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, 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., 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, postage paid, to subscribers. Single copies, 10 cents. Sold by all newsdealers 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., 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 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., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, OCTOBER 10, 1885.

Contents.

(Illustrated articles are marked with an asterisk.)

Aerial navigation..... 230
Aerolite, Pennsylvania..... 224
Aluminum, manufacture of, by electrolysis..... 225
Architect's responsibility..... 231
Bee, mechanism of..... 233
Bees, honey, busy..... 231
Blowing up Flood Rock*..... 223, 227
Brake, wagon, automatic*..... 226
Business and personal..... 244
Car coupler trials at Buffalo, N.Y.*..... 232
Car couplers, automatic, adopted after test, at Buffalo, N. Y.*..... 232
Chimney, suit about a..... 225
Coal, duty of..... 225
Communications received..... 235
Electric lighting business, curious features of..... 224
Elevator, chair, for use at fires*..... 231
Engine, gas, made by the Economic Motor Co.*..... 230
Electric railway in Toronto, an..... 228
Engines, gas, small, improvement in*..... 230
Fig trees, about..... 225
Flood Rock, view of*..... 223
Gold, deep mining for..... 233
Hell Gate and vicinity, bird's eye view of*..... 223
Hell Gate originally, map of*..... 223
Horseshoe, improved*..... 236
Inventions, agricultural..... 234
Inventions, engineering..... 234
Inventions, index of..... 235
Inventions, miscellaneous..... 234
Lumber, a great cargo of..... 228
Natural history notes..... 233
Notes and queries..... 234, 235
Perforation formulæ, graphical comparison of..... 224
Plow, snow, improved*..... 226
Rapid steaming by the Etruria..... 228
Roads, foreign..... 225
Roofs, loads on..... 226
Science leads to economy of time and labor..... 231
Spontaneous combustion from coal dust..... 226
Star, new, within a star cloud..... 225
Student mechanics..... 224
Texas copper deposits..... 228
Wrench, an improved*..... 228

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 510,

For the Week Ending October 10, 1885.

Price 10 cents. For sale by all newsdealers.

PAGE

I. CHEMISTRY, METALLURGY, ETC.—Ozokerite; its Nature and Properties.—Apparatus for purification of ozokerite.—With engraving..... 8146
Magnetic Separation of Minerals at Oberlahnstein.—By M. O. HABERLE..... 8147
Acetic Acid from Wood..... 8150

II. ENGINEERING, ETC.—Enormous Passenger Traffic..... 8135
Compressed Air Motor..... 8135
Distribution of Power to Houses by Rarefied Air.—3 engravings..... 8135
The Forth Bridge.—By THOS. C. CLARKE..... 8136
The Car Coupler Trials at Buffalo, N. Y.—2 full pages of engravings..... 8137
The Clinograph or Borehole Test.—Scotchman's United Mine.—The phials or clinostats.—The clinometer or recording instrument.—Cylinder or guide tube.—Core extractor..... 8140
On the Construction of Rolling Cams and Symmetrical Lobed Wheels.—By Prof. C. W. MACCORD..... 8142
Comparison of Great Guns..... 8144

III. TECHNOLOGY.—How to Prevent Curling of Unmounted Photo Prints..... 8145
Some Easy Ways of Making Grain Plates or Surfaces for Photo Mechanical Printing Processes..... 8145
Woolens and Worsteds..... 8145
The Clarification and Purification of Public Water Supply.—By L. H. GARDNER..... 8146

IV. ELECTRICITY, ETC.—Bazin's Rotary Pile.—With engraving..... 8148
A High-Pressure Influence Electric Machine.—Experiments.—By W. HEMPEL.—With engraving..... 8148

V. ART, ARCHITECTURE, AND ARCHÆOLOGY.—The Constitutional Club, Northumberland Avenue, Charing Cross.—An engraving..... 8144
Two Chamber Organs by Chippendale.—With engraving..... 8145
Clog Almanacs used before the Introduction of Printing.—Several figures..... 8149

VI. MEDICINE, HYGIENE, ETC.—Remember the Skin.—A poem..... 8150
Erysipelas.—Its rapid cure..... 8150
Nutritive Value of the Different Parts of the Grain of Wheat..... 8150

VII. MISCELLANEOUS.—Phases of American Progress..... 8149

THE PENNSYLVANIA AEROLITE.

