

the blackboard. Lastly, the pupil must have practical experience in the field. When he has been taught how to observe and record the natural features of his own immediate vicinity, he should be taken to another district, and be taught by contrast. Such is the practice of German schools, but in England we are told that the thing is impossible, that excursionist teaching would end in anarchy. Yet head masters find no difficulty in taking cricket and football teams to play distant schools. If they themselves knew or cared for geography, the difficulty would vanish. "Such," said Mr. Mackinder, "is, in briefest outline, my ideal of geography-teaching in schools; but the lecturer can only propose: it is the examiner who disposes."

SPEED OF RAILROAD TRAINS IN EUROPE.

THE German technical press is at present discussing the speed of express trains. In answer to petitions addressed to him by a number of persons interested, says the *Railroad and Engineering Journal*, the minister of public works declared recently that it would be very difficult to respond to demands of this kind, since the speed of express trains on the Prussian railroads was already greater than in any other European country. If it should be increased, the public would not patronize the railroads.

This assertion, it is shown from statistics recently collected, is not by any means correct. The following table shows the average speed of fast trains in different European countries, and shows that Germany does not by any means occupy the first rank.

Country.	Speed per hour in miles.—	
	Including stops.	Without stops.
Great Britain.....	41.7	44.6
France.....	32.8	36.2
Holland.....	32.5	35.0
Belgium.....	31.8	33.5
North Germany.....	31.8	34.3
South Germany.....	31.2	33.0
Austria-Hungary.....	30.0	32.0
Italy.....	29.5	31.8
Russia.....	29.0	31.7

The inferiority of Germany in this point of view finds a marked expression, if we compare the speed of the great Oriental Express, which runs between Paris and Constantinople, passing over the railroads of a number of European countries, including Germany. This train is the fastest long-distance express train run in Europe, and from the time-table the average speed in the different countries is as follows: in France, 40.5 miles per hour; in Germany the speed varies in different sections, being in Alsace-Lorraine, 32.5 miles; in Baden, 35.5 miles; in Würtemberg, 30 miles; in Bavaria, 33.7 miles. In Austria the average speed is 33.5 miles; in Hungary, 34 miles; and in Roumania, 32 miles. This comparison, it will be seen, is not altogether to the advantage of the German lines.

In this connection some comparison may be made of the passenger tariffs in different countries. From this it appears that the lowest charges, both for first and second class passages, are in Belgium, Holland coming next, then Germany, then France, then Austria-Hungary. England and Italy charge the same fare for first-class passages, but the English second-class is considerably lower than the Italian. The highest fares in Europe are in Russia. Third and fourth class fares are not included in this system, as those classes of passengers are not generally carried on the fast express trains.

AMONG THE PUBLISHERS.

BEGINNING with Jan. 1, 1890, Mrs. Fuentesy Capdeville, Madrid, Spain, will publish a new scientific illustrated weekly magazine entitled *La Naturaleza*.

—J. F. Whiteaves has published in the "Transactions of the Royal Society of Canada" (Vol. VII., Section IV., 1889) "Descriptions of Eight New Species of Fossils from the Cambro-Silurian Rocks of Manitoba," illustrated by six plates.

—D. Appleton & Co. have ready "Appletons' Handbook of Winter Resorts." They have in press a book by Frank Vincent, entitled "Around and About South America." Mr. Vincent circumnavigated South America, and visited the various places of in-

terest in the different countries, including many in Brazil. The volume will be fully illustrated. They have in press a valuable historical work in "James G. Birney and the Genesis of the Republican Party," by Gen. William Birney.

—In the Christmas number of *The Ladies' Home Journal*, Theodore R. Davis gives a glimpse inside the White House and of the State dinners under several administrations, and Edward W. Bok tells what are the literary tastes of two such men as Gladstone and Bismarck.

—John Howard Appleton, professor of chemistry, Providence, R.I., author of "Beginner's Handbook of Chemistry," "The Young Chemist," "Qualitative Analysis," "Quantitative Analysis," "Laboratory Yearbook," has issued his "Laboratory Yearbook for 1890." This publication is now in its eighth year.

