

another bar of identical length, shape, and size. The total resistance when the two bars are in contact is about three-quarters the resistance of one bar alone. As the gap is increased, there is at first a small decrease in the resistance. With a gap equal to the thickness of one bar, the total resistance is the same as when the bars are in contact, and becomes equal to the resistance of one bar alone when the gap is twice the thickness of one bar. With a gap of sixteen times the thickness, the total resistance is only 5 per cent. less than double the resistance of the single bar. It would appear from these experiments that the total resistance of struts, following in the same run of air and more than thirty times the thickness apart, may be assumed to be the same as the total resistance of the separate struts in a clear run of air.

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A 1914 supplement to their "General Apparatus Catalogue, 1910," has been issued by Messrs. Heynes Mathew, Ltd., of Cape Town. The new list of apparatus affords an instructive illustration of recent progress in South African education. The improved methods of teaching geography which have become established in this country, for example, are being taken up in South African schools, and a demand for material for lessons in practical geography is met by a section in the new catalogue being devoted to this subject. Similarly this firm is prepared to supply equipment for practical work in botany and other branches of science.

#### OUR ASTRONOMICAL COLUMN.

PLANETARY OBSERVATIONS AT THE LOWELL OBSERVATORY.—In *Astronomische Nachrichten*, No. 4710, a telegram is published from Prof. Lowell relating to observations on the satellites of Saturn and on Martian features. With regard to the former it is stated, "Tethys and Dione variable, range quarter magnitudes, periods coincident with revolution." Relating to the latter, the telegram says:—"The full aperture of the 40-in. reflector of the Lowell Observatory only now equipped for visible work shows the canals of Mars as fine direct geometrical lines, thus corroborating the work of smaller apertures. This should dispose of the erroneous idea that [such] apertures do not disclose these remarkable features."

WAVE-LENGTHS OF CHROMOSPHERIC LINES.—It was known soon after the event of the total solar eclipse of August 30, 1905, that Prof. S. A. Mitchell, who was in charge of the numerous spectroscopic instruments which were employed in the United States Naval Observatory eclipse expedition, had secured some most excellent photographs of the spectrum of the chromosphere. It is not until now, however, that

the results of their reduction are published, and these are printed in the current number of *The Astrophysical Journal* (December 1913). The photographs discussed were secured with gratings, both parabolic and plane, and the present paper deals with the reduction of one photograph from each instrument for the purpose of giving chromospheric wave-lengths, intensities, &c., "with as great an accuracy as possible." This communication is finely illustrated with plates showing different portions of the photographs, and they are demonstrative of the very fine adjustment of the instrument during use. A very long table shows the wave-lengths compared with Rowland, and the heights of the chromospheric lines, the corresponding elements and intensities according to Rowland, chromosphere, arc, and spark. No fewer than 2841 lines are tabulated in the chromospheric spectrum, and this above many faint lines which were measured; no lines were included unless they were measured in two or more separate measurements. The paper is full of many interesting summaries of these chromospheric lines arranged according to elements, atomic weights, &c. The conclusions arrived at are important, but it is impossible to repeat them all here. Some of them are as follows:—The "flash" spectrum is a reversal of the Fraunhofer spectrum. The "flash" is not an instantaneous appearance, but the chromospheric lines appear gradually, the highest layers first, the lowest last. The "reversing layer," which contains the majority of the low-level lines of the chromosphere, is about 600 km. in height. Wave-lengths in chromospheric and solar spectra are practically identical, the chromospheric spectrum differing greatly from the solar spectrum in the intensities of the lines. The differences of intensity find a ready explanation in the heights to which the vapours ascend. The enhanced lines are especially prominent in the chromosphere, and these are said to become brighter mainly because at the heights to which they ascend the vapours are mixed with hydrogen at reduced pressure.

THE ANNUAL OF THE BUREAU DES LONGITUDES.—The annual published by the Bureau des Longitudes is familiar to all readers of this column, and the present issue for 1914 will no doubt be found as useful for reference as its predecessors. In addition to the usual astronomical, physical, and chemical data embodied in these small pages, will be found articles of astronomical interest. Thus M. Deslandres gives a *résumé* of solar physics, M. P. Hatt contributes a short article on the deformation of images in telescopes, while M. G. Bigourdan writes very fully on the day and its subdivisions, the hour-zones and the international association of the hour. The seventeenth meeting of the International Geodetic Association is described by M. B. Baillaud.

#### WHAT IS PSYCHO-ANALYSIS?

PERHAPS the most important and startling scientific theory of modern times is that which Prof. Sigmund Freud, of Vienna, has formed to explain the workings of the human mind. Many thinkers, indeed, hail Freud as the Darwin of the mind, and consider that his views are destined to transform the science of psychology. He certainly has succeeded in explaining such obscure and widely differing phenomena as dreams, wit, the seemingly accidental mistakes in speaking and writing which people so often make, the obsessions and other symptoms found in a large class of mental diseases, and the spontaneous likes and dislikes which we all experience and find so puzzling, in terms of one single hypothesis. Put quite briefly, this is the hypothesis of "the unconscious mind," something quite distinct