

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 00
 One copy, six months, postage included.....1 50

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.00 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal or express money 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, express money 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, MARCH 19, 1887.

Contents.

(Illustrated articles are marked with an asterisk.)

Air, dry and moist, weight of.....	177	Label holder, improved*.....	185
Annual attempt, the.....	184	Lava beds, Connecticut.....	180
Apes as workers.....	186	Locomotive engineer, lecturer, and editor, a.....	180
Astronomical notes.....	177	Man, strong, a.....	183
Aurora borealis, the.....	181	Manganate of baryta for bleach- ing.....	184
Balloon, green, fusible plug in, device for.....	179	Money, how to make.....	183
Bomb test.....	177	Morgue at Paris, the*.....	178
Books and publications.....	187	Notes and queries.....	187
British Admiralty plans, sale of.....	176	Octopus, the, catching.....	186
Business and personal.....	187	Paints and compositions, danger- ous.....	182
Butter and cheese, pure, how sophisticated.....	181	Plaster casts from photographs, clichés.....	186
Cambie, A. J., death of.....	177	Plow, improved*.....	185
Cement, metallic.....	183	Railways, street, electric, pro- gress of.....	184
Cold air machine of the Paris morgue*.....	178	Rainfall, precipitating, sugges- tion for.....	181
Cold, taking.....	181	Reagent, sensitive, for albumen.....	183
Correspondence.....	183	Roburite.—A new explosive*.....	180
Cottage, Mr. Harry, Feathers*.....	183	Sadiron, Multum-in-Parvo*.....	185
Eggs, preservation of.....	186	School, training, manual, Chicago.....	180
Explosive mixture, new.....	181	Schools, trade.....	186
Explosions, sawdust.....	181	Something else coming.....	182
Feed water heater, Whitney's*.....	179	State tax on commercial travel- ers unconstitutional.....	176
Fog, effect of, on the electric light.....	185	Steno-telegaphy.....	185
Furnace heating.....	183	Stone, decay of.....	185
Gas alarm, electrical*.....	179	Stove, self-extinguishing, for railway cars*.....	184
Gas power.....	177	Stoves, cooking, attachment for- 181	
Gun, magazine, of the German army*.....	182	Surplus, Government, the.....	181
Gunpowder, improved.....	177	Tears, Prince Rupert's.....	181
Henry Ward Beecher.....	177	Ties, railroad, endurance of.....	182
House, suburban, of New York artist*.....	183	Torpedoes and torpedo boats.....	185
Ice, impure.....	179	Tunnel under the St. Clair River.....	184
Inventions, engineering.....	187	Wood dust, when it does not ex- plose.....	181
Inventions, index of.....	187	Yacht, snow, on a Dakota prairie*.....	175
Inventions, miscellaneous.....	187		
James Buchanan Eads, C.E.....	187		
Journals, Chinese, in California.....	187		

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 585.

For the Week Ending March 19, 1887.

Price 10 cents. For sale by all newsdealers.

I. ARCHEOLOGY.—Interesting Etruscan Remains.—Discoveries in the tomb of an Etruscan lady.....	9345
II. BIOGRAPHY.—Sir Joseph Whitworth, F.R.S., LL.D., D.C.L.—Life, with portrait, of the great mechanical engineer, lately deceased.—His achievements in mechanics and ordnance fully described.—Sir Joseph Whitworth.—Further note on the life and labors of Whitworth.....	9335
III. BIOLOGY.—How to Make a Simple Dissecting Microscope.—A home-made instrument described.....	9350
The Sea Serpent.—The probability of its existence and dates of its supposed appearance.....	9349
IV. BOTANY.—Sweet Scented Ferns.—By W. H. GOWER.—1 illustration.....	9349
The Poison of the Stinging Nettle.—By ALFRED W. BENNETT, M.A., F.L.S.—The formic acid hypothesis disproved, and the true nature of the poison considered.—The mechanical process of ejection.....	9342
V. ENGINEERING.—Fuel and Smoke.—By Prof. OLIVER LODGE.—An important treatise on the subjects of ventilation and combustion as referred to factory and home life.....	9338
Improved Steam Street Car.—The Rowan car, awarded the gold medal at the Antwerp Exposition.—1 illustration.....	9338
Steel Sailing Boat for Mr. Stanley.—A sectional vessel for use on African rivers.....	9338
Strength of the Cold Bent.—Steel Plates in the Sheep- head Bay Water Tower.—By SAMUEL MARSDEN.—The cause of the collapse considered.....	9350
Temporary Bridges.—Campaign bridges for passage of large bodies of troops over rivers; the Pressowski and Marva plans.—6 illustrations.....	9337
VI. GEOLOGY.—Suggestions on Teaching Geology.—By W. EDGAR TAYLOR.—Practical instruction in the science; laboratory and field work.....	9348
The New Gold Fields of South Africa.—The De Kaap gold fields; the journey to the ground; the capital.—2 illustrations.....	9346
VII. HYGIENE AND SANITATION.—The Relations of Tempera- ture to Health in Dwelling Houses.—By D. BENJAMIN, M.D., Camden, N. J.—House hygiene and proper conditions for ventila- tion and prevention of injurious draughts.—4 illustrations.....	9341
VIII. METALLURGY.—Aluminum.—A review of the present aspect of the industry; the different processes and the extent of their use described.....	9340
Henderson's Steel Process.—The last account of the results ob- tained by Henderson's gas furnace.....	9341
IX. MISCELLANEOUS.—History of the World's Postal Service.—A most interesting review of the postal service in all lands and all ages, with profuse illustrations.—16 illustrations.....	9343
Reasons why Mercury may be Considered a Compound of Gold and Thallium.—By A. C. CORSENS.—The relations of the specific gravities, atomic weights, and properties of the three metals.....	9341
Musk.—Statistics of production; possibilities of the American production.....	9346
The United States Laboratory at the New York Public Stores, with a description of the methods used.—By MARCUS BENJAMIN.—An elaborate account of the United States appraisal laboratory; the analysis of opium, sugar, tea, etc.....	9347
X. ORDONANCE.—Disappearing Turrets.—A description of the Mou- gain turret, its hydraulic lifting and depressing machinery and ac- cumulator, with dimensions of principal parts.—2 illustrations.....	9337
XL. PHOTOGRAPHY.—Blue Printing.—By F. R. C. PERLIN.—Im- portant notes on the preparation of the solutions and other points. The Process of Achromatic Photography.—An interesting abstract of an article by Admiral MOUCHEZ of the Paris Observatory.....	9348

