

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.

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, MAY 28, 1881.

Contents.

(Illustrated articles are marked with an asterisk.)

Air, cold, for domestic use.....	338	Matter, the fourth state of.....	340
Ammonia vapor engines.....	343	Mechanical Engineers, Society of.....	338
Anvil block, largest in the world.....	343	Mechanical inventions.....	343
Assaying*.....	339	Metals, coating of.....	344
Atlanta exhibition.....	341	Metals, microscopic structure of.....	340
Book holder, novel*.....	342	Mole trap, new*.....	338
Bridge, East River, new*.....	335	Nitro-glycerine, manufacture of.....	344
Can and bottle opener, new*.....	338	Notes and queries.....	347
Cattle car, new.....	338	Perpetual motion, the Gamagee.....	337
Chairs, elegant*.....	337	Petroleum and plant life.....	343
City area and sewerage.....	337	Plants, insectivorous.....	337
Cooking by electricity.....	342	Prints on linen.....	337
Corwin's cruise, the.....	335	Pump, centrifugal, large.....	340
Cradle, folding, novel*.....	342	Silk adulterations.....	337
Crank shaft, large.....	337	Teasels.....	344
East River Bridge, new*.....	335	Thermophones*.....	341
Electric light wires, insulation of.....	340	Trade marks, conflicting.....	338
Elevated railway, Philadelphia.....	342	Whale, a, attacks a ship.....	344
Faience of India*.....	343	Zeromotor, the.....	340
Filler, a, for porous hard wood.....	335	Zinc, actinic.....	340
Floors, cement.....	343	Distemper.....	346
Fruit jar, improved*.....	338	Electric railway, Berlin.....	336
Gamagee perpetual motion, the.....	337	Faithful John.....	336
Horse power of the world.....	345	Inventions new.....	343
Iceberg, cruising for.....	343	Iridium.....	336
Insectivorous plants.....	337	Quantitative analysis of alkaloids.....	346
Inventions, mechanical.....	343	Suspension by subdivision.....	346
Inventions, miscellaneous.....	341	Telegraphy, comet.....	336
Inventions, recent.....	342	Telephone central office system.....	346
Lead poisoning by cosmetics.....	346	Winter choiera in Chicago.....	346

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 282,

For the Week ending May 28, 1881.

Price 10 cents. For sale by all newsdealers.

I. ENGINEERING AND MECHANICS.—New 4½-Ton Breech-loading Gun. 1 figure. Section new English breech-loader.....		4487
The Panama Ship Canal. 7 figures. Map, profile, and sections.....		4487
The Otto Gas Engine. Case of Otto vs. Linford. 4 figures.....		4487
Storing Compressed Air or Gas. Method patented by Alexander James.....		4489
Driven Wells for Fire Purposes.....		4489
Specifications of New Steamer for the Mexican National Construction Company.....		4489
Iron and Steel under the "Hay Process." By A. T. HAY.....		4490
Manufacture and Uses of Cast Steel.....		4490
English Railway Speeds.....		4491
How Sluice Mining Originated.....		4491
Apparatus for Testing the Tensile Strength of Cements. 1 fig.....		4494
The Chime at St. Germain L'Auxerrois. 2 figures. Key-board chime, old system.—New chime of St. Germain L'Auxerrois.....		4496
II. ELECTRICITY, ETC.—Simple Holtz Electrical Machine. Curative Application of Static Electricity. (Continued from No. 279.) By G. M. HOPKINS. 11 figures. Working drawings of a 12-inch Holtz machine.—Double plate Holtz machine.—Curative application of static electricity.—Electrodes.....		4492
Electricity in the Card Room.....		4493
Schoenbein's Ozonometer for February and March, 1881. 6 diagrams.....		4494
III. NATURAL HISTORY, ETC.—Silk Producing Bombyces Reared in 1880. By ALFRED WATLEY.—Report of the extremely valuable work done last year in rearing silkworms by the Societe d'Acclimatation de France.....		4496
The Mode of Flight of the Albatross.....		4498
IV. ARCHÆOLOGY.—Archæological Explorations near Madisonville, Ohio. 40 figures.—Sections of mounds.—Groups of skeletons.—Diagrams of pits with human remains.—Figures of a great and interesting variety of earthen vessels, inscribed stones, stone pipes, and shell, horn, and copper ornaments.....		4498
V. AGRICULTURE, ETC.—The Grapes of California.—Report of Viticultural Commission.....		4501
Butter and Butter-making.—Remarks of Dr. E. L. STURDEVANT, E. F. BOWDITCH, JOSEPH S. WELLS, and HENRY E. ALVORD, at the meeting of the Franklin County (Mass.) Institute.....		4502
VI. TECHNOLOGY AND CHEMISTRY.—A Cement for Calking Canoes.....		4491
Detection of Ergotin Flour.....		4491
Inflammable Fabrics.....		4495
The Density and Tension of Saturated Vapors.....		4495
VII. HYGIENE AND MEDICINE.—Aural Symptoms in Bright's Disease.....		4495
VIII. MISCELLANEOUS.—The Quadrature of the Circle. 1 figure.....		4494
The True System of Mathematics.....		4495

COMET TELEGRAPHY.

