

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

A. E. BEACH.

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

TERMS FOR THE SCIENTIFIC AMERICAN.

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 AMERI-CAN, 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 word. Single copies, 50 cents. [37] Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed an nouncements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed cir-culation in all commercial places throughout the world. Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, DECEMBER 5, 1885.

Contents.

(Illustrated articles are marked with an esterisk.)

Thermometer required, improved 352 Tiles, brick. 382 Walls, whitening. 383 Washing machine, easily Oper-383 Window, improved*... 384 Window, improved*... 355 Yucatan, ancient, art of... 356

PAGE

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 518,

For the Week Ending December 5, 1885.

Price 10 cents. For sale by all newsdealers.

I. CHEMISTRYFreezing MixturesWith table Nitro-Celluloses Apparatus for Filling Suphons with Liquefied Sulphurous Acid	8272
1 figure	
II. ENGINEERING AND MECHANICSThe Nordenfelt Subma- rine BoatWith full description and numerous illustrations Surface CondensationCondensers of the S.S. CalabriaWith	8264

engraving 8266 Accumulator of Power for Use on Sewing Machines.-2 Dohis's

III. TECHNOLOGY .- The Manufacture of Toilet Soaps .- By C. R.

THE GREYHOUNDS OF THE ATLANTIC.

of extreme speed and enormous size can be made as acceptable to their owners as to the public, for the large expense for first cost and maintenance makes it doubtful on which side the financial margin will be found. The managers of the Cunard Line seem, however, to have satisfied themselves of their profitableness, for within the past few years they have added to their fleet as many as five of the fast-Company are following the same policy, and the voyage from New York to Havre will be made next summer by the large new steamers recently built for the pur- such unique inquiries is to him who breaks the ground. pose. The other lines, however, are more conservative. The White Star Line has not added a new vessel to its fleet for years, and its steamers can no longer be Line. The America, of the National Line, and the ing of this and other vessels, was hailed with delight British War Office. speeds adds to the resistance while it increases the chouc, to prevent the escape of hydrogen. power, and the greater space occupied by engines and in the carrying capacity. The cost of a steamer like burden.

at one trip, and could this rate be maintained all the and for a large part of the year she must either be laid Tribune puts it, is whether it will pay to build vessels at a vast cost which will run almost empty during half | ing atmosphere, the buoyancy is increased. the year, and will make the passage from New York to Queenstown in twenty-fours less time than other vessels which cost much less and burn half as much coal. In the long run, it will probably be found that the most profitable steamers for transatlantic passenger service are boats like the Britannic, the Gallia, and the burn something less than 200 tons of coal a day, and is at too great a cost.

M. PASTEUR'S RESEARCHES IN THE TREATMENT OF HYDROPHOBIA.

The entire civilized world has for some time past been watching with intense interest the experiments on the treatment of hydrophobia conducted by the ment of tissue taken from the spine of a rabid dog. marrow was in turn inoculated into a second rabbit, and the process continued until sixty rabbits had been treated. Each inoculation increased the power of the is similar to that of the independent ship except the virus, so that the last incubation occupied but seven motive power, which is here electricity. The track condays. As dried air diminishes the power of the virus, sists of two parallel wires supported on poles above the spinal marrow of the inoculated rabbits was kept the ground. The lower deck would be provided with in bottles of dried air. In beginning his experi- two large wheels constructed to run on the under side

from the time of the accident. To carry this system It is a question whether the new class of steamships into effect, it will be necessary to have rabbit farms established, where the animals will be kept constantly inoculated with the disease, just as we now have bovine farms for the production of vaccine virus. Two lines of treatment are mentioned, the inoculation of human subjects and the blotting out of the disease by the compulsory inoculation of dogs for several generations. The origin and nature of hydrophobia are understood but imperfectly, and it is too soon to make est and largest vessels afloat. The French Steamship any definite assertions in regard to M. Pasteur's system. It is probably but the first link in a chain of elaborate investigation. The honor, however, in

WAR BALLOONS.

At a recent meeting of the Military Service Institucalled swift. The same thing holds true of the Inman tion, held at Governor's Island, Gen. Russell Thayer, of Philadelphia, presented in detail his system of inde-City of Rome, of the Anchor, are both known as ocean pendent and dependent dirigible balloons, intended racers. The Guion Line retains the Alaska and the particularly for use in war times. General Thayer has Arizona, but was glad to sell the Oregon to the Cunard made many experiments in aerial navigation, and has Company; and it is said that the rumor of war be- so far been successful that a number of his designs and tween England and Russia, which led to the charter- working models are now under consideration at the

by those companies whose property was taken. It The independent balloon is for observation chiefly, will be observed that the evidence in the matter is de- and has sufficient carrying force to enable it to drop cidedly ambiguous. While the one company is increas-powerful explosive bombs upon the fleet or camp of an ing size and speed, the others are holding back. The enemy, and cause greater destruction than the most cost of operating these immense steamers is enormous, formidable fortifications. The buoyant part of the while the rates for ocean travel are, if anything, on balloon is made of superimposed tissues of silk or rubthe decline. The great size made necessary by high ber, or vegetable textures impregnated with caout-

