I do not think it worth while to enter into further detail regarding the experiments in question.

The following summary gives the densities of the various gases relatively to air, all obtained by the same apparatus.* The last figure is of little significance.

Air free from H_2O and CO_2	1·00000
Oxygen	1·10535
Nitrogen and argon (atmospheric)	0·97209
Nitrogen.....	0·96737
Argon.....	1·37752
Carbonic oxide	0·96716
Carbonic anhydride	1·52909
Nitrous oxide	1·52951

The value obtained for hydrogen upon the same scale was 0·06960; but the researches of M. Leduc and of Professor Morley appear to show that this number is a little too high.

"On the Application of Harmonic Analysis to the Dynamical Theory of the Tides. Part II. On the general Integration of Laplace's Dynamical Equations." By S. S. HOUGH, M.A., Fellow of St. John's College, and Isaac Newton Student in the University of Cambridge. Communicated by Professor G. H. DARWIN, F.R.S. Received October 27, —Read December 9, 1897.

(Abstract.)

The former part of this paper deals with solutions of Laplace's differential equations for the tides symmetrical with respect to the axis of rotation. In the present part the restriction of symmetry is no longer imposed, and a general solution is sought, the law of depth of the ocean, however, being limited to the case which will admit of both the interior and exterior surfaces being regarded as spheroids of revolution. It is found that, subject to this limitation, if the solution sought represent a simple harmonic motion of any period whatsoever, and the height of the surface-waves be expressible as an infinite series of tesseral harmonics of the same rank but different orders, a linear relation connecting three successive coefficients of the series can be deduced similar to that obtained in Part I.†

From this relation a period-equation for the free vibrations is deduced, and a method of determining approximate values of the

* 'Roy. Soc. Proc.,' vol. 53, p. 148, 1893; vol. 55, p. 340, 1894; 'Phil. Trans.,' vol. 186, p. 189, 1895; 'Roy. Soc. Proc.,' vol. 59, p. 201, 1896.

† 'Roy. Soc. Proc.,' vol. 61, p. 236.

higher roots is given. The earlier roots are examined numerically, and tabulated for four different depths of the ocean for the types involving tesseral harmonics of rank 1 and 2, these types presenting special interest in connection with the diurnal and semi-diurnal forced tides respectively.

The types of free oscillation are found to be of two classes, distinguishable by their limiting forms when the rotation-period is indefinitely prolonged. In the former class the motion remains oscillatory when the period of rotation becomes infinitely long, while in the latter the "speed" of the oscillation always bears a finite ratio to the angular velocity of rotation, so that the oscillation will be replaced by a steady motion when the angular velocity of rotation is reduced to zero.

In dealing with the forced oscillations, the theorem of Laplace that in an ocean of uniform depth there will be no diurnal rise and fall at the surface is obtained and generalised as follows:—In an ocean of uniform depth the tides due to a disturbing potential of degree $s+1$ and rank s will involve no rise and fall at the surface if the period of the disturbing force be $\frac{1}{2}(s+1)$ sidereal days.

A theorem given by Professor Darwin with reference to the expression of the semi-diurnal tides in finite terms, as also Laplace's solution of the problem of the diurnal tides in an ocean of variable depth, is found to admit of similar generalisation.

The general problem of the forced tides due to any disturbing force derivable from a potential function in the cases where infinite series are required for the solution is treated analytically, and is further illustrated by numerical examples typical of the leading tidal constituents which occur on the earth, the results where possible being compared with those obtained by other methods.

"On Methods of making Magnets independent of Changes of Temperature; and some Experiments upon Abnormal or Negative Temperature Coefficients in Magnets." By J. Reginald Ashworth, B.Sc. Communicated by Arthur Schuster, F.R.S. Received October 29,—Read December 9, 1897.

The present investigation, which has been carried out in the Physical Laboratory of the Owens College, Manchester, was undertaken at Professor Schuster's suggestion with the object of ascertaining what kinds of iron and steel are least liable to a change of magnetic intensity under moderate fluctuations of temperature.

Specimens of steels containing severally tungsten, manganese, cobalt, and nickel, also cast irons, of different blends of pig irons, and