In a special circular issued by the *Science Observer* the announcement is made of the receipt by cable of the elements and ephemeris of Swift's comet (a 1881), as computed by Drs. Copeland and Lohse at the Observatory of Dun Echt, in Scotland. The experience with Swift's periodical comet of last year, which was not seen at all in Europe for nearly a month after its discovery, owing to the moonlight and a total inability to determine its position after the moon had gone, was useful. It was an experience which involved the loss of many observations before perihelion passage, and caused the Boston Scientific Society to adapt a code to the telegraphic transmission of astronomical intelligence, and the first test of this code has just been made. The *Science Observer*, published by the society, has for the past three years issued special circulars by mail to American astronomers and observers, containing the elements and ephemeris of each new comet, when the date could be obtained, and Lord Crawford has made a similar distribution of circulars by mail from his observatory at Dun Echt to the English astronomers. It was, therefore, agreed that, as a test of the code, the elements and ephemeris computed at each place should be cabled to the other; the Boston data to Dun Echt, and vice versa.

The elements from Boston were sent across a few days ago, and those computed at Dun Echt have just been received at Boston, and form the subject of a special circular of the *Science Observer*. As a proof of the adaptability and utility of this astronomical code, both the original message and its translation are given. By the same code the announcement of a comet, which now requires a message of sixteen words, with a liability to error, can be condensed into seven words, five of which are necessary and two of which serve as check words to correct any possible error that might occur in the other five.

The elements and ephemeris computed at Dun Echt, on Monday, May 9, were transmitted by cable to Boston in the following message: "Decimosexto erective contextual be- witchery anticly demonstrative courageously sputter arith- mancy stomachical auriferous suety bayou synecdochically bissextile eminently." The translation of this message is herewith given.

ELEMENTS OF SWIFT'S COMET, 1881 (a).

Per. Passage, 1881, May 20.67, Greenwich Mean Time.

Long. Perihelion.....	300	2	} Eq. 1881.0.
Long. Node.....	124	54	
$\omega = \pi - \Omega$ .....	175	8	
Inclination.....	78	48	
Log. $q = 9.7674$ .....	$q = 5854$ .		

Greenwich, midnight.	EPHEMERIS.		Brightness.
	h. m. s.	Decl.	
May 10,	0 38 32	+26 46	1.69
14,	56 48	21 35	
18,	1 17 32	15 54	
22,	40 48	9 55	2.32

Computed by Dr. R. Copeland and J. G. Lohse, from observations made at Dun Echt Observatory. The light at discovery is taken as unity.

To astronomical people the translation will, of course, be of scientific value and interest; but a friend at our elbow says he is willing to wager a hat that the majority of readers will understand the telegraph message better and regard it with a deeper interest than the translation.

OPENING OF THE ELECTRIC RAILWAY IN BERLIN.

It is announced by telegraph that the electric street railway of Dr. Siemens, in Berlin, was opened for public travel on the 12th of May, with much success. A number of prominent officials and scientists were present. We have heretofore given accounts of the progress of the construction of this work. It is a narrow gauge elevated street railway, mounted on posts, placed on the street sidewalks, something like portions of the elevated railway in New York, but on a smaller scale. The new railway is located on the outskirts of Berlin, and extends from the suburb known as Lichterfeld to Yeltow, a distance of about two miles. The passenger cars are narrow and short, carrying only 14 passengers. There are two tracks. The cars are propelled by a dynamo-electric machine, which receives electricity through the track and a suspended cable, from an electric generator, one at each end of the line, each generator driven by a sixty horse engine. An average speed of twenty miles an hour was expected to be realized. We shall give further particulars in future numbers of our paper.

