

SCIENTIFIC AND PRACTICAL INFORMATION.

NEW INVESTIGATIONS IN MAGNETISM.

MM. Treves and Durassier have recently investigated the question of whether, and how, in a steel magnet, the known portable force varies when the weight and section are affected by the gradual dissolution of the magnet in an acid. The result is that the force is always proportional to the section and to the weight, so that a curve representing the variation of weight and section would be parallel to one indicating the diminution of intensity. As the dissolution progresses, the metal shows serrated inequalities perpendicular to the axis of the bar; and if a horseshoe magnet be treated, the curved part is found to dissolve incomparably quicker than the straight portions.

A NEW MODEL FOR SHIPS.

The circular ironclad lately constructed in Russia, and described in the SCIENTIFIC AMERICAN of August 7, 1875, may possibly lead to a radical change in the construction of sea vessels other than those for warlike purposes. A young officer of the Russian navy, attached to Admiral Popoff's staff, has constructed a saucer-shaped sailing yacht, 20 feet in diameter, which is described as extremely fast. The little craft is cutter-rigged, with an exceedingly high mast, and has great speed under canvas, in combination with an altogether unequalled power of staying and wearing. She is perfectly round, decked somewhat after the fashion of a Bermuda boat, and, having great stability, can carry, almost without inclination, all the canvas which it is possible to spread upon her. Strange to say, she is extremely handy as well as fast. Such, at least, is the account given of her in the London Times by Mr. E. J. Reed.

OXYCHLORIDE OF SULPHUR.

Paul Behrend, of Leipsic, has recently discovered a new and convenient method of preparing the oxychloride of sulphur, also known as sulphuryl chloride, SO<sub>2</sub>, Cl<sub>2</sub>. This was accomplished by taking sulphuryl chloride (SO<sub>2</sub>, HO, Cl), which is formed by the union of sulphuric anhydride with hydrochloric acid, and sealing it up in glass tubes which were heated for 12 or 14 hours to a temperature of 338° to 356° Fah., in a paraffin bath. On distilling the contents of the tube, pure sulphuryl chloride was obtained.

METALLIC GALLIUM.

The new element gallium has recently been obtained in a pure metallic state by M. Lecoq. Its brilliancy places it between platinum and silver. It was obtained by treating electrolytically the aqueous solution of its ammoniacal sulphate, and the very coherent deposit formed was subsequently burnished.

The Food Equivalent of Health.

General Sherman, in his chapter on the "Military Lessons of the American War," says: "To be strong, healthy, and capable of the largest measure of physical effort, the soldier needs about 3 lbs. gross of food per day, and the horse or mule about 20 lbs. An ordinary army wagon drawn by six mules may be counted on to carry 3,000 lbs. net, equal to the food of a full regiment for one day; but by driving along beef cattle, a commissary may safely count the contents of one wagon as sufficient for two days' food for a regiment of 1,000 men; and as a corps should have food on hand for twenty days ready for detachment, it should have 300 such wagons, as a provision train; and for forage, ammunition, clothing, and other necessary stores, it was found necessary to have 300 more wagons, or 600 wagons in all for a corps d'armée. Each regiment ought usually to have at least one wagon for convenience to distribute stores, and each company two pack mules, so that the regiment may always be certain of a meal on reaching camp without waiting for the larger trains." A curious calculation of a similar nature exists, made by Tempelhoff, a Prussian general, the historian of Frederick's wars: "100,000 men," he says, "consume daily 150,000 lbs. of flour, equal to 200,000 lbs. of bread. Bread and forage are seldom to be had in sufficient quantities on the spot—hence magazines are established along the line of operations. The bread wagons carry a supply for six days, the men for three more. In commissariat wagons, flour for nine additional days could be conveyed—one wagon to 100 men for nine days, thus 1,000 wagons supplied the army for that time. An operation of 18 days' duration could thus be conducted without an intervening magazine, but field ovens were required to make the flour into bread. But bread for three days requires two days to bake it; at the end of six days, therefore, a halt must be made to bake or else the ovens would fall behindhand with the supply; so that, in advancing into an enemy's country before magazines could be formed there, six days was the extent of march practicable without a halt."