—Charles Scribner's Sons have just published "Among the Cannibals," which is an account by Carl Lumholtz of his four years' travel in Australia, and of camp-life with the aborigines of Queensland, considered to be the lowest race of *homo sapiens* known to exist.

—Robert M. Lindsay, Philadelphia, Penn., announces to be published in December an etched portrait of Charles Darwin, after the painting by W. W. Ouless of the Royal Academy, London, and etched by G. Mercier of Paris, pupil and collaborateur of the eminent Rajon, recently deceased. The size of the plate is about twelve by fifteen inches.

—The January number of *Scribner's Magazine* will appear with additional space, and a new department at the end of the number, conducted under the title "The Point of View." An opportunity is here given to the best writers for a brief and familiar discussion of subjects of both passing and permanent interest. In the January number the subjects touched are "The Barye Exhibition," "Thackeray's Life," "Social Life in Print," and "The French as Artists." The success of the magazine has been such that the publishers feel justified in adding these new pages to a magazine already low in price.

—E. & F. N. Spon have just published "Inventor's Manual: How to Make a Patent Pay," by an experienced and successful inventor. Thousands of useful inventions are every year patented, but on which the inventor does not realize any thing, simply for want of information how best to proceed to introduce or dispose of his invention. Among the subjects treated in this work are how to invent; how to secure a good patent; value of a good invention; how to exhibit an invention; how to interest capital; how to estimate the value of a patent; value of design patents; value of foreign patents; value of small inventions; advice on selling patents; advice on the formation of stock companies; advice on the formation of limited liability companies; advice on disposing of old patents; advice as to patent attorneys; advice as to selling agents; forms for assignments, licenses, and contracts; State laws concerning patent rights.

—Messrs. Putnam have issued in the Story of the Nations Series a volume on "Early Britain," by Alfred J. Church. It begins with the earliest authentic records, and closes with the Norman Conquest. Being intended for popular reading, it of course has not the philosophical character that a work on such a subject might have, but from its own point of view it has considerable merit. The author has followed the best authorities, though always with independent judgment; and he has probably given as clear an account of the most stirring events in early English history as his space and materials permitted. The main fault of the work, as of the majority of historical books, is the excessive attention given to military affairs to the neglect of other matters of greater importance. Mr. Church evidently thinks the Roman occupation of Britain of more consequence than some writers do, for he devotes one-fourth of his book to it; and he is not disposed, like some, to think that all that is valuable in English life is due to the Teutonic settlers. On the whole, he has made a judicious and readable book. We are sorry to have to add that, like one other volume in this series which we had occasion to notice some time ago, it contains a number of grammatical blunders, such as singular nouns with plural verbs, abverbs used for adjectives, and so forth, which ought never to be seen in a respectable publication.

— The contents of the *Modern Science Essayist* for October, November, and December are, respectively, "Evolution as Related to Religious Thought," by John W. Chadwick; "The Philosophy of Evolution," by Starr Hoyt Nichols; and "The Effects of Evolution on the coming civilization," by Minot J. Savage. The *Essayist* is published by the New Ideal Publishing Company of Boston, Mass. The publication of this series of fifteen essays on evolution (which were delivered as lectures under the auspices of the Brooklyn Ethical Association) was undertaken in response to a demand for a correct statement, in popular form, of the leading ideas, inferences, and tendencies involved in the acceptance of the evolution philosophy, together with a clear statement of the main lines of evidence or proof by which the conception of evolution is sustained. The plan of the series involved not only the treatment of the physical and biological phases of the subject, but also its ethical, social, religious, and philosophical aspects; the whole being introduced by biographical sketches of the two men of our time whose names are most intimately associated with the evolution hypothesis, — Spencer and Darwin. The three numbers mentioned above complete the series of fifteen. They will be followed by other essays of a similar tenor.

