acquaintance with the subject is ensured. There is, perhaps, no department of farming which suffers so much from mismanagement as the poultry yard, yet the industry is of national importance. Mr. Watson reminds his readers that the annual value of farm poultry and eggs produced in the United States, according to the census returns of 1890, exceeded the annual value of the coal, iron, and mineral oil produced during the same period. In England we have no such statistics, but the Trade and Navigation Returns show that the imports of poultry and eggs to this country amounted last year to the value of 6,416,468*l*. The book has numerous illustrations.

R. W.

The Collected Scientific Papers of John Couch Adams. Vol. ii. Pp. xxxii+646. (Cambridge University Press, 1900.)

THE astronomical papers in this volume have been ably edited by Prof. Sampson. The first eighteen papers form a connected series on the lunar theory, and are substantially the lectures on that subject which Adams used to deliver at Cambridge. As an aid to the student they probably surpass any text-book that has been written on the subject. It has been said that the difficulties of the lunar theory begin where the text-books usually leave off, but Adams introduces the reader to many of the practical difficulties of the numerical work, such as the slow convergence and small denominators.

The other astronomical papers are miscellaneous in character and must have taxed the editor to the utmost, for, to quote the preface, "the papers . . . were almost devoid of arrangement. . . . It would have been a hopeless task . . . had not almost every page been dated. This permitted reference to a diary. . . ." Among the most interesting papers are those on Jupiter's satellites, a subject which Prof. Sampson has made his own, a paper on an infinite determinant in the motion of the moon's node which shows that Adams came nearer than anyone else to anticipating Hill in his treatment of the lunar theory, and some papers on the moon's secular acceleration.

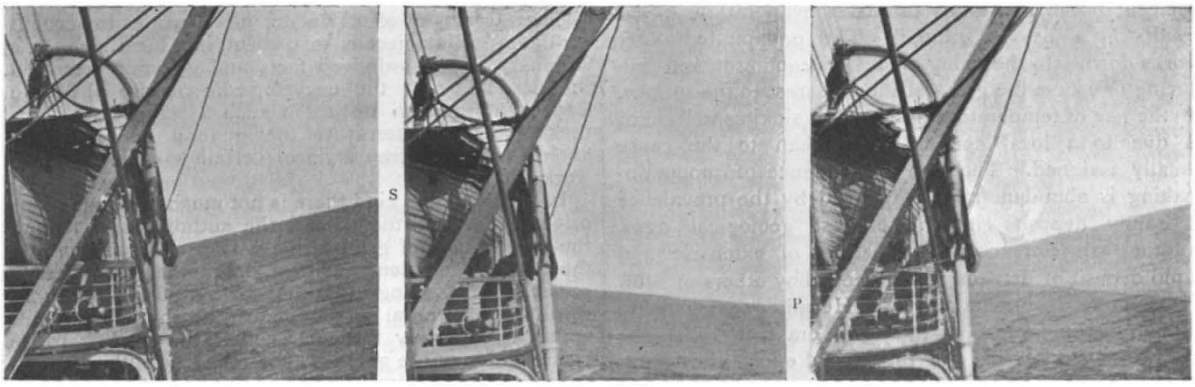
The second and larger half of the volume is devoted to Adams' papers on terrestrial magnetism edited by his brother, Prof. W. C. Adams. These consist chiefly in a determination of the Gaussian magnetic constants, a problem for which the material is even now scanty, owing to the fact that such magnetic observatories as there are, are for the most part closely grouped together in one portion of the earth's surface.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Rolling Angle of a Ship found by Photography.

WHILE crossing the Pacific Ocean between Auckland, N.Z., and Sydney, N.S.W., in the Union s.s. *Mokoia*, I wished to determine, if possible, the rolling angle of the ship by some means, other than that of the inclinometer, which the captain allowed me to inspect from time to time. As the period of rolling was long, it seemed quite possible that an ordinary kodak camera might be manipulated and a fresh film introduced, between the end of the roll to port and then to starboard. This turned out to be the case: the results are shown in the pictures A and B, which indicate the inclination of the ship to the horizon, to starboard and to port, respectively. The films when developed and finished were superposed, so that the pictures of the ship in each photograph coincided. The print made from this combination of the pictures B and A gives the composite picture C, in which the horizon in picture A is separated from that in picture B by the angle shown, which when measured with a circular protractor was found to be 19° 6′. After a few trials, no difficulty was experienced in making the exposure at the right time, viz., at the ends of a roll. Better results might have been obtained on dry plates, as films do not stand high temperatures well. The film B is very slightly distorted. The angle may also be found by means of a single picture; in this case a small stop should be used, and the exposure made for a longer period than that of one roll; the angle then appears as a rather faint fan, but the definition at the ends of the roll is not so well defined as when two pictures are made and then superposed.



A B C

Union Steamship Co.'s *Mokoia*. Rolling angle found by photography. A is a picture taken at the instant of the end of rolling to the right, S: B is a picture taken at the instant of the end of rolling to the left, P; C is a composite picture made by superposing the two films, A and B. The pictures of the ship are made to coincide, thus the angle between the two horizons in A and B is found. Lat. 34° 27′ S. Long. 157° 43′ E. To Sydney 325 miles.

Since my return to England, I find that M. Huet, of the French Navy, used a photographic method for indicating the rolling angle. But as his work on the subject is only in the hands of the French Naval Department, it cannot be consulted. His method is referred to in Sir W. White's "Manual of Naval Architecture." After obtaining the results shown in picture C, I devised an apparatus whereby the inclinometer angle may be simultaneously compared with that found by the photographic method. By this means, the positions of the inclinometer are also recorded on the films on which the horizon appears, so that the angle shown by the inclinometer may be at once compared with the angle found by the photographic method, which is entirely free from the errors inherent in pendulum inclinometers.

F. J. JERVIS-SMITH.

British Instruments at the Paris Exhibition.

IN connection with the English exhibits at the Paris Exhibition last year, it may be worth while to quote the concluding paragraph of this part of the impartial and very carefully con-