

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

A distinct paper from THE SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with THE SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 19 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, JUNE 4, 1881.

Contents.

(Illustrated articles are marked with an asterisk.)

Accident, strange. 358
Acid burns, remedy for. 358
Alloy for brands (20). 362
American awards, Int. Fish Ex. 361
American Medical Association. 353
Ammonia jelly motor, the. 353
Belt clasp, new\*. 355
Blood, etc., utilization of. 361
Books, to letter (1). 362
Brakes, good, value of. 362
Bridge, East river. 352
Castings, filler for (26). 363
Cattle, how killed for N. Y. mar. 360
Chemical nomenclature (12). 362
Commerce of New York. 361
Cypress, ancient, near Sparta. 361
Deafness, partial, curious case. 356
Discoveries, inter., in Yucatan. 354
East river bridge. 352
Electric lamps, on shipboard. 357
Engineering inventions. 356
Fans, Japanese, how made. 354
Feed water heater and pump\*. 357
Fire extinguisher, chemical (29). 358
Fish for artificial ponds (2). 363
Flour, self-raising (22). 363
Flowers about railway stations. 352
Gang boring machine, new\*. 357
Gold, phys. action of salts on. 355
Gymnastics as a cure of disease. 353
Heavy woman, a. 361
Hudson river tunnel, the, inside\*. 351
Inventions, engineering. 356
Inventions, mechanical. 358
Inventions, new. 357
Inventions, recent. 355
Jupiter's day, length of. 357
Labor, English, puzzling. 359
Leeches, how to keep. 359
Leech farming\*. 359
Mastodon, the, in recent times. 360
Mechanical inventions. 358
Mississippi river and grain trade. 361
Naval observatory, new. 355
Nickel oxide and cobalt oxide. 358
Orchid hunter, an, return of. 358
Paper, electrical. 352
Paste, to prevent moths (25). 363
Patent decisions. 357
Perpetuum mobile. 353
Perpetual motion delusions. 352
Perpetual motion, Govt. plea for. 352
Petroleum engine, trial of a. 357
Plate glass, manufacture of. 355
Rubber goods, to deodorize (8). 362
Rubber stamps (20). 362
Shears, spring grass\*. 361
Single product, the. 361
Sprinkler of woolen goods (21). 362
Signs, spacing and lettering\*. 359
Sound, polarization of. 352
Spence metal, to make (23). 363
Steamboat exper., John Fitch's\*. 359
Steam engine, self-acting, elec. 353
Storm glass (24). 358
Stumps, to remove (7). 362
Tapeworms, pepsine treatment. 352
Tattoo marks made useful. 355
Tea, American, improving. 361
Technology, Stevens Inst. of\*. 354
Telephone hand-car\*. 355
Telephone, noises in the. 356
Telltale, railway. 357
Testament, the new. 353
Transferring pictures to glass (4). 362
Tunnel, Hudson river, inside\*. 351
Twine, to treat (31). 362
Water, croton, bad taste in. 360
Water power of Atlantic coast. 361
Weather indications, how deter. 361
Wells, artesian, in New York. 361
Wood, to preserve (10). 362
Zeromotor. 353

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT No. 288,

For the Week ending June 4, 1881.

Price 10 cents. For sale by all newsdealers.