THE SALE OF THE BRITISH ADMIRALTY PLANS.

The British Government has detected the sale of certain naval plans and specifications, which were in the custody of the Chatham dock yards.

The Naval Department of the United States has started on the work of building ships, and recently purchased from a private English constructor the plans for a vessel. Considerable comment was devoted to this transaction by the English journals. They deemed the ship builder's action unpatriotic. But the enormity of the more recent transaction completely overshadows any evil discernible in Secretary Whitney's purchase. A draughtsman in the pay and employ of the government steals and sells its own private plans and specifications.

Hence, when the question arose of who the purchaser could be, America was first settled upon as the criminal.

A cable message, dated March 11, disposes of this rumor. An official announcement is made that the British authorities hold the name of the purchaser, and are in receipt of trustworthy information that the naval department of Russia is the culprit.

The exoneration of America from any share in the transaction is said to be complete. The unfortunate draughtsman has been discharged, and may be further proceeded against. Parliamentary action, government prosecution, and indictment for perjury threaten him. Russia has not yet been communicated with, but presumably will be well able to take care of herself.

The fact that the United States are no longer "in it" is, from an American point of view, a gratification. It would be a slur upon the ingenuity and resources of our engineers and inventors to acknowledge that we could not build a war vessel upon American lines. In the past our inventors have always risen to urgent occasions, until their quick and ready way of dealing with emergencies has become a proverbial attribute of Americans. The advertisements in the foreign journals bear their tribute to the ingenuity of the people of this country, where special tools, household implements, steam pumps, and other articles are heralded as of American invention. No foreign aid is needed to enable us to build war vessels.

The inventive genius of the United States can do as well as the British Admiralty in designing ships. Rigid adherence to precedence, an unwillingness to test new designs, and a want of confidence in ourselves, would be a very poor basis for action in establishing a navy. The successful war vessel of the future will probably involve many new features. It will be based as much on original thought as on precedents. To cope with those already existing it must be more than a duplication of its possible antagonists. For us to simply copy the ships of Great Britain would be a sure means to keep our navy behind the age, as the patterns would always lead the copy by some years.

JAMES BUCHANAN EADS, C.E.

In the history of American enterprise and engineering, the name of Captain Eads has long held a foremost place. By personal qualities of the highest order, and indomitable will and persistence, he won for himself a world-wide reputation in his profession. His fame was as great in England as here, and she was most generous in her tributes to his genius. His death has now to be chronicled with unfeigned regret. He died at Nassau, on the 8th of March, of pneumonia. He was a typical American in his inventiveness and powers of resource, and stood with but few equals in the front rank of the world's engineers.

He was born at Lawrenceburg, Ind., on May 23, 1820. From the age of eight, he showed more than the usual boy's interest in mechanics, and a couple of years later, at Louisville, whither his family had moved, possessed a workshop of his own, fitted up for him by his father, where he made all sorts of models for his amusement. Three years later the family removed to St. Louis. The steamer carrying them burned, and all his father's possessions were destroyed. Landing a barefooted boy, it is said that he began life by selling apples for a living. Eventually he became a clerk in a business house, and in 1839 was a purser on a Mississippi steamer. He kept up his mechanical studies, and in 1842 invented a diving bell for the recovery of cargoes from sunken steamers. A company was organized for its use, and employed it for several years in saving wrecked goods. Thus young Eads acquired an intimate knowledge of the great river and of its action upon the silt beds that lie in its course. In 1845 he sold his interest in the company and established glass works in St. Louis, the first ever started west of the Ohio. Failing in this, he returned to the work of saving wreckage, and in this work and in improving the river channel at St. Louis he accumulated a fortune.