— The December number of the *Political Science Quarterly* opens with an article on the deferred constitutional convention of New York State, by the Hon. Seth Low, president of Columbia College. George Gunton attacks the economic basis of socialism; namely, Karl Marx's theory of "surplus value;" the Rev. Samuel W. Dike reviews the new and important government report on marriage and divorce; Worthington C. Ford (late of the State Department) criticises and opposes the scheme of substituting silver for legal tender notes; Professor F. W. Maitland of Cambridge, England, completes his valuable survey of the materials of English legal history; and Professor F. J. Goodnow of Columbia College begins a description of the recent re-organization of local government in Prussia. Twenty-two recent American, English, German, French, and Italian works are reviewed. Among the reviewers, besides the editors, are Professors Hadley of Yale, Giddings of Bryn Mawr, and Ashley of Toronto University; J. B. Moore, assistant secretary of State; and Sir George Baden-Powell, M.P. The "Record of Political Events" (previously published in the *New Princeton Review*) is continued to Nov. 1.

— Messrs. Putnam have published a work on the pleasures of country life by Philip G. Hubert, jun., entitled "Liberty and a Living." The author had been engaged in constant work as a journalist, but abandoned a portion of his work, and took a small country home on Long Island, where he lives for eight months of the year occupied with gardening, fishing, etc. He still does some writing, however, and in the winter spends four months in the city in journalistic work. Thus his income still comes mainly from his pen, his country work being carried on chiefly for pleasure; and the life he thus leads he holds up as the true ideal. He sings its praises with no little fervor; and, so far as mere enjoyment is concerned, there is something to be said for it. But then, we are not placed in this world for selfish enjoyment, but to serve humanity; and the life that Mr. Hubert describes is wholly destitute of any such object. It is a life of idleness and sport, with only so much work as is necessary to support existence; and such a life is even less honorable than that of the money-getter whom Mr. Hubert so much despises.

— A work will shortly be issued anonymously by the J. B. Lipincott Company, Philadelphia, which may excite widespread interest in political circles. It is entitled "Justice and Jurisprudence: An Inquiry concerning the Constitutional Limitations of the Thirteenth, Fourteenth, and Fifteenth Amendments." Advance sheets show an inside political knowledge of events and allusions which indicate a close connection between the author and the present administration, and it bids fair to have an important bearing upon the policy and future of parties in this country. The book is free from partisanship or sectionalism, and is a bold and original treatment of the race question. As a legal argument on one of the most important subjects of the day in America, and as a criticism of the decisions of the highest judicial tribunal of the land, the work will commend itself. An appendix contains a state-

ment of all legislation, National and State, and a digest with table of every case, Federal and State, touching the race question or civil rights. The volume may become an authority upon constitutional liberty, and a guide for foreign as well as American statesmen, not less than an educational work for the general public, for whose benefit ostensibly it has been prepared.

— Messrs. Munn & Co. announce as now ready "Experimental Science," by George M. Hopkins. This book treats on the various topics of physics in a popular and practical way. It describes the apparatus in detail, and explains the experiments in full; so that teachers, students, and others interested in physics, may readily make the apparatus, and perform the experiments without difficulty. The aim of the writer has been to render physical experimentation so simple and attractive as to induce both old and young to engage in it for pleasure and profit. A few simple arithmetical problems comprise all of the mathematics of the book. Many new experiments are here described for the first time.

