tramways has not been solved, nor is it much nearer solution than it was a year ago. The ideal system for such work is undoubtedly the storage-battery system, and the experiments that have been made in that direction are few. In Philadelphia a partial test of storage-batteries was made, with the result — as stated before the Street Railway Convention a month ago — that the cost of running a car was nine dollars per day, — about that of horses. In New York the cars on the Fourth Avenue Road are being slowly equipped, but it is too early to obtain even approximate figures as to the cost. A storage-car was run for a few months in Baltimore, and another in Rochester, but nothing has been heard of them for some time.

So that, although a number of roads have been equipped with electricity, yet the work has been in the direction of suburban tramways, and the question of city tramways remains still unsolved. But the important question now is, what will be the effect of snow and sleet on the overhead structures, and on the possibility of propelling the cars? And according as the reply is favorable or not, will the work of next year be satisfactory or otherwise. If there are no hitches other than any system would be subject to, then it is easy to predict that next year the companies engaged in electric railroading will get as many roads to equip as their capacity will allow, for on the question of economy of operation there is no doubt.

It should be the aim, then, of the electric-motor companies to supply every possible means of clearing the tracks of snow and ice. In Boston the Sprague people have constructed a special clearing car with an abundance of power, and with brushes worked by electric motors, for clearing the track, and it is fair to suppose that such an arrangement will be more efficient than a team of horses. It is probable that both this company and others have equipped all of their roads with some such construction-car. If they have not, they will lose by it, for this winter will test electric tramways; and the company that best stands the test will have the most work next year.

THE WESTINGHOUSE COMPANY'S EXTENSIONS. — The growth of the Westinghouse Electric Company in the last two years is one of the remarkable features of the rapid extension of the applications of electricity now taking place. Two years ago the alternating system of electric distribution was practically unknown in this country: several successful installations were in operation in England and on the continent, but it had not been taken up here. The Westinghouse Company purchased the patents of Goulard and Gibbs, and undertook the exploitation of the system with so much energy and success, that to-day they have over three hundred thousand lights in operation. At first they had no fundamental patents on incandescent lamps, under which to operate; but a combination with the Sawyer-Mann interests gave them the protection of the patents granted to Sawyer and Mann, and in the last few weeks they have absorbed that company. Their latest move has been the purchase of the control of the Waterhouse Electric Company, whose system of arc-lighting has many points of merit. Some time ago the Tesla patents for alternating-current electro-motors were acquired, and now the Westinghouse Company advertises that they are ready to supply motors for their alternating circuits. It would seem as though this company was gathering its energies for the conflict between alternating currents with converters and continuous currents with secondary batteries, — a conflict that is already at hand. They have very wisely secured control of apparatus that will enable them to use their stations to the fullest capacity possible. They can supply arc lamps, incandescent lamps, and motors from the same station, and the latter will partly compensate for the advantages that secondary batteries offer. It is not probable, however, that in the lighting of crowded city districts they will be able to successfully compete with a direct system of distribution, especially if electric-light wires are ordered under ground, and if storage-batteries are slightly improved. But the field for the alternating system is wide enough to fully occupy the energies of even the Westinghouse Company.

THE ELECTRIC LAUNCH 'VISCOUNTESS BURY.' — The London *Electrical Review* describes, in a recent issue, this launch, — the largest, with one exception, in the world. She will carry eighty passengers comfortably. Her dimensions are 65½ feet long by 10 feet beam, with a draught of 22 inches and a displacement of 22 tons. Her rudder is specially designed with the object of clearing weeds and obstructions. The steering-wheel is forward: adjoining it is an indicator communicating with the electrician in charge of the switches controlling the electrical power. The electrical energy is stored in two hundred of the Electric Power Storage Company's accumulators of the 1888 type, each of which has a storage capacity of 145 ampère hours, with a discharge-rate up to 50 ampères. These cells are arranged one hundred on each side under the seats. The space occupied by them is lined with lead, with small drains leading off, so in case of accident there would be no damage from the acid. It is calculated that the stored energy will propel the vessel for ten hours at six miles an hour. Twin propellers are used, each driven directly by a 7½-horse power Immich motor, making one thousand revolutions per minute. The switches are fixed so that either motor can be worked independently of the other; or they can be driven at half speed or astern. All of the machinery is beneath the flooring, leaving a clear space fore and aft for the passengers.

