

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico... \$3 00
One copy, six months, for the U. S., Canada or Mexico... 1 50
One copy, one year to any foreign country belonging to Postal Union... 4 00

The Scientific American Supplement.

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, for the U. S., Canada or Mexico. \$6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country. See prospectus, last page.

Building Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plans, perspective views, and sheets of constructive details, pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To builders and all who contemplate building this work is invaluable. Has the largest circulation of any architectural publication in the world.

Spanish Edition of the Scientific American.

LA AMERICA CIENTIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number of La America is profusely illustrated. It is the finest scientific, industrial trade paper printed in the Spanish language. It circulates throughout Cuba, the West Indies, Mexico Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. \$3.00 a year, post paid to any part of the world. Single copies 25 cents. See prospectus.

The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO. Readers are specially requested to notify the publishers in case of any failure, delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, MAY 23, 1891.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'Armor trial, new', 'Blackboard covering, Bergmann's', 'Bridge, proposed Hudson River suspension*', 'Car coupler, Marshall's', etc.

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 803.

For the Week Ending May 23, 1891.

Price 10 cents. For sale by all newsdealers.

Table listing sections such as 'I. ASTRONOMY.—The Great Equatorial of the Paris Observatory.', 'II. CHEMISTRY.—An Apparatus for Heating Substances in Glass Tubes under Pressure.', 'III. CIVIL ENGINEERING.—The Compressed Air System of Paris.', etc.

ORIGINAL WORK IN AMERICA.

COLUMBIA COLLEGE, NEW YORK CITY.

Resuming the narrative of our inquiries: Seth Low, LL.D., President of Columbia College, said: "We at present are in an unsettled condition. Radical changes are taking place and entire reorganization is in progress; and so, with regard to what the professors in the college are doing in the way of original work, I am not just now able to speak. It is my opinion, however, that this is indeed an important function of the ideal university. The college, is concerned with pedagogics, with the work of teaching what is already known. The university is concerned with higher things than that. Its duty is to add to the sum of human knowledge. The college, of course, is the seed whence springs the university, but it is for the sake of the tree that the college exists. I do not mean by this to deprecate the work of undergraduate instruction. This is as essential, as honorable, a vocation as it has ever been. But for those members of Columbia's faculty who have given promise of good work in this field, it is our aim to secure the time and means whereby they can do original work in their respective branches. One of the great distinctions between a college and a university is the fact that the college concerns itself with teaching what is already known, while the university seeks to widen the domain of what is known and taught. In order to carry on this work in scientific investigation, a new system of fellowships has been established. After July 1, 1891, there will be twelve fellowships, after July, 1892, eighteen, and after July, 1893, twenty-four fellowships, each of the value of five hundred dollars a year. They are to be awarded by the president, with the advice of the University Council, to those applicants who give evidence of fitness to pursue courses of higher study and investigation, and the competition for these prizes is to be open to graduates of any college or scientific school. The fellows so appointed are to hold office for one year. No fellow, moreover, shall be permitted to accept remunerative employment except by permission of the president."

Elwyn Waller, A.M., E.M., Ph.D., Professor of Analytical Chemistry in the Columbia College School of Mines, said: "The work of original investigation in science at Columbia is not as extensive as we would wish for, owing to the fact that the time which ought to be devoted by the professors to research is taken up by the routine duties of instruction. This is true of all the departments in this school. There is a desire on the part of the officers to engage in this work, but we are all handicapped by lack of time. In spite of this, however, fairly good work is being done in several of the branches of natural science. In this department I have been engaged for some time with the study of lithia mineral waters, and the method of determining the presence of lithia in liquids bearing that name. As a result of my investigations, I have found that many of the liquids known and advertised as lithia waters really contain a very small quantity of this ingredient. A study has also been conducted in this laboratory of the determination of manganese and zinc as pyrophosphates. The plan for the determination of these metals after precipitation as carbonates, although very tedious and troublesome, has always been the favorite one with chemists. But a method involving less trouble has been called for, and to meet this demand, the precipitate of manganese as pyrophosphates has met with much favor. A question of great uncertainty has been the solubility of the precipitate in ammonium salts and the volatility of the precipitate in ignition. In order to reach some conclusion in this matter, three small quantities of pure zinc were weighed out and dissolved respectively in sulphuric, hydrochloric and nitric acid. The solutions were then diluted to known bulk, thoroughly mixed and aliquot portions taken for experiment. Precipitates of the solutions were then filtered and washed by decantation. Finally, when no reaction was given by the washings for phosphates, the precipitate by the aid of some nitric acid was dissolved and the solution filtered and poured into a weighed platinum dish; the zinc being rinsed into the dish with distilled water. The dish and its contents were then weighed, after evaporation and careful ignition. The object of this was to reduce the action of burning filter paper upon the precipitate, thus avoiding the consequent loss of zinc. The conclusion is that the disregard of this precaution and the consequent loss of zinc was the cause of the former opinion that the precipitate was partially volatilized on ignition. We have also been engaged in experiments on asphalt, for paving and other purposes. An apparatus has been devised to test the hardness of this substance; and many interesting experiments are being made in this comparatively new field."

