has made an improvement here, in the arrangement of the logarithms of numbers in single entry. The logarithmic sines and tangents are given for every second of arc up to 3° 0′ 0″; and the type of the main trigonometric table, together with its very convenient tables of proportional parts, makes this superior, on the whole, to any other similar one. A material improvement has also been introduced in the table of addition logarithms.

The formulae at the end are convenient, and not superfluous. They are elegantly arranged (see the black-faced type on p. 157, for example), and are such as are always needed. The table of constants, as in his six-place tables, is very full and most practical. A few electrical data might, perhaps, have replaced Gauss' formula for the date of Easter with advantage. This is, no doubt, the very best five-place table for general use, and exactly suited for use with students.

Topographical surveying. New York, *D. Van Nostrand*, 1884. (Van Nostrand science series, No. 72.) 210 p. 24°.

The four papers which have been republished in this book, upon methods in surveying, more particularly adapted to topographical work, were first printed in *Van Nostrand's engineering magazine*. The one by George J. Specht explains the use of the stadia, with a telescope having additional horizontal wires, so that distances may be obtained without measurement. The application of photography to topographical surveying, as developed by the French engineers, so that the adjustment of two or more views of the same objects in a landscape to their proper positions on a sheet will enable these objects to be platted with their proper distances and elevations, is explained by Prof. A. S. Hardy. Applications of the geometry of position to some problems in surveying are given by John B. McMaster, — a method of solution which depends upon intersections of lines, and does not seem so convenient, expeditious, or accurate as other methods long and well known. The use of rectangular coordinates for the location and description of points is urged and illustrated by Henry F. Walling. All of these papers are necessarily brief, but serve to give some useful hints to the topographer. A more careful proof-reading would save a young surveyor from a little perplexity in knowing what is meant by some statements.

Dynamic electricity, including, 1°, Some points in electric lighting, by Dr. John Hopkinson; *2°, On the measurement of electricity for commercial purposes,* by James N. Shoolbred; *3°, Electric-light arithmetic,* by R. E. Day. New York, *Van Nostrand*, 1884. 4+167 p. 24°.

Dr. Hopkinson's lecture before the Institution of civil engineers is an excellent treatment of the many analogies between the mechanical theory of electricity and the science of hydraulics. The student will find in this lecture a description of Maxwell's apparatus for illustrating the laws of induction, which has not found its way into any other treatise on electricity. A very pretty analogy between the action of the hydraulic ram and the extra current of induction is also given by Dr. Hopkinson. It is also shown how alternating dynamo machines can be run on the same circuit in order to assist each other, — a problem which has been considered by some unsolvable. The equations which illustrate the theory of the dynamo-electric engine are grouped together, and their practical use is shown. The author briefly refers to his improvements in the Edison dynamo, and gives an estimate of the cost of incandescent lighting. Dr. Hopkinson thinks that the efficiency of the carbon-filament lamp will be very much increased. These lamps have not been in the market more than three years, and it is reasonable to suppose that the coming three years will see great improvements in them. The prospect that the electrical incandescent light will be the light of the future seems a very good one.

The paper by Mr. Shoolbred gives an excellent account of the various meters invented by Edison, Sprague, Hopkinson, Boys, Ayrton and Perry, and others. Mr. Day's treatise on electric-light arithmetic is a useful one for the electrical engineer.

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

U. S. geological survey.

Division of chemistry. — Prof. F. W. Clarke is examining a collection of waters from the Virginia hot springs, and is also beginning a series of experiments upon the synthesis of silicates by the wet method. —— Dr. T. M. Chatard has completed a research upon a new method of estimation of alkalies in silicate analyses.

Dr. F. A. Gooch began work in the laboratory on the 2d of April, and since that time has been occupied almost exclusively with analyses of spring-deposits and rocks collected in the Yellowstone national park. He has completed analyses of waters from the Giantess geyser, and the Excelsior spring (or geyser), both in the park, and of a basalt from the same region, and a rhyolite from Washoe, Nev. —— Dr. Henry Erni also began work in April, and has been engaged in various mineral determinations of a qualitative character; notably, upon an alleged tin ore from Clay county, Ala., and phosphatic rocks and marls from Mississippi and Alabama.