As long ago as 1856 he proposed to keep the channel of the Mississippi, Missouri, Ohio, and Arkansas Rivers clear, but Congress rejected the plans. His first great achievement was during the war. In 1861 President Lincoln asked him for designs for gunboats for the West- ern rivers. He offered the plans, which were accepted, and he undertook to build seven vessels in sixty-five

days, and carried out the contract. Seventeen other boats were built by him during the war, and did good service under Farragut, at the capture of Mobile and elsewhere.

The great steel arch bridge at St. Louis, with a clear span of 564 feet, built by him, still represents a triumph of modern engineering. It was opened to traffic in 1874, after seven years had been consumed in building it. His next important work was the excavation of the Mississippi channel by the aid of jetties, which work he carried out in the face of the most determined opposition from other engineers. He deepened the South Pass from a depth of 8 ft. to 30 ft. by his plan of making the river scour its own channel.

His great project of the Tehuantepec ship railroad is still in embryo. Success marked his work always. He has left this enterprise in such an advanced phase that its consummation need only be a question of time.

He was the recipient in June, 1881, of the Albert medal of the British Society of Arts, he being the first American upon whom it was conferred. From the Missouri State University he obtained the degree of LL.D. In the same year he was received by the British Association at their York meeting, and made an address upon the improvements of the Mississippi chan- nel, and upon the Tehuantepec ship railroad, which the society voted to print among its archives. A full account of his achievements would fill many pages. The above is a mere note of the more remarkable ones. In past numbers of the SCIENTIFIC AMERICAN and SUPPLEMENT, various accounts of his life and labors will be found.*

THE STATE TAX ON COMMERCIAL TRAVELERS UNCONSTITUTIONAL.

On March 7 an opinion was rendered by the Supreme Court of the United States in a case involving this tax. In Shelby County, Tenn., a special tax has been levied upon traveling salesmen engaged in soliciting orders. In amount it was quite onerous, being ten dollars per week or twenty-five dollars per month. It was collected not only from salesmen from other States, but also from those coming from other parts of Tennessee. This district includes the city of Memphis. The case is num- bered 816. It is of special importance, because in the opinion of the court the doctrine of the regulation of inter-state commerce is considered at some length.

An unlicensed salesman had been arrested in Mem- phis, and had been convicted and fined, and on appeal to the highest State court the conviction had been af- firmed. The case was then carried up to the Supreme Court of the United States. They have now reversed the decision of the Tennessee Supreme Court, and ordered the plaintiff in error to be discharged. The opinion was delivered by Chief Justice Bradley. Start- ing with the point that the power to regulate inter- state commerce is vested in Congress, the court holds that this power is exclusive whenever the subjects of it are national in character, and only admit of one uni- form system or plan of regulation. The part of the Constitution on which this rests is the well known third clause of Section VII., the one under which protec- tion is extended by the United States courts to trade marks.

From this premise it is held that a failure on the part of Congress to act in such cases indicates its will that the subject shall be left free from any re- strictions or regulations imposed by the States, ex- cept as regards matters of local concern. Thus, by virtue of its police power and jurisdiction over persons and property within its boundaries, certain restric- tions might incidentally be placed upon business transactions, but this would not justify any direct in- terference with inter-state commerce, nor the direct imposition of taxes upon temporary sojourners within the State, nor upon property not yet become part of the common mass, so as to discriminate against the citizens of other States. In the matter of inter-state commerce, the United States are, in the opinion of the court, but one country, and are, and must be, subject to one system of regulations, and not to a multitude of systems.

This is a brief abstract of the principles on which the decision was founded. The question of its expediency as affecting the resources of the State is considered at considerable length. Congress is pointed out as the proper power to pass laws to undo any injury which freedom of trade may do to the individual State. Based on the peculiar fact that Shelby County taxes com- mercial travelers from other parts of Tennessee as well as the outside class, a dissenting opinion was rendered by Justices Field and Gray, they holding that to relieve such travelers from other States from taxa- tion would operate as a discrimination against those from other parts of Tennessee. Two wrongs do not make a right, however, and the State of Tennessee can easily, by proper legislation, remove this burden, if it is such, from residents outside of Shelby County. A further interest attaches to the decision, as it indi- cates a reaffirmation of the limits of State rights.

* See SCIENTIFIC AMERICAN, December 27, 1884, and SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 44 and 479.