THE DIRECT UTILIZATION OF THE SUN'S ENERGY. — Many plans have been proposed for the direct utilization of the sun's energy, — Ericsson's heat-engine supplied by solar radiations; the plan of MM. Conova, Piffre, and Mouchot, who proposed to concentrate the sun's rays on a mass of water, which would be turned into steam; with a number of others, none of which have even reached the stage of successful experiment. Mr. Edward Weston proposes, and has recently patented, the idea of using a thermopile, which is to be placed in the focus of a mirror or lens, and which is to be used to charge a storage-battery, from which the energy is finally to be drawn. An electro-magnet in the circuit is so arranged as to cut out the pile when its electro-motive force falls below that of the battery. When we consider the very low efficiency of thermopiles, — not over three or four per cent, — it would appear doubtful whether the plan will ever be more than an interesting suggestion.

BOOK-REVIEWS.

Fifteenth Annual Report of the Secretary of the State Board of Health, Michigan, for the Fiscal Year ending June 30, 1887. Lansing, State. 8°.

IN addition to the statistics and routine reports usually found in official health reports, this volume contains a number of exceedingly valuable contributions to sanitary science. The most important of them is that which describes the investigations conducted in the State Laboratory of Hygiene, under the direction of Prof. V. C. Vaughan. These include experimental studies on the causation of typhoid-fever, poisoning from tyrotoxicon, and an exposure of the stenocarpine fraud. At the time this exposure was made we called the attention of our readers to it. It will be remembered that the announcement of the discovery of a new local anæsthetic was made through the medical journals, to which the name of 'stenocarpine' was given. F. G. Novy, M.St., instructor of hygiene in the State Laboratory, analyzed the drug, and found it to be a mixture of cocaine and atropine. Since the publication of his analysis, nothing more has been heard of stenocarpine, and we are informed that it has been withdrawn from the market.

The cases of poisoning from tyrotoxicon which were investigated were those which occurred at Milan, Mich., in September, 1887. Four persons in one family were poisoned; and of these, three died. Professor Vaughan reports that the sickness was distinctly traceable to milk, in which tyrotoxicon had developed. The milk was kept in a buttery, the floor-boards of which had rotted, so that a second layer of boards was necessary. Between these two floors a great mass of moist, decomposing matter was found, the accumulation of years. When the floor was taken up, a nauseating odor was perceived, sufficient to cause vomiting in one of the persons engaged in the examination.

The experimental studies on the causation of typhoid-fever were made by Professor Vaughan and Mr. Novy, and had special reference to an outbreak at Iron Mountain, Mich., in October, 1887. Attention seemed to be directed to the drinking-water used by the

families in which the disease appeared, and this was accordingly examined. Believing that the ordinary analysis, which consists in the determination of free and albuminoid ammonia, chlorine, etc., would be entirely inadequate, it was decided to inoculate sterilized meat preparations and sterilized milk with the suspected water, and to keep this material at or near the temperature of the human body for varying periods of time, and ascertain whether or not there would be any poisons developed by the bacteria, which were suspected of being in the water. This method was followed, and resulted in demonstrating that the water contained a ptomaine which produced poisonous symptoms; and a cultivation of the micro-organisms in the water upon potato, together with certain physiological experiments, showed that the water contained typhoid bacilli. It has been shown that the fever was brought to Iron Mountain by a man from a railroad construction camp. In commenting on this outbreak, the investigators state that it is well known that typhoid-fever invariably follows dry seasons, and is coincident with low water in wells. There are, on an average, about one thousand deaths and ten thousand cases of sickness from this disease annually in Michigan. These figures can be greatly reduced if people will cease polluting the soil about their houses with slops, garbage, cesspools, and privy-vaults, and will see to it that their drinking-water is pure beyond all question. When there is any doubt, the water should be boiled; but it should be remembered, that, while the typhoid germ most frequently finds its way into the body with the drinking-water, it may be taken in with any food, and even with the air. When a case of typhoid-fever occurs, all discharges should be thoroughly disinfected; and the earth, water, and air about our homes must be pure, if we escape this disease altogether.

The causation of cold-weather diseases is discussed in the report by Dr. Henry B. Baker, the efficient secretary of the board. Although it is a recognized fact that many of the communicable diseases are most prevalent at certain seasons of the year, yet the extent to which their prevalence is controlled by meteorological conditions has not been thoroughly shown by statisticians. This Dr. Baker does by means of tables and diagrams, which exhibit the close relations which diphtheria, small-pox, and scarlet-fever bear to atmospheric temperature. He finds that diphtheria is most frequent in the autumn and winter, accompanying somewhat, in its rise and fall by seasons and by months, the fall and rise of the temperature, and the rise and fall of the velocity of the wind. Small-pox bears a quantitative relation to the atmospheric temperature, rising after the temperature falls, and falling after the temperature rises. Scarlet-fever falls after the temperature rises in the spring, and rises after the temperature falls in the autumn, the sickness changes averaging about one month later than the temperature changes.

The whole report is a valuable one, and reflects great credit on the State board and its officers.

Livy. Book XXII. Ed. by M. T. TATHAM. Oxford, Clarendon Pr. 16°. (New York, Macmillan, 60 cents.)

