

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included... \$3 20
One copy, six months, postage included... 1 60
Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid. Remit by postal order. Address MUNN & CO., 37 Park Row, New York.

To Advertisers.—The regular circulation of the SCIENTIFIC AMERICAN is now Fifty Thousand Copies weekly. For 1880 the publishers anticipate a still larger circulation.

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, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired. The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

NEW YORK, SATURDAY, NOVEMBER 20, 1880.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'Adulteration of artists' materials', 'Immigration a source of wealth', 'Agricultural inventions', etc., with corresponding page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 255.

For the Week ending November 20, 1880.

Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement by section: I. ENGINEERING AND MECHANICS, II. TECHNOLOGY AND CHEMISTRY, III. MEDICINE AND SURGERY, IV. ELECTRICITY, LIGHT, ETC., V. NATURAL HISTORY, ETC., VI. ART, ARCHITECTURE, ETC., VII. GEOLOGY, VIII. MISCELLANEOUS, IX. AGRICULTURE.

AMERICAN MECHANICAL ENGINEERS.

The first annual meeting of the American Society of Mechanical Engineers began in this city November 4. About sixty members were present. Prof. R. H. Thurston, of Stevens Institute, presided. The secretary reported an enrollment of two life members, one hundred and sixty-one active members, seventeen associates, and nine juniors. The president submitted the following list of papers to be read before the society:

"Friction as a Factor in Motive Power Expenses," Prof. John E. Sweet; "An Adaptation of Bessemer Plant to the Basic Process," Prof. Holly; "Measurement of the Friction of Lubricating Oils," C. J. H. Woodbury; "Strength in Machine Tools," Charles T. Porter; "The Efficiency of the Crank" and "Adjustment of Cushion in Engines," S. W. Robinson; "A New Type of Regenerative Metallurgical Furnace," Prof. Reese; "Standard Screw Threads," George R. Stetson; "On Practical Methods for Greater Economy of Fuel in the Steam Engine," Allan Stirling; "Putting a New Crankpin in the Crank of the Steamship Knickerbocker," Lewis Johnson; "Mechanical Correctness," Charles A. Hague; "Packing for Piston-rods and Valve-stems," Prof. Lyne; "Study of the Mechanical Theory of Heat," Prof. Wolff; "The Metric System—Is it Wise to Introduce it into Our Machine Shops?" Coleman Sellers.

The first session was devoted to the first and the last paper on the list, Professor Sweet leading by special request made in consideration of his eminent services in connection with the organization of the society. Mr. Sellers took strong ground against the adoption of the metric system as ill-adapted to the use of machinists.

The president's address was delivered in the evening. In it Professor Thurston reviewed at considerable length the conditions and professional needs which had led to the organization of the society, and spoke of its objects, purposes, and prospects. He said:

"The class of men from whose ranks the membership of this society is principally drawn directs the labors of nearly three millions of prosperous working people in a third of a million mills, and other manufactories are responsible for the preservation and profitable utilization of \$2,500,000,000 worth of capital, direct the payment of more than \$1,000,000,000 in annual wages, the consumption of \$3,000,000,000 worth of raw materials, and the output of \$5,000,000,000 worth of manufactured products. Fifty thousand steam engines, and more than an equal number of water-wheels at their command, turn the machinery of these hundreds of thousands of workshops that everywhere dot our land, giving quietly and docilely the strength of 3,000,000 of horses, night or day, or all night and all day, whenever the demand comes for their wonderful power. This society, when it shall have become properly representative of such a class, may well claim position and consideration. We are now called upon to do our part in the work so well begun by our predecessors, and so splendidly carried on by our older colleagues during the past generation. We have for our work the cheapening and improvement of all textile fabrics, the perfecting of metallurgical processes, the introduction of the electric light, the increase of facilities for rapid and cheap transportation, the invention of new and more efficient forms of steam and gas engines, of means for relieving women from drudgery and for shortening the hours of labor for hard-working men, the increase in the productive power of all mechanical devices, aiding in the great task of recording and disseminating useful knowledge; and ours is the duty to discover facts and to deduce laws bearing upon every application of mechanical science and art in field, workshop, school, or household."

Following the President's address was a debate on the paper read by Prof. Sweet at the first session; after which Mr. Holly read the second paper on the list. He said that the Bessemer plant in use in America produced twice as large results as the plant in Germany, France, and Belgium, partly, he thought, because our plant was of better make and partly because it was more skillfully worked in this country.

The session closed with the reading of a short paper by Mr. Chas. T. Porter upon "Strength in Machine Tools."

ELECTRIC DISCHARGES FROM ANIMALS AND MEN.