— We glean the following news items from *The Publishers' Weekly*. Egmont Hake has edited the diary kept by Gen. Gordon during the Tai-ping rebellion. It will be published shortly, illustrated with portraits, maps, and plans. R. D. Blackmore's recent appearance in court as complainant against a man who had stolen twenty-five dollars worth of his pears brings out the fact that the author of "Lorna Doone" is better known at his home in Teddington as a market-gardener than as the author of some of the most charming of contemporary works of fiction. Emile Ollivier, the ex-minister of the French Empire, has in press his new work, "1789 and 1889." The volume treats of the Revolution, and the social, political, and religious work of the movement of 1789, concluding with a programme of reforms to be effected in the political organization of latter-day France, and notably in the management of universal suffrage and the present parliamentary system. Douglas Sladen, the Australian poet, who has been making a tour of Canada from Halifax to the Pacific, is now in Victoria, B.C., collecting information for a book which he intends writing on Canada. The volume will contain his personal impressions of the Dominion, statistics of her trade, her relations with the mother-country and reciprocal benefits derived from the connection, besides the advantages offered by Canada as a trade route between England and the colonies of the Pacific. Gustav Freytag's "Der Kronprinz und die deutsche Kaiserkrone" was printed in full in the *Belletristisches Journal* of this city of Nov. 14. It will be issued at once by George Bell & Sons, in an English translation, under the title of "The Crown Prince and the German Imperial Crown." A reply to this book, by Dr. Otto Arendt, will be published shortly by Walther & Assolant of Berlin. Freytag is a Conservative; Dr. Arendt, a Liberal; and it is expected that the latter's reply will make considerable sensation in the German political world. A number of gentlemen interested in the University of Pennsylvania have established a publishing company under the name of the University Press. Their purpose is to control the present publications of the university, and to establish such new periodicals as the needs of the institution may suggest. At least four new magazines will be issued by the company soon after Jan. 1. *The Arena* is the title of a new monthly magazine, published in Boston, which intends to devote itself to the serious discussion of serious public questions. The first issue, published in November, and the December number, contained contributions from the Rev. M. J. Savage, W. H. H. Murray, Mary A. Livermore, Helen Campbell, O. B. Frothingham, N. P. Gilman, and others. For the January number, articles by Col. Ingersoll, Henry George, and Dion Boucicault are promised. The American edition of *Artistic Japan*, published by the Artistic Japanese Agency, 220 Fifth Avenue, will hereafter be published simultaneously with the English, French, and German editions issued abroad. The edition printed for this country contains precisely the same engraved and colored plates as the European editions, which are printed in color by M. Gillot of Paris, under M. S. Bing's personal direction. The series of plates issued with this journal will form a valuable collection on various subjects, desirable for amateurs, architects, decorators, and artists, as well as all industrial workers needing suggestions in design, color, motive, or form.

—“‘Evolution of Sound’ Evolved” is a review of the article entitled “The Nature of Sound,” in “The Problem of Human Life,” by Marcellus Thompson, professor of natural sciences in Garfield University, Wichita, Kan. To this work is appended an account of some original experiments in electricity which Professor Thompson conducted when a candidate for the master’s degree at the University of Michigan. This work has been warmly received, as witness testimonials from John W. Langley, professor of general chemistry in the University of Michigan; Alfred Fairhurst, professor of natural sciences in Kentucky University; B. J. Radford, associate editor of the *Christian Standard*; John B. De Motte, professor of physics in DePauw University; O. P. Hay, professor of biology in Butler University; David S. Jordan, president of Indiana State University; A. E. Dolbear, professor of physics in Tufts College; C. Williams Parks, professor of physics in Rensselaer Polytechnic Institute.

LETTERS TO THE EDITOR.

*.*Correspondents are requested to be as brief as possible. The writer’s name is in all cases required as proof of good faith.

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

A Belated Dandelion.

THE day before Thanksgiving I found in full bloom a fine dandelion-head measuring one and one-half inches in diameter; yet the record of temperatures for the November just past shows a lower average than that of any November in Kansas since 1880.

E. B. KNERR.

Atchison, Kan., Dec. 5.

Is Man Left-Legged?

LAST Sunday, while walking on the beach at Nahant, we tried some experiments bearing on the subject. We found that, walking either forward or backward with the eyes shut, we bore to the right, but in running either forward or backward we bore to the left. This last fact surprised us somewhat at first; but we thought it might be explained from the fact that, the left leg being the stronger, there would be a stronger spring from the left foot in running, which would make the right leg take the longer step. We should be glad to hear if others have tried these experiments, whether with the same or different results.

FRED’K A. LOVEJOY.

FRANCIS H. ALLEN.

West Roxbury, Mass., Dec. 8.

INDUSTRIAL NOTES.

The Crocker-Wheeler Electric Motor.