The following analyses have also been made at the laboratory at Washington: galenite from near Washington; chlorite from Georgetown, D.C.; nephrite from Point Barrow, Alaska; margarite from Gainesville, Ga., and Iredell county, N.C.; copper ore from Lee's ferry, Arizona; fulgurite from Mount Thielson in Oregon; and water from Bear River in Utah. The latter was collected by Mr. I. C. Russell, and proves to be an ordinary river-water; the greatest impurity being carbonate of lime, of which there are contained .1080 of a gram to the litre, the total solid contents being .1845 of a gram to the litre. The fulgurite was collected by Mr. E. E. Hayden, and is being made the subject of special study by Mr. J. S. Diller. Some of the results of his examination will be given in a future number.

In the New-Haven laboratory, during March, Messrs. Barus and Hallock continued their high-temperature observations. Most of the work has been done with thermo-electric couples. The boiling-point of mercury has been redetermined with great accuracy. During April the boiling-point of zinc was the subject of study. It seems probable, from the present outlook, that these high-temperature researches will be very satisfactory in their results, and that they will render possible a wide range of investigations hitherto impracticable in the domain of physical geology.

In the laboratory at Denver, Mr. Hillebrand has been busy with the chemical examination of rocks from the Silver-Cliff district. He has proved the existence, at this locality, of several minerals not hitherto known to occur in North America. The results of his examinations also point to the existence, in one of these minerals, of silver in a very rare form, if, indeed, not in a combination hitherto unknown in the mineral kingdom. In March, eleven rock specimens were analyzed, and a number of interesting minerals from Ouray, Col. (some of them probably new to science), were examined.

In the laboratory at San Francisco, Dr. Melville was busy, in March and April, with routine work connected with Mr. Becker's investigations.

Paleontology. — Prof. O. C. Marsh, in April, had two field-parties at work in Jurassic beds in Wyoming Territory, and one in the Jurassic in Colorado. Although the weather was very unfavorable during a great part of the time, interesting results were obtained.

RECENT PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Engineers' club, Philadelphia.

May 17. — The secretary presented for Mr. Edward Parrish an illustrated account of the effect of sea-water on the iron of Brandywine shoal lighthouse. This lighthouse was built in 1849–50, near the mouth of the Delaware Bay, and stands in about six feet of water. It was the first screw-pile structure built in the United States, and had but few predecessors in the world. The house is supported on nine piles of hammered iron, surrounded by fifty-two piles of rolled iron, acting as an ice-fender. The whole is strengthened by systems of braces and ties. The effect of the water on the iron, continually submerged, has been to produce longitudinal seams or grooves, with occasional holes on the surface, in some cases seriously reducing the strength. The most extensive corrosion is observed on the hammered iron. Round rods in the air are altered in section, approximating an irregular polygon with longitudinal grooves. —— Prof. L. M. Haupt read a paper on rapid transit, giving valuable data relative to the effects of velocity of movement on the ratio of increase of population, and contrasting the situation in New York and Philadelphia. In comparing the topography of the two cities, a silhouette of Manhattan Island was laid on a map of Philadelphia (same scale), showing that the island, from the Battery to 150th Street (nine miles and a half), only extended from League Island to Erie Avenue. From this it was inferred, that, if there was need for elevated roads in New York, there was greater need for them in Philadelphia, "as the necessity is proportional to the extent of surface of a city, and the distance of its residents from the business centres." The former commercial supremacy of Philadelphia was considered, with the reasons for the rapid decline in the ratio of increase of population, which has diminished from seventy-nine per cent in the decade 1840–50, to twenty-five per cent for 1870–80; while Camden's population has increased from fifty-one per cent in 1850–60, to a hundred and eight per cent in 1870–80. In short, Philadelphia is overflowing because her time-limits of travel are too restricted. Assuming the time-limit at thirty minutes each way, or one hour per day, at the usual velocities of travel, the limits of the 'Pedestrian city' were found to be a square with diagonals of 4 miles, and area 8 square miles; 'Horse-car or cable city,' were found to be a square with diagonals of 6 miles, and area 18 square miles; 'Elevated railroad city,'