I. ENGINEERING AND MECHANICS.—Chaudiere Bridge, Ottawa. 3 illustrations.—The Chaudiere Bridge, Ottawa River, Canada.—Perspective, map, plan, etc. 4508
Furnaces for Destroying the Refuse of Cities. 4 figures.—Apparatus used at Burmantofts, and adopted by several English and German cities. 4504
The Stability of Certain German Ships. W. H. White's paper before the Institution of Naval Architects.—With discussion on waves raised by paddle steamers and their positions relatively to their wheels.—3 figures. 4505
Improved Canal Dredger. 4 figures.—Views and sections of a novel dredging machine for excavating canals in British Guiana. 4506
Air Regulator for the Air Chambers of Pumps. 4 figures.—Arrangement of apparatus and sections, Dwyer's invention. 4507
Apparatus for Conditioning Fibrous Materials. 1 figure.—Hertz's invention. 4506
Aerial Navigation and its Possibility. By TIM. CHOINSKI. 2 figures.—A suggestive study of the flight of birds, with a plan of an air ship to be navigated without wings, machinery, or a balloon. 4507
Stevens Institute of Technology. 4518
II. ELECTRICITY.—The Future Development of Electrical Appliances.—Society of Arts paper, by Prof. JOHN B. PERRY.—A suggestive survey of present condition and immediate prospects of electrical investigation.—Figures.—Electricity as a form of energy.—Difference of potential.—Electromotive force.—Electrical magnitudes.—Rate of production of heat, in horse power.—Transformation of electric energy into heat and light.—The dead beat galvanometer.—The dispersion photometer.—Distribution of electricity.—Possibilities.—Electrical machines. 4509
The Stevens Institute of Technology, Hoboken, N. J.—Opening of the New Workshop.—Addresses by President Morton and others. 4509
The Theory of the Photophone. Wm. H. Preece's investigations. 6 figures. 4514
III. HYGIENE, MEDICINE, ETC.—How We are Poisoned, by Dr. C. A. GREENE and others. Poisoning by absorption.—Copper utensils.—Soap.—Hair brushes.—Tin milk cans, etc. 4515
On the Attenuation of the Virus of Chicken Cholera. By L. ASTURER. Results discovered and established.—The mysterious problem of variable virulence.—The attenuation of virulence.—The cultivation of virus.—Power of oxygen to destroy virulence. 4516
Microphyth. By Dr. JOHN W. MCLEAN. 4516
A Curious Result of Mental Derangement. 4513
IV. NATURAL HISTORY, AGRICULTURE, ETC.—The Ferns of the Pacific Coast. By Mrs. S. A. P. LEMMON. Geographical range.—Floral divisions.—Peculiarities of distribution.—The origin of ferns.—Life of ferns.—Reproduction and growth.—Fern literature of America.—New ferns of the Pacific coast.—Little known ferns.—Uses, benefits, etc., of ferns. 4517
The Grass Crop. Methods of seeding.—How much seed.—Varieties.—Selection of varieties. 4518
V. TECHNOLOGY, CHEMISTRY, ETC.—How is Petroleum to be Examined. By F. SKALWEIT. 1 figure. A simple petroleum tester. 4514
The Action of Certain Organic Substances upon the Rose Color Produced by the Solution of Potassic Iodate in Potassic Iodide. By FRANK FIELD. 4515
On Ozone. Investigations of Hautefeuille and Chappuis. 4515
On Nitrification. 4515

PERPETUAL MOTION DELUSIONS.

We publish in another column sundry paragraphs relating to the zeromotor and other perpetual motions, among them a letter from Professor Gamgee. This communication is of interest, as showing that the Professor considers himself to be a persecuted saint and martyr, chiefly because he has, as he avers, supported himself and his schemes for the past two years. He also grieves that a man who has so clear and profound a knowledge of the zeromotor principles as Chief Engineer Isherwood, should be misunderstood and misrepresented to the degree of being charged with indorsing a perpetual motion.

It is a singular circumstance that such arrant deceptions as the Keely motor and the Gamgee motor should each have had for its godfather a prominent officer of the United States Navy. In the case of the Keely motor it was the former Engineer-in-Chief of the United States Navy, Prof. Charles H. Haswell, who supported the deception, in a report, from which extracts were given in the SCIENTIFIC AMERICAN of May 2, 1874. The Keely Company at that time also referred to William W. Wood, Chief of the Bureau of Steam Engineering, U. S. N., and also had the certificate of Wm. H. Rutherford, Chief Engineer, U. S. N., as to the correctness of their statements concerning the operation of the motor. We believe that it was chiefly on the strength of the certificates of these gentlemen and of Prof. Haswell's favorable report that the Keely operators succeeded in milking the New York bankers and brokers out of the thousands of dollars which they originally paid over for shares in the silly scheme.