The original electric railways, which were tried as experiments at Berlin and Dusseldorf exhibitions in 1879 and 1880, were worked by locomotives whose mechanism resembled a fixed dynamo-electric machine. The rails of the line and the wheels of the locomotive engines were made of use to conduct the current of electricity and produce the necessary motion. The second conductor conveying the current produced by the stationary machine to the locomotive was connected with a system of brushes attached to the locomotive. These brushes touched a high-edged rail running in the middle of two other rails and insulated from the ground by a longitudinal sleeper. In practice, however, it has been found that this arrangement is exposed to serious interruptions. The wet, snow, and mud which (according to the season) collects in the ordinary course of traffic upon the middle rail interfere very seriously at times with its conductive capacity. It has accordingly been determined on the Berlin electric line to conduct the current by means of a copper wire properly insulated, and attached to pillars erected

alongside the line, the current being conducted from the copper wire to the locomotive by means of contact rollers.

IRIDIUM.

Several weeks ago we described the new process of John Holland, of Cincinnati, by which he is enabled successfully to work this refractory metal, thereby effecting some very remarkable and promisingly useful results. A patent has lately been granted for the invention. The process consists in bringing the iridium to a high heat, then adding phosphorus, then casting the metal into the desired form, and then eliminating the phosphorus by heating the metal again in a chalk bath. In a recent lecture before the Ohio Mechanics Institute, Cincinnati, Professor Dudley enlarged upon the value and importance of the discovery, reiterating the particulars given in the SCIENTIFIC AMERICAN of February 26, about the aid of the metal as an electrode in the electric lamp, its astonishing hardness, anti-corrosive nature, etc. He stated that the metal has the appearance of steel, but is much harder, being next in hardness to the ruby. It does not rust and cannot be injured by acids. Professor Dudley stated that a bar of it had been used with gratifying success, in place of the negative carbon in the electric light. It burned for sixty hours without any loss in weight or any perceptible change in form. Iridium cannot be fashioned by hammering while hot, nor can it be filed. It is moulded into convenient forms, and then sawed or ground by rapidly revolving copper disks, treated with emery and water. Many uses for the metal have been suggested. Besides its applicability to the electric lamp it has been found to be superior to platinum in telegraph instruments. Heretofore owing to the exceeding difficulty of working the metal its use has been much restricted, its most extensive employment, probably, being for pen points.

Faithful John.

JOHN W. JACKSON, for more than thirty years a faithful employe in this office, died on the 6th of May, of consumption, and was buried from the Colored Methodist Episcopal Church in Sullivan street the following Sunday.

"Old John," as he was familiarly called, had grown up with the SCIENTIFIC AMERICAN, and was as well known among business men down town as the paper itself.

John was faithful to his trusts and exacting in others. If he had business to transact with a business house or an official department and he discovered in the clerk a disposition to give another attention to the exclusion of himself he would have no argument with the clerk as to his rights, but would seek out the head of the firm or department and lay before him his complaint, which, he used to say, prevented delay and facilitated business next time.

A number of years ago, before the present system of making collections through our banks was general, John had a great many collections to make throughout the city. One day, in the absence of the member of our firm who was accustomed to indorse the drafts and checks for collection, a draft was received at the office for a considerable amount on the Sub-Treasury in this city. Another of the firm, who is no longer a member, indorsed the draft and John was sent to collect the money. He soon returned with his bag of gold, and laying it on the desk said: "Mr. W., your indorsement was not known to the cashier, and he at first refused to pay the draft, but on my assuring him it was all right, he said if I would add my indorsement he would pay the money, so I did it, and it was my signature that obtained it."

It is doubtful if Mr. W. ever fully understood why the colored porter's indorsement was necessary. And so wherever John's errands called him, his word or his signature was recognized authority.

Old John is very much missed about this office, and he will be missed by scores of business men about town, so identified had he become with the SCIENTIFIC AMERICAN and its thirty-five years' growth.

New Telephone Central Office System.

Mr. T. G. Ellsworth, manager of the John street office of the Metropolitan Telephone and Telegraph Company, of this city, has patented an improved telephone central office system, the principal object of which is to facilitate connection between wires of telephone lines in a telephone central office, and to afford means for making such connections rapidly and accurately.

Ordinarily in telephone central offices mistakes and delays in connecting and disconnecting the wires of communicating parties are of frequent occurrence, for the reason, among others, that the operator at the telephone cannot conveniently, or does not himself, connect and disconnect the wires, but gives directions to others to do so; hence results much noise and confusion, and consequent misunderstanding and forgetfulness or neglect of orders.

To avoid these difficulties Mr. Ellsworth has devised a system involving the use of novel switch connections and of novel telephone stands, and their peculiar arrangement relative to each other, whereby each telephone operator is enabled easily and without delay to connect and disconnect several communicating wires that are connected with his instrument.

American Medical Association.

The spring convention of the American Medical Association in Richmond, Va., the first week in May, opened with every promise of a successful and profitable meeting. Five hundred physicians were in attendance.