Nathaniel L. Britton, E.M., Ph.D., Professor of Botany in the Columbia School of Mines, said: "I am engaged at present with the investigation of the flora of Bolivia, based on the extensive collections made in that country by Dr. H. H. Rusby, in 1885-1886, and the collections now being made there by Mr. Miguel Bang. I am also making a study of miscellaneous northern plants including the genera Lechea, Lespedeza, and Rynchospora. Mrs. N. L. Britton, voluntary assistant in

the Botanical Laboratory, is now investigating the mosses of North America, based on the collections recently made by Mr. J. B. Leiber, in Idaho. Dr. Morong, Curator of the Laboratory, is at work on the flora of Paraguay, based on collections made in that country by himself during the past three years. He is also making a study of the various North American plants with especial reference to aquatics, and a study of the order Haloragaeae, a work now nearing completion. Among other studies, an important one is that now being carried on at the laboratory by Miss A. M. Vail, an interesting work on the North American species of the genus Desmodium. Besides this, study is being made of the North American species of the genus Polygala and the genus Xyris."

Ogden N. Rood, A.M., Professor of Physics in Columbia, said: "I have almost completed an optical investigation with the object of determining quantitatively the relative intensities of colored lights which are not complementary, also a study of the contrast of color, quantitatively. Besides this, my assistants are engaged on a number of subjects. Among these are: a study of the conducting powers of liquids for electricity, by means of the Kohlrausch method; an investigation of the methods of measuring the velocity of sound, and a study of the electrical resistance of contacts. No member of this department is engaged in any commercial or outside work whatever. There is one feature of work in which some college professors are accustomed to indulge, and which cannot be too strongly condemned. That is when a man under salary from a great university, trading on the name and fame of the institution, holds himself in readiness to testify as expert witness for a pecuniary consideration. This practice, I take it, is one which ought to be discouraged by the authorities of the colleges where it exists. The time of a college professor should be devoted to teaching and to original research, to the interests of the students, and the advancement of science. The office should not be prostituted in such a manner by self-seekers and mercenary men. There is, so far as I know, only one institution where this practice is not known, that is at Johns Hopkins. The only reason that makes such expert testimony valuable in the eyes of the jury is the fact that the witness is an officer in a prominent institution of learning; and this looks, to me, like trading in the reputation of the college, and a great breach of, to say the least, good taste."

PROGRESS OF STEAM ENGINEERING.

We have received from the Babcock & Wilcox Company a list of some of the high pressure boilers put out by them, which well illustrates the advances made within the last few years in the economies of steam engineering. The list gives the location of some seventy-five boilers, all of which are in constant use, carrying pressures of 200 pounds per square inch to 250 pounds and over. In one instance 300 pounds is regularly carried. These are mostly used for compound triple expansion and quadruple expansion engines. It shows that it is not only practicable but economical to carry such high pressures, if the engine plant is properly designed.

Theatrical Face Paints.

Torjesen gives the following formulæ:

White.—Oxide of zinc, subnitrate of bismuth, and plumbate of alumina—of each, 1 oz. Mix, and make into a paste with almond oil (5 to 6 drachms required), and perfume with 12 minims of peppermint oil, 12 grains of camphor, and a drachm of ess. bouquet.

Bright Red.—Oxide of zinc, subnitrate of bismuth, and plumbate of alumina—of each, 10 drachms; eosin, 2 1/2 grains, dissolved in a drachm of ess. bouquet; oil of peppermint, 12 minims; camphor, 12 grains; almond oil, a sufficiency to make a paste. Mix as above.

Deep Bordeaux Red.—Oxide of zinc, subnitrate of bismuth, plumbate of alumina—of each, 15 drachms; oil of peppermint, 12 minims; camphor, 12 grains; carmine, 30 grains (dissolved in 80 minims of solution of ammonia); almond oil, a sufficiency; ess. bouquet, 1 1/2 drachms. Mix.

Skin Color.—Vermilion, 3 drachms; tincture of saffron, 2 drachms; powdered orris, 5 drachms; precipitated chalk and oxide of zinc, of each, 20 drachms; camphor, 20 grains; oil of peppermint, 20 minims; ess. bouquet, 1 1/2 drachms; almond oil, a sufficiency. Mix.

Black.—Drop black (made by burning camphor and washing the soot with spirit), 2 drachms; almond oil, 2 drachms; coconut oil, 6 drachms. Mix, perfume, and cast into sticks.

It Pays to Advertise in the Scientific American.

In a recent letter to the publishers of this paper the Felt & Tarrant Manufacturing Company, of Chicago, writes:

"We hardly think it advisable to change our advertisement in the SCIENTIFIC AMERICAN, as the present wording brings us a constant stream of inquiries and numerous sales. It has brought us orders direct from South America, Brazil, Mexico, Peru, India, and all principal countries of Europe, and is by great odds the best advertising medium we have yet found."