In the case of the Gamgee perpetual motion, its claims to consideration rest mainly upon the report of Chief Engineer Isherwood, U. S. N., date of March 19, 1881, and published in the SCIENTIFIC AMERICAN, date of May 21, 1881. We inferred from this report that the Navy Department had already expended some of its resources on Isherwood's recommendations, in pursuit of the Gamgee delusion. He strongly urges the Secretary of the Navy to authorize the continued use of the Washington Navy Yard facilities for the same purpose. Prof. Gamgee, however, says that the expenses are paid by him, which is consolatory.

Another singular feature of these twin deceptions is that they are both based (or were originally) upon the same alleged principle of operation. It was claimed for Keely's motor (see SCIENTIFIC AMERICAN, June 10, 1876) that the vapor "does its allotted work upon the engine, is recondensed into its former state, and again becoming vaporized, starts again upon its mission of mighty pressure." All this without the supply of fuel, electricity, galvanism, or any agency other than that supplied by the machine itself.

In Gamgee's motor the liquid expands into vapor, which acts against the piston; the vapor then condenses itself, and runs back to act again against the piston, and so on in one perpetual round or "cycle" of duty. All this, too, according to Prof. Gamgee and Chief Engineer Isherwood, "by the working of the machine itself."

An improvement on the Gamgee plan, suggested in the letter of a correspondent, elsewhere published, consists in the use of ammonia cream or jelly.

Another correspondent, whose letter we give, a young man without money or friends, wants help to develop his perpetual motion. Perhaps the Secretary of the Navy will give him the same facilities that he is now bestowing upon enterprises of this nature at the Washington Navy Yard.

We give, from Engineering, a letter from Mr. Kilbourn, in which he explains the frigorific dangers of using motors on the Gamgee principle, namely, liquefaction by expansion. May it not be possible that the last glacial epoch was brought about by a race of men now extinct, through the ill-advised use of too many Gamgee machines, they and their motors having become solidified?

POLARIZATION OF SOUND.

Professor S. W. Robinson has an article in the Journal of the Franklin Institute, the object of which is to show, by theory and experiment, that longitudinal vibrations, such as sound waves, can be polarized; and not only this, but also to show that it is irrational and improbable for vibrations in extended media generally to be primarily otherwise than longitudinal. All this is aimed especially at the "transversal theory" of light.

The phenomena of radiation, refraction, diffraction, diffusion, interference, and polarization are, with the exception of the latter, common to light and sound, and it is for the sake of explaining polarization in light that physicists have set up the theory of transversal vibration. It is, therefore, only necessary to polarize the sound to place all the known effects of luminous waves in common with sound waves, or to make the theory of longitudinal vibrations universal. The author, after much study, became convinced about eight years ago that undulations generally could be polarized, and, after some preliminary experimentation, apparatus was devised by him last May, by means of which he obtained results which verified all his preconceived notions in the matter. The means adopted for polarizing the undulations was the same as that for polarizing light by reflection, but the apparatus can scarcely be described without the use of figures.

The results obtained by Professor Robinson establish the following facts for sound waves or for undulations: (1) A decided reflection occurs at a surface separating two gases of different density, confirming the views of Henry and Tyndall in this regard. (2) In repeated reflection from such surfaces the intensity of the final component varies with the relative

positions of those surfaces, the same following the laws of polarization in light, from which we conclude that longitudinal undulations can be polarized.

With sound polarized, we complete the list of effects for longitudinal undulations which are known to light, viz., radiation, shadows, reflection, refraction, diffusion, diffraction, interference, and polarization; and the laws are common for like conditions.