The Second Book of Xenophon's Anabasis. Ed. by. C. S. JERRAM. Oxford, Clarendon Pr. 16°. (New York, Macmillan, 40 cents.)

Cæsar's Gallic War. Books I. and II. Ed. by C. E. MOBERLY. Oxford, Clarendon Pr. 16°. (New York, Macmillan, 50 cents.)

THREE volumes of this useful series have reached us. The twenty-second book of 'Livy' has been edited by M. T. Tatham. The text is preceded by a brief historical introduction and by a chronological table of the events described in the book. In an excursus the peculiarities of Livy's Latin are dwelt upon; and in the second part, which contains notes to the single chapters, difficult passages are explained. A good sketch-map of the western Mediterranean, on which Hannibal's march from Carthago Nova to Italy is sketched, accompanies the volume. The arrangement of C. S. Jerram's second book of the 'Anabasis' is made on the same plan, the selected book being made complete in itself, without presupposing a knowledge of the general contents of the 'Anabasis.' A sketch of the narrative down to the second book is given in an introduction. This book is also accompanied by a sketch-map showing the march of the ten thousand. Rev. Charles E. Moberly's edition of the first and second books of the 'Gallic War' is illustrated by numerous maps and diagrams. Besides the historical introduction and notes, and hints on the mode of translating Cæsar, it contains an appendix on the Roman military system. The books are printed in very clear type, — an important consideration for school-books, and will be found very useful by the teacher.

A Latin Prose Primer. By J. Y. SARGENT. Oxford, Clarendon Pr. 16°. (New York, Macmillan, 60 cents.)

An Introduction to Latin Syntax. By W. S. GIBSON. Oxford, Clarendon Pr. 16°. (New York, Macmillan, 50 cents.)

THE 'Latin Prose Primer' is intended to be used as a companion to Mr. Sargent's 'Easy Passages for Translation into Latin.' It is designed for the use of beginners. In a number of preliminary exercises, which consist of detached sentences, the pupil is made familiar with the various forms of Latin syntax. The second part consists of aids and explanations for the translation of a part of the 'Easy Passages.' Vocabularies, grammatical notes, and arrangement of the pieces so as to suit the Latin syntax, are given. In an introduction the principal difficulties to obtaining a good Latin style are treated at some length. Gibson's 'Introduction to Latin Syntax' will be found a very handy and useful book. The author does not give a mere collection of rules, but collections of sentences, from which the pupil has to find the rule by induction. Exercises are added to test the pupil's power of applying the rule which has just been arrived at. Separate vocabularies are given for the various parts of speech, the pupils being thus obliged to think before looking out a word, and one of the great disadvantages of dictionaries being thus overcome.

Microscopical Physiography of the Rock-Making Minerals. By H. ROSENBUSCH. Tr. by Joseph P. Iddings. New York, Wiley. 8°. $5.

THE translator of H. Rosenbusch's well-known 'Mikroskopische Physiographie der petrographisch wichtigen Mineralien' has endeavored to present this valuable book in such shape as to be best adapted to the use of colleges and schools. Therefore much of the interesting contents of the original have been omitted, which the advanced student will miss with regret; but the translator has shown good judgment in abridging; and the English edition, as it stands, is a fair general compendium of the subject. Most of the historical portions, which form so interesting a part of the original, have been omitted, as well as the elaborate treatment of the optical anomalies of certain minerals, and many notes on European localities, while a number of notes on American occurrences have been inserted. The book is a translation of the German edition of 1885, and we miss with regret the color-plate of the original, and descriptions of the newest improvements in microscopes. The prefaces to the first and second editions have been reprinted in German. Twenty-six instructive plates of photomicrographs, which formed so prominent a feature of the second edition, have been reproduced here. The translation has been made carefully, and the book, in its English form, will be a useful introduction to the study of the subject, although the advanced student will have to fall back upon the original.

The Ear and its Diseases. By SAMUEL SEXTON, M.D. New York, William Wood & Co. 8°.

IN many respects this work of Dr. Sexton's is unique. It is a wide departure from the beaten path, and contains a large amount of material which has never before, so far as we know, been treated in any one book, and much of it has never before been treated in a thorough manner; the discussions having been confined to medical and other scientific journals. Without attempting to mention all these peculiarities, we would nevertheless refer to some of the most prominent: viz., the influence in producing disease of the ear, of decaying teeth and sea-bathing; wounds and injuries of the ear occurring in warfare and civil life; rupture of the drum-head from boxing the ears, and its medico-legal aspect; concussion from the blast of great guns and explosives; noises in the ears, and their connection with insane hallucinations and delusions; the effects of false hearing on singers, actors, lecturers, and musicians; the classification and education of school-children with defective hearing; the effect of