A strange Explosion in Boston.

A singular explosion occurred in South Boston on the evening of December 22. A large gas main, running under the Federal street bridge and along Federal street, exploded, tearing up the pavement, killing and wounding a number of people, and blowing others into the water. It is supposed that gas had escaped from a defective pipe until the ground had been saturated by an explosive mixture of gas and air. How it was fired is not known. The main pipe, about five inches in diameter, passes through under Federal street bridge, and along the causeway leading from it up Dorchester avenue, the continuation in South Boston of Federal street. This causeway is composed of three feet or more of dirt and gravel, with the pavement resting on a foundation of piling, and on either side, for 17 feet or more, is the river.

Eye witnesses state that a bright flash was first seen about the middle of the causeway, followed by a sharp explosion

and paving stones, gravel, and debris flying in all directions. Almost immediately the causeway on the right hand side fell over into the river, carrying over with it several persons. The number of these is not yet ascertained, but it is feared several were buried under the debris at the bottom of the river. The pavement was completely torn up for a distance of 175 feet from the wooden portion of the bridge to Crosby's warehouse, which was seriously shattered. Had the explosion occurred five minutes later the loss of life would have been far greater, as the draw of the bridge had been up for some time, and a crowd of 300 or 400 persons, on their way from the city to their homes in South Boston, had collected on this side, and in a few minutes would have swarmed upon the causeway.

Another Subterranean Explosion.

An explosion in one of the city culverts of Philadelphia, Pa., accompanied by the rupture of a gas main and the upheaval of inlet covers and the iron tops of manholes, coming soon after the fatal occurrence of a somewhat similar nature in Boston a few days ago, has led the Public Ledger of the former city to make some inquiry into the fact. It does not appear that the explosion came from any contact of inflammable gases with fire, as there is no account of any flames having been seen by anyone. A rupture of a small gas main seems to have been an incident of the violence, and not the cause of it. The damage appears to have been occasioned by confined air, compressed within the culvert by the backing up of the tide water of the river to such a degree as to break out through the inlets and manholes with great force. This is not an unusual occurrence, and not by any means so dangerous as the ignition and explosion of inflammable gas in a culvert would be.

The Value of the Scientific American.

S. S. B. says: "I believe that, since its first year (1848, I think) I have missed but one year's numbers of your journal. In the burning of my house, four years ago, I lost some 18 years of your paper, with many other valuable books; but none was so great a loss as the file of your paper. In 1854, I lent a volume of the paper to a friend of mine, who was erecting a factory. He told me that that volume of the SCIENTIFIC AMERICAN saved him about \$800 in the construction of a grist and saw mill."

D. L. R. says: "The SCIENTIFIC AMERICAN affords me more pleasure than anything else that I can find in the literary line. It is indeed a great storehouse for deep, interesting thought. Not a bit of room is wasted. As an American I am proud of it, and wish it all prosperity from ages on to ages."

F. McC. says: "I cannot refrain from saying a word for the SCIENTIFIC AMERICAN. As it is now conducted, it cannot be beaten as a scientific periodical. I make it a rule to always take my copy to the weekly meetings of our association, and never fail in finding something to read aloud to the members, with profit to them all. You are doing a world of good in sounding the Keely motor."

Rendering Wood Fire and Water Proof.

M. P. Folacci has devised a new mode of rendering wood waterproof and incombustible, which involves the use of the following composition: Sulphate of zinc 55 lbs.; American potash 22 lbs.; alum (ammonia base) 44 lbs.; oxide of manganese 22 lbs.; sulphuric acid at 60°, 22 lbs.; river water 55 lbs. The above ingredients, with the exception of the sulphuric acid, are mixed in a boiler, where the water is added at a temperature of 113° Fah. As soon as solution is effected, the acid is gradually poured in. To prepare the wood, the timbers are placed in a suitable chamber, on gratings, and separated by spaces of about a quarter of an inch. The composition is then pumped in to fill completely the receptacle, and is maintained therein in a state of ebullition for three hours. The wood is then withdrawn, and dried in the air. According to the inventor, it becomes practically petrified, and the most intense flame only carbonizes the surface very slowly.