The conclusions to which the author has been led are summed up as follows: (1) Vibrations in extended media, produced from the action of a remote single center of disturbance, can only be longitudinal, even in light. (2) Vibrations will be to a certain extent transversal when due to two or more centers of disturbance not in the same line, as when two or more independent coexistent systems of undulations combine into one, or when a simple system is modified by such lateral disturbance as a reflection or a refraction. (3) Undulations, to be in a condition called polarized, must consist of vibrations which are transversal, and no necessity exists for assuming vibrations transversal in front of a polarizer.

ELECTRICAL PAPER.

Letter paper, well heated and rubbed briskly by the hand or a brush, acquires, as well known, electrical properties. It adheres to walls or other flat surfaces, and even gives, in contact with the hand, small discharges, which are visible in darkness. The Revue Industrielle points out a method of treating paper so that these electrical properties may be increased to such a degree that the sparks shall be of considerable length. Ordinary Swedish filtering paper is immersed in a mixture of equal volumes of nitric and sulphuric acids, as in the process of making gun cotton. The paper thus pyroxylated is then washed in a large quantity of water, and afterward dried.

This paper, when laid upon a piece of oil cloth and rubbed very briskly, will exhibit very energetic properties, and with it, says the Revue, may be perfected nearly all the ordinary experiments in static electricity, such as the production of sparks, shocks, charging of the Leyden jar, etc.

Paper makers, as a general rule, know by practical experience that it is not difficult to get electricity into paper; and some of them would be glad to hear of some simple way to get the fluid—or what-is-it—out of the paper. We recently received a cargo of SCIENTIFIC AMERICAN paper that was so charged with electricity that the sheets would not separate without tearing, and we could not run them through the press. We were compelled to return the entire consignment to the maker, as its use was impracticable.

We believe that printers are more troubled with electricity upon their papers and presses nowadays than formerly. Perhaps it is due in some measure to the more common practice of running the sheets through the press in a dry condition. On the other hand, may not the rapidly increasing local uses of batteries and electric machines for telegraphs, telephones, lights, etc., yield such a superabundance of the mysterious element as to show itself in the press rooms?

The East River Bridge.

The work of laying the floor beams of the East River Bridge is now going forward quite rapidly. The manner of suspending these beams was illustrated in this paper a fortnight ago. There are now thirty-four beams in position on each of the land spans, and on the river span there are thirty-seven in position on both the New York and Brooklyn sides of the river. There are, therefore, one hundred and forty-two floor beams in position, or including the eight in the towers, one hundred and fifty in all.

Engineer Martin reports that three cargoes of creosoted yellow pine for the roadway of the bridge have been received. These beams, which are four and a half inches thick, will be laid directly upon the floor beams, and over them will be laid a covering of oak two and a half inches thick. The paving stones for the roadway are arriving in good numbers, and the work of paving will begin about the middle of June.

Flowers about Railway Stations.

For some years the Pennsylvania Railroad Company has endeavored to relieve the barren dreariness of the ordinary railway station by surrounding their country station houses with flower beds. More attention to this matter is being paid this year than ever before; and recently the company purchased 50,000 plants in this city for the adornment of the stations of the New York and Philadelphia division of the road. The practice is worthy of general imitation.

The Pepsine Treatment of Tapeworms.

The tapeworm is able to live in the stomach because of its ability to resist the digestive action of the fluids normal to the stomach. In a stronger peptic solution the live worm succumbs and is digested like any other flesh. Accordingly a French physician treated with strong doses of pepsine a child who had passed segments of a large tapeworm. About 45 grains of pepsine were administered daily for five days. The child experienced no harm and showed no special symptoms. Then a proper dose of sulphate of pelletierine with castor oil was given, and the discharges showed no signs of the worm. Subsequent experiments with vegetable pepsine—papaine—which is much more active, are said to have given very promising results. One child passed fragments of tapeworm ten inches in length, softened and partially digested.