THE Crocker-Wheeler Electric Motor Company of this city are now putting on the market a series of electric motors which show a considerable advance in design, construction, and efficiency. Two of their smaller motors are shown in the illustrations on this page. Fig. 1 shows a $\frac{1}{4}$ -horse-power motor belted to a small three-piston suction and force pump, which is capable of lifting a thousand gallons of water per day a height of a hundred feet, and other quantities a correspondingly greater or less height. When desired, the motor is connected to the pump by toothed or friction gearing instead of by a belt.

By means of an automatic attachment to the ordinary float in the water-tank, the electric current is cut off from the motor when the tank is full, thus stopping the pump until enough water has been used from the tank to allow the float to fall, thus starting the motor and pump again by switching on the electric current. This cycle of operations being entirely automatic, the water-supply is never exhausted, and no more electric energy is absorbed than is just sufficient to pump enough water to supply the demand.

Fig. 2 shows one of the new Crocker-Wheeler arc motors with fan, and a regulator which effects any desired change in the speed and power of the machine by simply moving the armature out of

the field. By this simple device the necessity of a switch, complicated windings, and attendant evils are entirely overcome.

The motors are built of very few pieces, and are strong and durable. They are designed with a broad base and a low centre of gravity, in order to render them perfectly steady and quiet in their operation. In their care they require a minimum of attend-

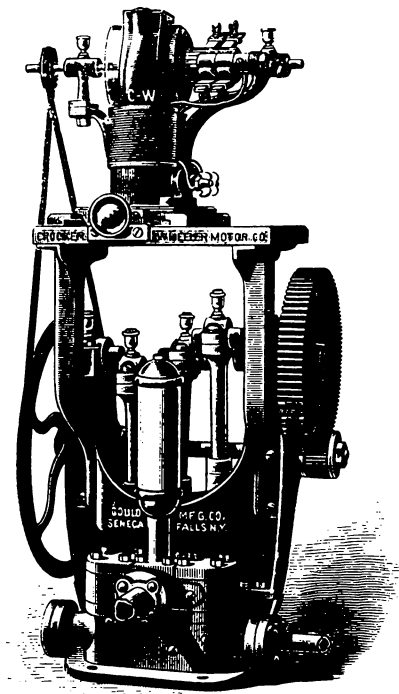


FIG. 1. — NEW C.-W. ELECTRIC PUMP.

ance. They are arranged to be controlled by either of three methods of regulation, — for constant load, for variable speed, and for constant speed, — any one of which is obtained by attaching the corresponding regulating fixture.

The motors are arranged so that they can be reversed by simply inverting the brush-holders upon the clamping-rods, so that the upper brushes are placed below, and the lower ones above. By

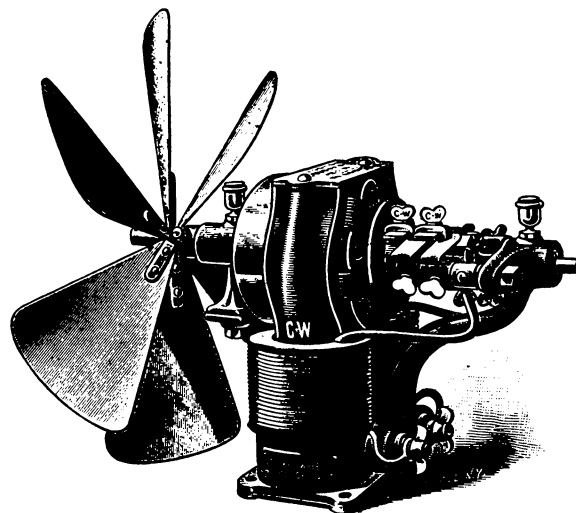


FIG. 2. — NEW C.-W. ELECTRIC FAN.

this device the machines can be run either right-handed or left-handed without taking apart or changing any connections. They are wound for every kind of circuit, and those of different windings are always compared to see if the same efficiency and proportion of ampère-turns are maintained. On the smallest size, about 2,500 ampère-turns are used to magnetize the field, the total loss in the machine due to resistance never being permitted to exceed about 47 watts.