

of the secret code, without any more danger than would arise from the transmission of signals by means of the semaphore. It was discovered that the system was unworkable unless conducted by the most expert operators, so delicate are the adjustments that have to be made from time to time. An instrument tuned up for a distance of 20 miles was found to be equally efficient at a distance of 50 miles. Marconi has devoted his energies to the remedying of this salient disadvantage of the system, and states that he is now able to minimize, or to obviate entirely, any possibility of such leakages. The presence of land, and the condition of the atmosphere, was proved to materially affect the intensification of the electric impulses and the accuracy of the signals.

PAN-AMERICAN MEETING OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

BY WILLIAM H. HALE.

The Buffalo meeting of the American Institute held in the New York State Building at the Pan-American Exposition was notable both for the papers presented and the international character of the attendance. Last year the institute met at the Paris Exposition, and invited European engineers to attend this meeting. Over 4,000 invitations were sent out to all the prominent engineers of Europe; and though only about fifteen persons responded the foreign delegation included representative men from France, Belgium, Germany, England, South Africa, Hawaii.

The impressiveness of this meeting was emphasized by its environment. The triumph of electrical engineering was conspicuous at the fair, and in all the surrounding region, in the utilization of Niagara for power and light and vast electrolytic works.

The foreign guests were welcomed to New York by President Charles P. Steinmetz at the house of the American Society of Mechanical Engineers, and went by special train to Buffalo, stopping to examine the great works of the General Electric Company at Schenectady, which are under the management of President Steinmetz.

The exercises of the first day at Buffalo consisted merely of an address of welcome by Prof. George F. Sever, chief of the electrical department of the fair. Papers were read on each of the other days. Thursday, which has been designated as Electrical Day, was distinguished by a lack of electricity, causing an interruption of two hours to the illumination that evening.

Papers read include the following: Paul M. Lincoln described a frequency indicator of his own invention now used in the Niagara Falls Power House. It tells whether the machine being synchronized runs too fast or too slow; also it tells the exact place of synchronism.

Caryl D. Haskins, in his paper on "Electric Meters," said that recording meter design has progressed rapidly, so that no such radical improvements may be expected now as formerly. The two essentials meriting most careful study are: First, the expenditure of the maximum permissible amount of work in the Foucault disk, and, second, the provision of the best means for instantly compensating for friction variation at the point of use without affecting total calibration.

William H. Browne, Jr., read a paper on "Power Factor Indicators," constructed to show that the wattless component of current due to induction motors is balanced by the use of synchronous motors or converters. The use of such an instrument shows that when induction motors are used alone the inductance factor is always a large percentage of the power factor; and he says that those who use induction motors should at least pay rental for the wattless volt amperes required. The ensuing discussion developed a general sentiment in favor of charging rental for power thus borrowed, even though afterward returned.

Thursday, August 15, "Electrical Day," was taken up with papers and discussions on "The Transmission of Power." E. W. Rice, Jr., described an oil break of his invention now employed by the Metropolitan Street Railroad Company of New York, which retains the usual advantages of the oil switch and minimizes the amount of oil required. This safely controls currents of practically unlimited power at potentials considerably above 40,000 volts, probably as high as 100,000 volts.

President Steinmetz presented a theoretical investigation of some oscillations of extremely high potential in alternating high potential transmissions, in which by elaborate mathematical processes he worked out several conclusions, the most important of which is thus stated: "The electric oscillations occurring in connecting a transmission line to the generator are not of a dangerous potential, but the oscillations produced by opening the transmission circuit under load may reach destructive voltages, and the oscillations caused by interrupting a short circuit are liable to reach voltages far beyond the strength of any insulation. Thus special precautions should be taken in

opening a high potential circuit under load. But the most dangerous phenomenon is a low resistance short circuit in open space."

F. A. C. Perrine, in his paper on "Elements of Design, Particularly Pertaining to Long Distance Transmission," called attention to the different nature of the problems involved in great and in small installations, due to the fact that mechanical factors of safety must be more carefully considered, because good insulations are never materials of great strength and can be relied on for their mechanical properties only when the mechanical strains are comparatively unimportant.