A Magnetic Island.

The volcanic rocks composing the foundation of the Isle St. Paul are ferruginous. Those on the north side of the crater, which result from the slips whereby all the east side of the mountain is laid bare, attract the two poles of a magnet, and contain 6 per cent of iron. Those met with around the cones of scoriae situated at the foot of the exterior slopes of the crater, on the sea shore, are true magnets with two poles, containing 14 per cent of iron. The observations made for declination and inclination indicate the local action of a south pole toward the center of the crater, a fact which should warn navigators to guard against the magnetic influence of this isle.—A. Cazin, in Comptes Rendus.

Useful Recipes for the Shop, the Household, and the Farm.

Round steel wire rope will bear more than double the weight required to break iron wire rope of similar diameter.

The following is the London rule for gas pipe sizes: For 200 lights, 2 inch iron tube; 120 lights, 1½ inch; 70 lights, 1¼ inch; 50 lights, 1 inch; 25 lights, ¾ inch; 12 lights, ½ inch; 6 lights, ¼ inch; and 2 lights, ¼ inch.

Apply soapsuds to a suspected leaky joint in the gas pipe. The formation of bubbles will show any escape. This is safer than trying the joint with a lighted match. If the leak occur in the branch of a bracket or chandelier, it is repaired by soldering with plumber's fine solder; if it be a very small one, heat the place first with a spirit lamp, and fill the aperture with cement.

The drive wells which are extensively used in the South and West are made as follows: A piece of 1½ inches gas pipe is perforated with several hundred holes near the end, which is covered with a fine brass wire screen, and this in turn is protected by a covering of sheet zinc or iron also perforated. The extremity of the pipe is sharpened, or a steel point may be fixed. It is then driven into the ground, adding pieces on the top as it sinks in. As soon as the proper depth is reached, a pump is attached, and the result is an inexhaustible well, often giving an abundant supply of water in half an hour after the end of the pipe first entered the soil.

NEW BOOKS AND PUBLICATIONS.

THE ALDINE, a Fortnightly Journal devoted to the Fine Arts and Literature. Price 50 cents a number. New York city: The Aldine Company, 18 and 20 Vesey street.

This publication is of the rarest beauty in typography, engravings, and paper that we have ever seen. It was first published in 1869, and we have recently perused with great care all the numbers since issued, up to that for December, 1875: and it is with the greatest satisfaction that we attest the gradual improvement of the work, from the first number to the last issued, until now, when it has attained a higher standard of perfection than any illustrated journal on this continent. The superb engravings illustrate highly artistic subjects, some from Nature, and others from the paintings of our best American and the most celebrated foreign artists, all of which are executed by our best engravers. The Aldine is to be published twice a month in the coming year, and the publishers promise to give their readers engravings of historical events, appropriate to the Centennial year. We can add, in closing this notice, nothing that gives a more concise and truthful idea of this artistic publication than the words of our honored American poet, William Cullen Bryant. He says:

"In England and Italy we have the best printed books, and I think in England the best impressions of engravings made; but I have never seen anything comparable to the work of THE ALDINE: nothing so fine, the ink put upon the block in such just proportions, not too much, not too little, impressed on the paper with the greatest care and dexterity; no blot, no blur, no blank—the slenderest, lightest and most delicate lines impressed with the greatest certainty, so that the impression represented the original engraving on the block as it left the hands of the artist, with as much fidelity as a mirror reproduces the lineaments of the human countenance."

HYDRAULIC MANUAL. PART I, consisting of Working Tables and Explanatory Text, intended as a Guide in Hydraulic Calculations and Field Operations. By Louis D'A. Jackson, A. I. C. E. London: W. H. Allen & Co., 13 Waterloo place, S. W.