The people of Southwestern Pennsylvania were startled on the 26th of September, by the occurrence of a very unusual phenomenon; an immense aerolite had descended upon them. At first the impression prevailed that the district had been visited by an earthquake or that a terrible explosion of natural gas had taken place, while others decided that a pretty large set of boilers had burst, or that a gigantic blast had thrown down a large mass of rock from some neighboring quarry. Loud detonations were heard throughout that entire section, the explosions apparently following a straight line across the country, and causing not a little consternation among the people.

The meteor seems to have passed from the northeast to the southwest, and the noise of its passage, which was variously described as resembling the rattling of heavy artillery over a solid roadbed or as a mighty peal of thunder, was heard over a large area of country in the neighborhood of Pittsburg and to the south. A number of witnesses describe it as an immense mass of fire, fully as large as the largest barns—and Pennsylvania barns, it will be remembered, are noted for their size. A powerful flame of deep red color, which tapered off into a darker tail, seemed attached to the mass. This, however, is stated to have disappeared as the meteor came nearer, and the color of the mass changed to a bluish white, which was maintained as long as it remained in sight.

A mail carrier on horseback and a farmer who was plowing at the time both describe their animals as being so terrified that they remained perfectly motionless, and could not be persuaded to stir for several minutes after the fiery visitor had disappeared. It finally struck the earth on the farm of Mr. Buckland, in Jefferson Township, Washington County, near the West Virginia line. The stone broke into three pieces, and became partly buried. The color is gray, with streaks of red running over it; possibly from the formation of sesquioxide of iron. The form is irregular, and the dimensions, if correctly reported, are without precedent. It is stated to be from 30 to 50 feet in diameter, but we doubt very much that the statement can be verified. The Gibbs meteorite, in the Yale College Cabinet at New Haven, is noted for its size, but it weighs only 1,635 pounds, and has a length of 3 feet 4 inches, a breadth of 2 feet 4 inches, and a height of 1 foot 4 inches. It came from the Red River.

A still more noted one is the Tucson meteorite, from Sonora, Mexico, which is now at the Smithsonian Institution. It is ring-shaped, and 49 inches in its greatest diameter. The most remarkable masses of which we have any knowledge have been found in South America. One discovered in the district of Chaco-Gualamba was estimated to weigh 16 tons, and another found near Bahia, Brazil, to contain 28 cubic feet, and to weigh 7 tons. These weights and volumes would, however, be quite dwarfed by a comparison with those reported for the Pennsylvania meteorite. But there is probably still a little romance attached to these accounts, and the true dimensions will not be reached until later.

An odd superstition clings to meteors, and many who witnessed this remarkable one were inspired with the dread belief that it brought with it a spirit of pestilence and famine; but if these people would only call to remembrance the wide prevalence of meteoric visitors, they would conclude that the most persistent spirit which their imagination could attach to them must be quite exhausted by this time. Dr. Kleiber of St. Petersburg has calculated that 4,950 pounds of meteoric dust fall to the earth every hour, which would make 59 tons a day, or more than 21,500 tons in a year, while Professor Proctor thinks that even this estimate is too small. Yet very little damage is done by the fall of these "air stones," for the most of them fall upon unoccupied ground or into the sea. Relic hunters are reported to be already at work and carrying off the meteorite by piecemeal. This seems to indicate either that the mass was very much shattered by its fall, or that it has a large predominance of stony matter, which would enable fragments to be broken off; for the most accomplished vandal would find difficulty in securing a souvenir from a piece of meteoric iron.

GRAPHICAL COMPARISON OF PERFORATION FORMULÆ.

In connection with the Board on Armament of Fortifications, Major W. R. King, of the Corps of Engineers, U. S. Army, has compiled a comparative table of all formulæ relating to the perforation of armor plating; and in order to show at a glance the relative values obtained by using the different formulæ, has plotted the results to a uniform scale. As this sheet gives information of some interest to engineers, it has been published by the government and distributed to the different members of the corps. The two axes in the diagram represent the thickness of the unbacked wrought iron plating in inches, and the energy in foot tons per inch of shot's circumference, so that the resulting curves at any point show the values obtained from the formulæ of different authorities.

