

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT No. 261 BROADWAY, 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., 261 Broadway, corner of Warren street, New York.

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., 261 Broadway, corner of Warren street, New York.

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.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

NEW YORK, SATURDAY, OCTOBER 13, 1883.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Agricultural inventions, American Institute Fair, and others with their respective page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 406,

For the Week ending October 13, 1883.

Price 10 cents. For sale by all newsdealers.

Detailed table of contents for the supplement, listing sections like CHEMISTRY AND METALLURGY, ENGINEERING AND MECHANICS, TECHNOLOGY, ELECTRICITY, LIGHT, ETC., NATURAL HISTORY, AGRICULTURE AND HORTICULTURE, ART, MEDICINE AND HYGIENE, and MISCELLANEOUS.

NATURAL HISTORY IN PUBLIC SCHOOLS.

About three years ago the authorities of the Museum of Natural History in Central Park, this city, addressed a letter to the Board of Education, suggesting that a few of their teachers be allowed to attend lectures to be delivered by Professor Albert S. Bickmore upon the objects on exhibition. The lectures proved so beneficial that the Board requested that at least one teacher from each of the 104 schools be permitted to attend, in order that they might give the most complete information to their pupils upon human and comparative anatomy and zoology, and other subjects upon which oral instruction would be given in the schools.

Professor Bickmore, in a paper read before the National Educational Association, describes his methods of imparting instruction by ocular demonstration, "believing that the sense of sight is the royal avenue to the mind." A large part of the objects which it was desired to display were either too small or too large to be taken to the lecture hall, and at the same time too important to be omitted. To overcome this difficulty the most complete stereopticon to be found was purchased; and as it was discovered that photographic transparencies of the desired subjects could not be obtained in anything like a systematic series, an assistant skilled in this branch of photography made negatives and slides from the specimens on exhibition in the public halls, supplemented by copies of the best illustrations in standard works on natural history. There have been made some 800 negatives, in addition to a large number purchased from every available source. The book and map publishers of New York and London lent their assistance by striking off uncolored impressions of their wood cuts and engravings for the use of the photographer. After the negatives have been provided, the slides can be supplied at a little more than half the usual price for such transparencies. Such slides, although giving more satisfactory results when used in connection with the lime light, will be distinctly visible by from 50 to 75 persons when a lamp burning kerosene oil is used.

As this mode of exhibition necessitated a darkened room, a second lantern was introduced by which any portion of the blackboard could be illuminated, thus keeping the classification of the specimens constantly before the audience as each appeared upon the screen.

In an adjoining place in the hall was fitted up a series of shelves, like a case in the public hall, on which were arranged the specimens to be described. Diaphragms pierced with holes of differing sizes admitted light upon any or all of the specimens, and in this way the audience was, as it were, instantly transferred to the exhibition halls, while the attention of all was kept upon the subject under consideration.

This method of teaching is applicable to any science which can be made more instructive and interesting by the aid of pictures, diagrams, or ideal sketches.

THE MAKING OF STEEL PENS.

The steel pen is a modern invention, not fifty years having elapsed since it was introduced, and like many other innovations it met with much opposition and had a number of rivals. Of these the quill pen was the most formidable, and to this day the quills of geese are used by some old stagers. Pens of silver and of gold, the latter especially, have been great favorites with those who admire much flexibility in a pen, and the handy self-feeders, as the stylographic, have plenty of users. But, after all, the steel pen is the most generally used, and unlike most inventions, the method of its manufacture has not been essentially changed or improved.

The steel from which pens are made is the finest crucible cast steel rolled into sheets 1/100 of an inch thick. From this the blanks are cut by means of a punch and die in presses worked by hand or foot, the operators being girls. The side slits in the pen, the central oval or semicircular hole, the corrugations or embossings, the curved or semicircular form to the originally flat blank, and the stamp of the pen or the maker, are all formed and produced by similar means—the screw hand press or the lever foot press—by the use of punches and dies, each pen being handled separately.

These corrugations and slits and central cuts are not merely fanciful ornaments, but are intended to adapt the pen to the user. Some want a resisting pen, very stiff and allowing considerable pressure without opening the nibs wide enough to make a heavy mark; others a yielding pen that requires but a touch to open the nibs. Then there are many degrees of these qualities required, as well as differences in sizes; so that a single establishment makes no less than forty-six styles of steel pens.

Of course, cast steel of such extreme tenacity becomes hardened by these successive pressings and punchings, and must be annealed. This is done by placing the blanks, or unfinished pens, in a cast iron box, which is then covered by a larger box leaving a space all around of half an inch, or more, which is filled with ashes or fine charcoal. The whole is then subjected to the glowing red heat for about two hours, and allowed to cool. When annealed, these blanks may be rolled up by the fingers just like so many bits of tea lead, which they much resemble in softness.