This is the third edition of probably, to the hydraulic engineer, one of the most useful of professional treatises. It embodies a collection of working tables, based on the most improved modern principles and enough text to set forth both principles and formulae in a manner both clear and concise. The work has been prepared under the auspices and with the assistance of the English civil officials in India; and the second part of the book, now added, consists entirely of hydraulic and meteorological statistics, the former principally, the latter altogether, Indian. The present edition includes, beside the above, many new tables and considerable amplification of the text, and forms, as a whole, a valuable compendium both of the works of many of the best authorities on hydraulic engineering and of several valuable and hitherto unpublished manuscripts. D. Van Nostrand has the book for sale in New York city.

THE POPULAR HEALTH ALMANAC FOR 1876. New York city: E. Steiger, Frankfort street.

This is a laudable effort on the part of Mr. E. Steiger, the well known publisher and importer of German scientific and other works, of this city, to produce a popular calendar which will replace the well known yellow covered pamphlets which now serve the double purpose of almanacs and advertisements of quack medicines.

DECISIONS OF THE COURTS.

United States Circuit Court—Southern District of New York.

PATENT BILLIARD TABLE.—LEVI DECKER vs. WILLIAM H. GRIFFITH & CO.,—LEVI DECKER vs. CHARLES SILVERBRANDT.

[In equity.—Before Blatchford, J.—Decision rendered November 5, 1875.] The patent sued on in these cases, being a reissue granted to the plaintiff, Levi Decker, March 9, 1869, on the surrender of the original patent granted to him December 18, 1866, for an "improvement in cushions for billiard tables," has been heretofore the subject of consideration by this court in the case of Decker vs. Grote (10 Blatchf. C. C. R., 531). The invention set forth in the specification of the patent has reference to a cushion formed of India rubber.

The claim in this case is for the catgut or other cord E, partially or fully embedded, or otherwise attached at the angle a of the rubber cushion C, so as to protect said cushion against the impact of the ball, substantially as herein shown and described, and for the purposes set forth. The manufacture and use by Winant, prior to the alleged date of invention by Decker of his device, of a strip of spring steel, or equivalent material, with holes in its lower edge, through which wires were passed and fastened to the under side of the rail, said strip being placed in a crease or groove cut in the upper face of the rubber near the angle thereof, and the manufacture by Stevens, prior to 1864, of India rubber cushions for billiard tables, having a French clock spring placed in a slot in the upper face of the rubber, parallel to and near the inner face of the rubber, bringing the upper edge of the spring near the upper corner of the rubber, are substantially the same arrangements of devices used by Decker.

Bill dismissed. William J. A. Fuller, for the plaintiff. Edward N. Dickerson, for defendants.

Recent American and Foreign Patents.

NEW CHEMICAL AND MISCELLANEOUS INVENTIONS.

IMPROVED ELECTRIC CABLE AND CONDUCTOR.

George W. F. Hoogeveen, Haarlem, Netherlands.—This inventor proposes a series of telegraph wires, which are covered with gutta percha, and sewn within a covering of sail cloth made perfectly impervious to moisture and other disturbing agencies, by being impregnated and coated with highly insulating material. The latter is a mixture of paraffin and glycerin, provided on the outside with a coat of coal tar and sulphur, and having on the inside a coat of rubber varnish and benzine.

IMPROVED SWINGING SHIP'S BERTH.

Edward P. S. Andrews, Lisbon, Me.—This inventor, in order to prevent sea sickness, proposes berths pivoted to the cabin walls, and connected by separate and jointly-swinging governing end plates, of which one is applied to a swinging weight of corresponding size, to produce the level position of the berths. A pivoted hook lever of each berth may be attached to the corresponding end piece, to swing therewith and with the weight, or to a staple of the wall, to assume a fixed position at the wall. By this arrangement, the berths will always remain level; or any one of them may be fastened and held rigidly to the vessel, in accordance with the desire of the occupant.

IMPROVED CRACKER MACHINE.

Charles S. Fowler, Brooklyn, N. Y.—This invention has for its object to improve the construction of the class of machines that are used for cutting dough for crackers, cakes, etc., so as to enable them to be more readily adjusted and more thoroughly controlled than when made in the ordinary way. The arrangements are such as to allow the dough to shrink before reaching the cutters, so that the crackers or cakes will not be drawn out of shape by said shrinkage. The construction embodies many new and ingenious devices.