

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

Australia and New Zealand.—Those who desire to receive the SCIENTIFIC AMERICAN, for a little over one year, may remit £1 in current Colonial bank notes. Address MUNN & CO., 361 Broadway, corner of Franklin 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, for U. S. and Canada. \$8.00 a year for foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U. S. or Canada, on receipt of seven dollars. The safest way to remit is by draft, postal order, express money order, or registered letter.

Australia and New Zealand.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for a little over one year on receipt of £2 current Colonial bank notes. Address MUNN & CO., 361 Broadway, corner of Franklin 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 current week's 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. Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, NOVEMBER 12, 1887.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles and their page numbers, including 'American Institute exhibition', 'Books and publications', 'Inventions, agricultural', 'Inventions, engineering', etc.

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 619.

For the Week Ending November 12, 1887.

Price 10 cents. For sale by all newsdealers.

Table listing the contents of the supplement by section: I. ASTRONOMY, II. BIOGRAPHY, III. BOTANY, IV. CHEMISTRY, V. ELECTRICITY, VI. ENGINEERING, VII. GEOGRAPHY AND TRAVEL, VIII. GEOLOGY, IX. MISCELLANEOUS, X. NAVAL ENGINEERING, XI. TECHNOLOGY, XII. VITAL SCIENCE.

THE RICH COAL FIELDS OF COLORADO.

Prof. Newberry, of Columbia College, at a meeting of the New York Academy of Sciences, October 31, gave an enthusiastic description of some exceedingly rich coal fields in western Colorado. He exhibited specimens of coal that he had taken from various veins there but a few weeks ago, equal to any mined anywhere in the world, some of it showing only three per cent of ash and one-half of one per cent of sulphur.

One of the veins he described as 18 feet thick of solid coal, with numerous other veins of 14, 10, 8, and 6 feet thickness. Three railways are now approaching this wonderfully rich coal field, and, notwithstanding the great difficulties attending freight transportation in so mountainous a region, its almost exhaustless stores of the best of fuel will soon be furnished in abundance for that large section of almost treeless country just east of the foothills of the Rocky Mountains, from Dakota to Texas.

BOOKS FOR THE INSANE IN ASYLUMS.

From Georgia a very touching appeal has reached us. The State Lunatic Asylum at Milledgeville has within its walls between twelve and fifteen hundred patients. Many of them are not only well able to read in spite of their mental infirmity, but really need and crave some such literary exercise. A hall within the institution is fitted up for a library, but there are no books.

We notice the above mentioned appeal not only for its own sake, but because it seems to us the index of what is probably one of the great needs of our country. All through it are large insane asylums, but in how many of them is there any certainty that a sufficient library is provided for the inmates? No class would seem so open to benefit from literature as the insane.

It would appear that an opening for a most beneficent charity might be found in this direction. The asylums of the country should be investigated, and the extent of their libraries determined, and efforts made to supply their deficiencies. Every house has in it some unused books that idly fill the shelves, and which having been read once are never again opened.

So much is now done by organized charity that the suggestion of a new field for work will undoubtedly find many willing to assist in it. The question of the character of the books might safely be left to those in charge of each asylum. Even if the indiscriminate use of books were permitted, then for one patient who would be excited or injured by some work fostering or increasing his delusion, probably hundreds would be benefited.

It is clear that a need exists, and that it is one which can be easily supplied. We hope soon to receive evidence that work is doing in this field.

THE AMERICAN INSTITUTE EXHIBITION.

The American Institute exhibition in this city is now at its best. In general it is fully up to the standard of former years, and in some respects it is far in advance. The electrical display is especially noteworthy. A large number of dynamos and electric motors are shown in operation. The halls are illuminated by electric light exclusively.

Two No. 16 400 ampere Edison dynamos are exhibited, one being used for incandescent lights, and the other for supplying current to motors. One of the Edison machines is driven by the well known Arming-ton & Sims high speed engine, the power being communicated from the engine to the dynamo by a leather link belt.

The Mather Electric Co., of Hartford, Conn., exhibit a 500 light dynamo, driven by a Trenton high speed engine, made by the Phoenix Iron Co., of Trenton, N. J. This dynamo supplies a current to 500 incandescent

lamps. Another 250 light machine of the same make takes its power from the line shaft of the exhibition building, and supplies a current for running various electric motors. A 50 light dynamo of the same make furnishes a current for the "C. & C." motors.

The Oerlikon Machine Works, of Switzerland, exhibit a compact, efficient dynamo, running incandescent and arc lamps in the same circuit. It has a capacity of 120 incandescent lamps and 12 arc lamps.

The Mutual Electric Manufacturing Co., of Brooklyn, exhibit the Knowles system of electric lighting, in which the dynamo supplies a current to arc and incandescent lamps, and also to motors upon the same circuit. The feature of the dynamo which renders this possible consists of a very sensitive regulator, which is capable of quickly shifting the current according to the electric load.

A feature of electric lighting which has often been discussed, but never practically realized until now, is that of economically producing steady incandescent electric lights through the agency of the dynamo by power derived from a gas engine. Otis Brothers & Co., of New York, exhibit a 4 h. p. Baldwin gas engine, which drives a United States dynamo, and furnishes a current to thirty-two 16 candle power incandescent lamps. The engine, consuming 30 ft. of gas per h. p. per hour, makes the expenditure of gas for the production of 16 candle power 3/4 ft., whereas a 15 candle gas light requires 5 ft. of gas per hour.

The gas engine exhibit of the present year excels that of any previous year, both as regards the numbers shown and the variety and quality of the engines. Messrs. A. C. Manning & Co., agents for the Otto engine in this city, exhibit a 10 h. p. engine running idle, a 7 h. p. engine running arc lights, two 4 h. p., one 2 h. p., and one 1 h. p. engine. The 7 h. p. engine drives a Waterhouse dynamo, which supplies a current to 8 arc lamps.

The Economic Gas Engine Company have an exhibit of six small engines, ranging between 1 man power and 1 h. p. These little engines are extensively used in and about New York for pumping water for household purposes and for running light machinery. They are exceedingly simple and well adapted for any use requiring not more than 1 h. p.

Undoubtedly the greatest novelty exhibited this year is that of the electric welding of metals. This new art of electric welding is one discovered by Prof. Elihu Thomson, of Lynn, Mass. The invention is under the control of the Thomson Electric Welding Company, of Lynn, Mass. The welding is accomplished by sending a very heavy current of electricity through the bars of metal to be joined by welding, the resistance offered by the comparatively imperfect contact between the abutting surfaces serving to create a temperature sufficiently high for the purpose.

In the exhibit the current is furnished by a Thomson-Houston alternating current dynamo of high voltage, and this current is reduced to low voltage and large quantity by a transformer consisting of a primary and secondary coil and a magnetic core. The primary wire in this case, unlike an ordinary induction coil, is small and long, while the secondary conductor is very large and short. The terminals of the secondary conductor are connected with the clamp by which the material to be operated upon is held in position for welding.

Among electric motors in operation will be found the Daft motor, driving a street car, another applied directly to a Sturtevant blower, another operating an elevator. The Sprague Electric Company show a motor running a band saw, another running a printing press, another driving a large blower. This company also exhibit a railroad car having the electric motor attached. The "C. & C." Electric Motor Co. exhibit a large number of their motors of different sizes, doing various kinds of work—running sewing machines, blowing organs, operating ventilating and cooling fans, etc.