They display wide discrepancies, and, indeed, the variations in the quality of both the shot and the plate used by the investigators are such that it is quite impossible to obtain any general formulæ which are entirely accurate. The present graphical method has the advantage, however, of showing these conflicting results with admirable clearness, and it may be valuable in helping us to reach more uniform formulæ by calling attention to the existing confusion, and the need for further and more careful experimentation.

CURIOUS FEATURES OF THE ELECTRIC LIGHTING BUSINESS.

The business of the voltaic arc light companies may be said to furnish additional evidence of the credulity of human nature. The picture presented by hundreds of sub-companies spread over the country, living on prospects rather than profits, stimulates the observer and invites the analyst. At the recent meeting of the National Electric Light Association, it was not difficult to see in which direction the profit lay. Those engaged in selling light exhibited the unmistakable evidences of depression, while their fellows who confine their efforts to the sale of electric lighting plant were correspondingly elated and buoyant.

The first discussed economical processes with an interest that was profound and serious, as though their only hope of profit lay in a reduction of running expenses, while the second looked on with ill-concealed indifference.

To those who have had the time and inclination to study the electric lighting business, this will not be surprising. They will have discovered that there is an immense profit in electric lighting plant, and but little, if any at all, in the sale of the light. Like glucose, the electric lighting plant business is advertised but little; the private circular having been found to be the most judicious method of reaching purchasers.

Go into the office of one of the so-called parent companies, and talk about electric lighting plant, and you will be astonished by the prospective profits of light selling. It will be proved to you with mathematical precision that few modern enterprises offer such a large margin of profit as the operation of an electric lighting plant. But if there is so much profit in selling the light, why don't these companies go into the business themselves? Why do they confine themselves to selling plant? You will scarcely fail to be struck with this when hearing the plant people talk on the subject of light selling.

Last week two large electric lighting plant companies were consolidated. One of these companies only two years ago had a little office in Union Square, before which a single arc light hung suspended. This was rarely lighted, as if the dispensing of arc light was a luxury far too costly to be indulged in by any but sub-companies.

This company has now a great factory in New York city, where large quantities of lighting plant are manufactured for those provincial projectors who are possessed of robust bank accounts and adamantine credulity.

Fortunes have been made in arc light apparatus, but the only people who have profited, thus far, from the light itself are the gas companies, because its brilliancy so pales the gas jets by comparison that gas consumers, in order to counteract its influences, are forced to turn on more burners and use more gas.

STUDENT MECHANICS.

The most ardent supporters of technical schools do not claim that they can supersede the workshop; but they do claim, properly, that the inexperienced boy can obtain in them a general knowledge of the character of materials, the methods of working them and the reasons why these methods differ. None of our older mechanics ever regret the smattering of theoretical knowledge of natural laws that they obtained at school from the meager instruction afforded by the text book on natural philosophy; and in after years some of its statements—mere commonly known axioms—have been easy to quote, and beneficial to heed. Book knowledge on practical subjects may be useful, even if it does not teach the handling of tools and the best methods of doing a job. As a preliminary to the shop novitiate, the technical school is a wonderful helper.

Sometimes boys of fourteen or fifteen see clearer than do their elders the possible advantages of a theoretical mechanical education; but no experienced mechanic can visit one of our modern technical schools without feeling that he was a loser because they were not in his boyhood days, and that he had no opportunity for the advantages which they unquestionably give to the embryo mechanic. Such a school is a means of guiding the young man to the choice of an occupation; mechanical bent, discouraged at home, is given room for development. Occasionally, however, a parent has the wisdom to help the son in his inclination.

An instance in illustration is that of a boy of fourteen, left by his father, a prominent government official, with a considerable fortune. He shows a decided taste for mechanics, is provided by his sensible mother with a home workshop used in vacations will leave

© 1885 SCIENTIFIC AMERICAN, INC