The form is that of a circular spindle, the longer coal bunkers does not permit a corresponding increase horizontal axis of which should be three and two-thirds that of the smaller. The body is at all times perfectly the Etruria is about \$1,000,000; she burns over 300 tons inflated, so as to remain rigidly in shape. The susof coal daily, and her crew is necessarily much larger pended deck, carrying the machinery and crew, is than on a vessel of from five to six thousand tons firmly supported and braced. A lower deck carries the motive power. When the machinery is in operation, She has carried as many as 600 first class passengers the balloon can be raised or lowered to any elevation without employment of ballast. Four cylinders locatyear round, she would, of course, be a very profitable ed on the upper deck receive a portion of the hydrogen investment; but the season of heavy travel is limited, from the inflated bag of the balloon when it is desired to lessen its buoyancy, and consequently descend. To up or run at a loss. The real question, then, as the ascend, the gas is pumped from the cylinders into the bag, and by displacing the heavier air of the surround-

The motor is a high pressure air compressor coupled directly to a newly devised carbonic acid gas engine and a reservoir for storing the air until sufficient pressure is obtained. At given intervals of time, the compressed air is suddenly released, producing a powerful forward thrust. As the carbonic acid gas engine uses Normandie, which cross in about eight days. They no coal, danger from fire is entirely avoided. This is particularly important, since mixtures of hydrogen and can accommodate about 300 passengers. The gain air are so terribly explosive. The air being discharged of the larger and swifter boats in capacity and speed ; at the stern through a pipe and nozzle fitted on a ball and socket joint, the direction of the air ship is determined by a wheel governing the movement of the pipe and nozzle. No other rudder is necessary. The efficiency of the mechanism is increased materially by placing hollow, truncated cones over the nozzle.

Gen. Thayer expressed his belief that air ships, even 1,000 yards in length, could be operated without difficelebrated French scientist, Dr. Louis Pasteur. These culty, since the resistance does not increase in proporresearches have now been so far completed that the tion to the size of the ship. Last year the United results have been presented by the investigator to States Ordnance Board recommended the construction the French Academy of Sciences. The first step in of an experimental balloon, 100 feet in diameter and these investigations, as reported by cable to the 367 feet long. Such a ship would have a total ascend-Herald, was the inoculation of a rabbit with a frag- ing force of about 55 tons. It is thought that a speed of 50 miles an hour could be obtained. Gen. Thayer's The incubation of the poison occupied fifteen days, model, being 30 feet long by 10 feet in diameter, was As soon as the animal died, a portion of its spinal not placed on exhibition, as the assembly room was scarcely capacious enough.

The construction of the dependent dirigible balloon with the old tissue, and finished the operation by the side. This arrangement anchors the balloon to the om a dyna-

ALDER WRIGHTDistinction between toilet soaps and household	injection of tissue that had been bottled only two	earth, and furnishes the motive current from a dyna-
and scouring soaps.—Early history of soap making processes.—Ma- terials employed.—Causticizing of alkalies.—Classification and gen-	days, the period of incubation of which would not	mo at the end of the line.
eral chemical characters of soapmaking processes	exceed a week. These experiments have been very	It is expected that a speed of at least 20 miles an
Apparatus for Packing Flour in Bags2 figures	successful, for after such an inoculation the subject	hour could be obtained. A model of the balloon and
Machine for Covering Copper Cables with Gutta Percha2	is found to be entirely proof against hydrophobia. An	track was shown, and by making the connection was
figures	excellent opportunity to test the new treatment was	operated successfully. These experiments have at-
Qualifications of Foremen		tracted much interest, and have inspired a confidence
IV. ELECTRICITY, ETCNew Method of Manufacturing Incandes-	who had been bitten fourteen times by a rabid dog,	in their ultimate success when put into practice.
cent Lamps2 figures		
V. ARCHITECTURE AND ART The Midland Hotel, Withington,	no doubt of a speedy and painful death, should	ACCORDING to La Lumiere Electrique Mr. L. Senet has
near Manchester.—Full page of engravings		invented a new process that permits of the manufac-
VI. BIOLOGY, ANTHROPOLOGY, ETC.—The Origin of the Higher	proper subject for experiment. In thirteen days, the	ture of aluminum, as well as copper, silver, etc., by
AnimalsBy Prof. W. K. PARKERDid the higher vertebrata	inoculations made upon the lad were gradually in-	electrolysis. A current of from 6 to 7 volts and 4 am-
arise suddenly, or slowly by gentle modifications ?-Did the lower	creased in strength, until the last was from a rabbit	peres is made to act upon a saturated solution of sul-
vertebrata arise suddenly, or by gradual metamorphosis of non- vertebrate types ?	that had only died on the previous day. At the end	phate of aluminum in the presence of a solution of
The Carp.—Its food		chloride of sodium, the two solutions being separated
Soldanella AlpinaWith illustration		by a porous vessel. A double chloride of aluminum
VII. MISCELLANEOUSThe Eightieth Anniversary of the Battle	Another lad, named Judith, who was fifteen years old,	and sodium is formed, which is decomposed, and the
of Trafalgar.—With plan and engraving		aluminum that is set free deposits upon the negative
Japanese Tattooing.—Origin and meaning of the practice.—Man- ner of operating, etc	satisfactorily after a week's treatment, and a fortnight	