhenium Compounds.—Briscoe, Robinson, and Stoddart, in the November *Journal of the Chemical Society*, give details of some experiments on the supposed thallous thioper-rhenate, $TlReS_4$, recently described by Feit. They show that the product so described is not a thioper-rhenate but either a mixture of thallous per-rhenate and rhenium sulphide, or almost pure per-rhenate, according to the method of preparation. The same issue gives an account, by Briscoe, Robinson, and Rudge, of a new oxide of rhenium, the pentoxide, Re_2O_5, obtained by heating rhenium heptoxide with the metal in a sealed tube. It is a purplish-red crystalline powder, being bottle-green in thin flakes with transmitted light and showing a green streak. The new oxide is insoluble in dilute or concentrated sulphuric or hydrochloric acid and in caustic potash solution, but dissolves in warm dilute nitric acid and in fused caustic potash.

The Glass Electrode.—The *Journal of the Chemical Society* for November contains two papers by C. Morton on the use of valve electrometers and valve potentiometers with the glass electrode. The arrangements of the circuits are shown and the accuracy of the instruments has been increased. The application of the valve potentiometer to differential potentiometric titration with the glass electrode is described, with some experimental details. The new feature of the valve potentiometer is an increase of sensitivity with increasing resistance of the source of electromotive force, which makes it particularly suitable for use with the glass electrode. A sensitivity of 38 microamperes per millivolt was obtained. The null ballistic valve galvanometer described had complete zero stability and high sensitivity. The sensitivity was such that an electromotive force of 0·01 millivolt operating through 1000 megohms could be detected.

Astronomical Topics.

Great Meteor in Southern Europe.—The daily papers reported that a meteor of unusual size was seen in Portugal on the night between Dec. 28 and 29. No exact details are yet to hand; the reports describe it as greenish, three times the apparent diameter of the moon, and suggest that it may have fallen into the sea, as its light vanished with startling suddenness. It is to be hoped that it was seen by some trained observers.

Observations of the Leonids in England.—The fact that a fair display of these meteors was seen in England by Mr. J. P. M. Prentice at Stowmarket, Suffolk, and Mr. A. King at Ashby, Lincs, has been already noted in this column. Fuller details are given by Mr. King in the *Observatory* for December. The maximum, according to both observers, occurred rather late on the night between Nov. 16 and 17. None were seen on Nov. 9 and 11, one early on Nov. 14, while Mr. King saw eight early on Nov. 18; a fair shower was seen in Iowa early on Nov. 16, so that the earth takes more than two days in traversing a tolerably rich region of the swarm, though it takes only six hours in crossing the extremely crowded 'ortho-stream'.

The position of the radiant for the night Nov. 16-17 is given as R.A. 153·0°, Decl. +21·7°, by Mr. Prentice and R.A. 152°, Decl. +22·2°, by Mr. King. Prof. J. C. Adams adopted 149·2° +23·0° (the mean of six observers) for the 1866 display. Precession accounts for a change of +0·9°, - 0·3°; the remainder is due to the perturbations of the meteors. The longitude of their ascending node, given by the above observations, is near 233·9°, which agrees exactly with the value of the node of Tempel's comet predicted in the B.A.A. Handbook for 1932.

Cepheids and Long-Period Variable Stars.—*Scientia* for December contains an article on these stars by Mr. P. Doig. The two classes differ chiefly in temperature; the red stars of long period have temperatures of the order of 2000°, while the Cepheids range from 4000° (type *G*) to 10,000° (type *A*). The extreme rarity of these stars in space is pointed out; one star in a hundred thousand is a long-period variable, and the distances between them are of the order of 500 light years. The Cepheids are rarer still; accepting Shapley's distances (which are now thought to be somewhat too large), there is only one Cepheid in two million stars, and the distance between them averages 1500 light years. These figures suggest that variation of either kind lasts only for a small fraction of the whole life of a star.

Mr. Doig considers that the ordinary long-period stars vary from a similar cause to the Cepheid stars, but that the super-giant Betelgeux stands outside them, probably because of its excessively low density. He favours the theory of Sir James Jeans that the Cepheids are rotating stars on the point of dividing into two. This causes a wave to travel round the star's surface, and its shape is supposed to be steeper in front than in the rear, thus accounting for the steeper rise than fall in the light curve. The long-period stars are supposed to be at an earlier and less condensed stage than the Cepheids; in both of them a liquid or quasi-liquid core is postulated: it is suggested that in Betelgeux the density may be too low for the formation of such a core: in its case the variation arises from pulsation alone, in the other cases from a combination of pulsation with the phenomena arising from an elongated nucleus in the process of dividing.