In heating for hardening the same method is used—packing in double boxes six or eight inches square—and when the pens are red hot, they are poured into a tank of animal oil. When taken out from this bath they must be handled

carefully, as they are not only stiff and brittle, but crumbly; they can be squeezed to minute fragments between thumb and finger. They are then placed within a cone-shaped sheet iron receptacle open at the large end and mounted on a spindle, and are rotated over a glowing fire until they turn to a full or "low" blue. They are then chilled in oil, and when cool are rattled in saw dust until they are quite clean and bright. The next process is the grinding of the nibs on minute wheels of fine emery and of corundum, and lastly comes the essential process that completes the pen and makes it a pen—the slitting of the nibs. This is done by a pair of shears acting the same as the presses and punches. This splits the steel from point to central hole without removing a particle of material. The pens are then lacquered, straw or brown, blued or blacked, or left bright, as the style demands, and packed for the market.

The American Institute Fair.

The fifty-second annual fair of the American Institute was formally opened in this city on the 3d inst. This society has for its object the promotion of arts, sciences, and manufactures, and during its existence of more than a half a century has contributed not a little toward the advancement of the country. It has grown so as to be a national, not a sectional exhibition. Within its walls may be found each year many results of the most recent progress. Exhibitions of this nature afford a kind of instruction which is not only invaluable, but which cannot be obtained by other means.

The machinery department contains many of the newest and most interesting novelties displayed in operation, and time can be well spent in their examination; various types of the steam engine are represented. Manufactured articles of every description, both useful and ornamental, are found grouped in appropriate classes.

There is a fine display of electrical appliances, ranging from the cell of the latest pattern to the dynamo. The industries in which electricity plays a prominent part are illustrated in a very interesting manner.

Destruction of the Great Exhibition Building at Pittsburg.

At 2 o'clock on the morning of the 3d inst., the exhibition buildings at Pittsburg, Pa., caught fire and were totally destroyed, together with their contents. The exhibition was opened on September 6, and there was displayed an endless variety of articles illustrating almost every branch of art, science, and mechanical skill. The fire started in Machinery Hall, but spread so rapidly that Floral Hall and the main building were a mass of flame before any of the exhibits could be removed. The buildings were valued at \$150,000 and their contents at \$800,000, but since it is impossible to duplicate many of the articles, their worth cannot be estimated. The origin of the fire is unknown. Had the fire occurred during the evening of the previous day, the loss of life would have been appalling, as on that day the admissions amounted to over 25,000.

Methods of Testing Boilers.

It is alleged that the shock of forcing water into a boiler by means of a pump is equal in its effects to a succession of blows which may injure the shell. As every strain put upon the boiler decreases the final strain necessary to produce rupture, it is reasonable to presume that such a method of testing may so injure the parts that they will finally give way under a pressure much less than that at which the boiler was tested. A plan which obviates this is to fill the boiler with cold water and gradually raise the pressure to the desired point by a slow fire. Still another method is to fill the boiler with hot water and then apply the desired pressure by the aid of an injector made for the purpose, which continues to add heated water to the boiler. A relief valve is set to open at the desired pressure, and the duty of the injector is to maintain that pressure, uninfluenced by any leaks for a given time. A uniform pressure is insured throughout the boiler. An injector of this kind is made by the Rue Manufacturing Company, of Philadelphia.

A Hydraulic Theater Curtain.

Messrs. Clark, Bunnett & Co., of Rathbone Place, have fitted the new Lyceum Theater, in Edinburgh, with a hydraulic curtain. The proscenium opening is over 30 feet high by fully 28 feet wide. The curtain is constructed of two screens of wrought iron plates, an eighth of an inch thick, forming a double division, with air chambers between of 9 inches. The top of the curtain is riveted to double wrought iron girders secured to head of hydraulic rams, which are fitted, with their cylinders, on each side of the proscenium opening. The supply of water for working the rams is laid on from the town mains, and with an expenditure of only 84 gallons of water the curtain, which weighs about 6 1/2 tons, can be raised or lowered in fifty seconds. The means of working the curtain are in the prompter's box, and the prompter, by simply moving a lever, can drop the curtain, thus forming, with the proscenium wall, a solid fireproof division of the house, totally separating the stage from the auditorium, so that in case of fire an audience would be perfectly free from danger.

THE treatment of leprosy is becoming a hard problem in India. In the Bombay Presidency 9,483 cases are under treatment.