

which, as he points out, affords a direct comparison between the constant pressure scale of any gas and the absolute scale, but which cannot be applied directly to the constant volume temperatures without knowing the isothermal equation of the gas. He discusses the various empirical assumed formulæ for the "cooling effect," and the conclusions deducible from them. The relations of actual gas scales to the thermodynamical scale are set forth, but the author considers that the time is approaching when a mere reference of temperatures to "the gas scale" will be insufficient. Mr. Dickson's paper deals with the inversion temperature of the Joule-Kelvin effect both for small and for finite differences of pressure, with special reference to Olszewski's experiments.

THE *Physikalische Zeitschrift* for February contains a description, by Dr. C. W. Lutz, of the filament electrometer invented by himself and Dr. M. Edelmann, jun. The filament consists of a Wollaston platinum wire of about 0.001 mm. diameter suspended vertically between two narrow vertical plates, one of which can be put into electrical connection with the wire, while the other may be connected either to earth or to some source at constant potential. The repulsion of the filament from the former plate when both are charged is observed through a small microscope magnifying eighty times, and by suitably adjusting the tension of the filament the range of the instrument may be made to extend from 2 volts to 1000 volts. It is very compact, and its electrical capacity is less than 10 cm.

MR. C. W. BURROWS, of the United States Bureau of Standards, after extensive experiments on the various methods in use for demagnetising iron in magnetic testing, comes to the conclusion that the following is the best method of procedure:—the current should be reversed about twice a second, and diminished at such a rate that the decrease of induction is as nearly as possible the same each second, the process to last about ninety seconds. In obtaining the magnetisation curve of the specimen, the magnetisation current should be reversed about the same number of times, and near the end of the series two throws of the ballistic galvanometer about twenty-five reversals apart should be observed. If they agree, they may be taken as representing the normal induction. The next observation may be made by this method without its being necessary to again demagnetise the specimen (Bulletin for January).

A NEW and cheap edition (price 5s. net) of Mr. Benjamin Kidd's "Principles of Western Civilisation" has just been published by Messrs. Macmillan and Co., Ltd. The original work was reviewed at length in *NATURE* of April 24, 1902 (vol. lxx., Supp., p. vi). In a long introduction, which appears for the first time in the new edition, Mr. Kidd replies to points raised by his critics, and refers to some differences between the evolution of the individual and of a social organism. Mr. Kidd has been appointed to deliver the Herbert Spencer lecture for 1908 before the University of Oxford in May or June next. Three lectures have already been given, namely, in 1905 by Mr. Frederic Harrison, in 1906 by Mr. Auberon Herbert, and in 1907 by Mr. Francis Galton, F.R.S.

#### OUR ASTRONOMICAL COLUMN.

SATURN'S RINGS.—The January number of the *Astro-physical Journal* (vol. xxvii., No. 1, p. 35) contains an article by Prof. Barnard in which he describes and discusses his recent observations of Saturn's rings with the 40-inch refractor of the Lick Observatory. On July 2,

1907, Prof. Barnard found that, although no direct sunlight was falling on its earthward side, the entire surface of the ring was distinctly visible. On each ansa were two prominent condensations symmetrically placed with respect to the ball. On October 4—when the earth again passed back to the shadow side of the ring—and for some days after, the ring was perfectly linear, and the condensations, which, if they were real masses on the ring system, should then have been best seen, had disappeared.

From his observations Prof. Barnard concludes that it is not merely the illuminated edge of the system which we see when the earth is on the shadow side, but the feebly luminous surface of the ring itself viewed very obliquely. The luminosity is caused by the transmittance, by repeated reflections from the particles comprising the ring, of sunlight. Adopting this interpretation, the condensations are produced by the outer brighter part of the inner ring, the higher illumination of which, as seen ordinarily by directly reflected light, or, as during these observations, by light which had by successive reflections passed through the ring, is probably due to the denser agglomeration of its particles.

THE OBJECTIVE PRISM IN SOLAR SPECTROSCOPY.—A device by which double equatorial refractors, as employed for stellar photography, may be adapted to serve as objective-prism spectroscopes in solar observations, is described by M. E. Schaer in No. 4233 of the *Astronomische Nachrichten* (p. 137, February 15). The solar rays, passing through the first objective, are, by two reflections by plane mirrors, projected along the axis of the second telescope. Before reaching the second tube the reflected image is, however, intercepted by a slit plate, so that only the narrow beam which passes through the slit traverses the tube to the object glass. On passing through the latter the light falls upon the objective prism, which is silvered on the posterior face, so that after two dispersions and one reflection it passes again through the object-glass and down the tube. The solar spectrum thus produced may be viewed with an ocular, or an arrangement for photographing it may be substituted. By the interposition of a second slit in front of the photographic plate and mechanical movements this instrument may be used as a photospectroheliograph.

UNIFORMLY DISTRIBUTED DARK SPOTS ON JUPITER.—In an article which appears in the January number of the *Bulletin de la Société astronomique de France*, Mr. Scriven Bolton describes a number of Jovian phenomena observed by him in recent years, and pays particular attention to a series of dark markings which are symmetrically distributed along the northern edge of the south equatorial and the southern edge of the north equatorial bands. As these spots occur in the same longitudes on each band and partake of a common motion, Mr. Bolton concludes that they have an objective existence. Generally, the alternate spots on the opposite bands are joined by festoons of dark material which cross the equatorial regions obliquely at angles of 45°. The spots on the southern band present the more marked uniformity, there being twenty-four of them at regular intervals throughout the whole length of this band. Drawings made on June 15, 1899, November 4, 1903, and February 23, 1907, respectively, are reproduced to illustrate Mr. Bolton's description.

DOUBLE-STAR OBSERVATIONS.—Finding that the published magnitudes of the components of double stars are generally only given approximately, Dr. Joel Stebbins, director of the Urbana Observatory, Illinois, U.S.A., decided to make a number of systematic photometric observations of them, and he now publishes the results in the *Bulletin of the University of Illinois* (vol. iv., No. 25, 1907). After describing the instruments employed and the system of observation, Dr. Stebbins gives a catalogue of the 107 double stars which he observed, and discusses the probable errors and the differences from the Harvard observations of the same objects. On comparing the results with other available observations, no evidence of variability could, with certainty, be detected, and in the case of  $\theta^1$  Orionis—the Trapezium stars—it appears certain that no change greater than 0.08 magnitude has taken place since the Harvard observations were made in 1878.