In a recent communication Mr. Jacob Thompson, of Benicia, Cal., describes an interesting exhibition of electric action observed by him on the evening of Oct. 11. For the first time for several months the wind was blowing a pretty stiff breeze from the northeast, the regular summer wind of that part of California coming from the west. With the change of wind there was a marked change from the humid air of the ocean to the dry atmosphere of the interior, with a corresponding change in the electrical condition of the air. This was especially manifested in the appearance of horses and mules, whose hair stood out in all directions, the long hairs of their tails spreading out like a brush. When Mr. Thompson brought his hand near the diverging hairs, the brush of hair was strongly attracted by the hand, and a very perceptible electric discharge was felt, attended by a crackling noise. The appearance was first noticed about half-past four, and continued until six o'clock or later. Never having noticed the appearance before, Mr. Thompson thinks it cannot be very common in that region.

It is the first time, so far as we know, that the phenomenon has been reported from a point so near to and so near the level of the sea. In a recent note to the French Academy, M. Amat mentions a number of observations of a simi-

lar kind, made by him while traveling in Algeria, between Djelfa and Laghouat, among the Atlas mountains. M. Amat says that he has frequently drawn large sparks from the hair of his horse by means of his pocket comb. The best results were obtained in dry weather in the evening, between 7 and 9 P.M. If the hair was a little moist, or the sky cloudy, no sparks or cracklings could be got. Animals, and especially horses, present in a higher degree than man the power of exhibiting these discharges. Travelers on the high plateau of Central America have remarked that the coats of their horses discharge sparks under the brush or currycomb; and in South Algeria it is common to see the hairs of the tail so much alive with the electric forces that they diverge from the center. On stroking the tail by hand distinct crackling sounds may be heard, especially during the day. One reason why man accumulates less electricity than the horse is perhaps that the horse is better insulated on his horny hoofs. Animals, however, do not seem to be alone in such electric manifestations.

It appears from a recent report by another African traveler, Mr. A. W. Mitchinson, that the natives of West Central Africa are quite susceptible of electric excitation. One evening, while disciplining a native with a cowhide whip, he was astonished to see sparks produced, not by a blow between the eyes, as would have happened in a more civilized country, but by the action of the whip on the native's naked skin. He says he was "still more surprised to find the natives themselves were quite accustomed to the phenomenon." Evidently their habits of scientific observation are much more advanced than their habits of scientific investigation, or they would have improved the opportunity to discover whether sparks could be brought under like conditions from a white man's skin. Mr. Mitchinson subsequently found, he says, that a very light touch, repeated several times, under certain conditions of bodily excitement and in certain states of the atmosphere, would produce a succession of sparks from the bodies of native men as well as native cattle.

During electric storms mountain climbers not unfrequently find themselves highly charged; and we have seen the same appearances, in a lesser degree, among the Adirondacks during extremely cold weather.

A NEW SYSTEM OF APPRENTICESHIP.

The difficulty in getting thoroughly qualified machinists, and the practical failure of the old system of apprenticeship, have led a manufacturing firm in Springfield, Mass., to devise a new plan, involving both school and shop work. For beginners, under twenty years of age, the term of apprenticeship is fixed at six years. In this time it is believed that an apprentice will be able to acquire the theoretical and practical knowledge needed to make him a first-class journeyman. Those who are over twenty years of age are allowed to finish their apprenticeship in five years, and those who have worked in a shop are advanced according to proficiency. The beginner is first put to drawing from sketches, then takes up projection and diagram, and advances regularly according to his ability. It is believed that in this way one year will qualify him as well to work from drawings as four or five years ordinarily. All applicants are taken from four to twelve weeks on trial, and if not satisfactory are then dismissed. For the first year's labor five cents per hour is paid to those under eighteen, six cents to those who are eighteen, and seven cents to those who are twenty and upwards; for the next years the rate is advanced to six, eight, ten, eleven, and twelve cents. The firm also pay two cents per hour additional into a reserve fund, which is paid to those apprentices who finish their full term of service; for the six years this amounts to \$400.

The organizers of this scheme, Messrs. Richards & Dole, propose to require of each apprentice fifty-eight hours a week of shop work and nine hours of study. This, we are inclined to think, is too much work and too little study to secure the best results, especially with the younger apprentices. Still the plan is well worth a fair trial. It is said that the applicants for apprenticeship already exceed the number that can be taken, which speaks well for the plan and for the young mechanics of Springfield.

The London International Milling Exhibition.

An international exhibition of flour mill machinery, under the auspices of the National Association of British and Irish Millers, will be held in London in the early part of May next. It will be especially devoted to the means and method of modern milling. The secretary of the association makes the curious announcement that "it is not the intention of the council to attempt in the present experimental stage of the milling industry anything in the way of prizes or medals for machines. Ample steam power will be provided, so that each maker may be able to show the results he may promise, and every facility will be afforded visitors to use their own judgment, unfettered by any official recommendation."

Influence of the Mississippi Improvement.

The effect of the jetty improvements at the mouth of the Mississippi River, in extending the commerce of the Mississippi Valley, is already very great. Since the beginning of this year St. Louis has shipped to Europe, by way of New Orleans, twice as much grain as passed out of the country by that route during the first ten months of last year. The shipments down the river would be still greater were it not for the lack of barges to carry the grain. It is said that a fleet of boats are being built to supply the want.