Charles F. Scott read a paper on "The Induction Motor and the Rotary Converter, and Their Relation to the Transmission System," in which he maintained that these two kinds of apparatus represent the survival of the fittest, and confirm the judgment of engineers who have advocated them, because they best fulfill the two important functions of an alternating current transmission system; namely, the production of mechanical power and the furnishing of a direct current.

On Friday, August 16, Lewis B. Stillwell gave an elaborate account of the Niagara Falls transmission plant, by far the longest paper read. The company are now building a new power house for 55,000 horse power. The most striking point of the paper was the statement that the improvements made in the new house were mainly in the hydraulic and but slightly in the electrical equipment, proving that for nearly a decade electrical engineering has been established upon a basis as certain and permanent as other branches of engineering; that eight years ago it was possible so to plan an electrical installation involving ultimately the transmission and distribution of several hundred thousand horse power; that at the present time we can effect improvement only with respect to relatively unimportant details, the aggregate results of which, if adopted, would be hardly noticeable as affecting the cost of power. The resulting economy of power would not amount to one dollar per kilowatt year.

"The Development of the Nernst Lamp in America" was presented by Alexander J. Wurts. A striking exhibit of these lamps is made by the Westinghouse company in the Electrical Building, the entire dome being lighted by them. It is said that the lamp has passed beyond the experimental and has fairly reached the commercial stage. The light, brighter and purer than that of the incandescent lamp, has nearly the spectrum of sunlight; yet it costs but half as much as the incandescent. The lamp has been described in the SCIENTIFIC AMERICAN. Mr. Wurts recapitulates its advantages as being absence of shadow, steadiness of light, simplicity and low cost of maintenance, high efficiency of the lamp, and the fact that it is operative on 3,000 alternations.

Saturday, August 17, was devoted to electric railways, with two papers and much discussion. Albert H. Armstrong read "Notes on Modern Railway Practice," with special reference to long distance and either high speed for passenger or great power for freight trains. The best equipment for both is a mixed system, combining third rail and overhead trolley.

Ernst J. Berg read a paper on "Electric Railway Apparatus." He favors for general use the direct current and rotary converter, though admitting that there is a field for alternating-current motors, but it is strictly limited to long distance schemes, or to mountain roads.

Messrs. Janet, of France, and Jaenisch, of Germany, both speaking in their own language, agreed that the three-phase system found most favor on the continent.

President Steinmetz replied that while the General Electric Company were building a three-phase installation for a North Italian road, they had never been able to secure an experimental use of that system in America, even when they offered it to builders at cost price.

A member in discussing the subject stated, on the authority of a railroad official who has been using electric traction for five years, that the cost of hauling freight by electricity is less than by steam.

An invitation was received to meet next year at Great Barrington, and indications are that the council will accept it.

EXTERMINATION OF THE MOSQUITO.

BY JOHN CHAMBERLAIN.

I am convinced that the renewed pursuit of the mosquito, which science is making with so much apparent promise of late, is a mistake in at least one important particular. I shall have to confess that my conclusion is in great part inferential, but it seems so positive that it ought to merit at least more than a passing consideration. The accounts of the habits of this insect all stop short of what is plainly the fact in regard to the life of the larvæ, which I am

sure that I can demonstrate, if only in a semi-negative fashion.

I cannot avoid the conclusion that this insect, assuming that this region is the habitat of certain species of *Culex*, does not confine itself to standing water for the hatching of its eggs and the development of the larvæ, but when that is wanting, is able to make the shift of using thick grass and the soil and decaying leaves of heavy forests. To a certain extent this is also true of frogs, and especially the common garden toad. This latter has made its appearance this summer in my city yard, where there has not been a toad for many years and which is far from any standing water. The specimens were of this year's growth.

The mosquito does not always need to resort to moist, loose and shaded soil for the propagation of its species, and in such seasons it is less numerous there than in dry seasons. During the past three seasons I have had an especially good opportunity to note this fact, though unfortunately the conviction of it has come to me so lately that I have not carried the matter to an actual demonstration. During the seasons of 1899 and 1900 there has been a severe drouth, beginning so early that there was no standing water anywhere near us. We did not have water enough for the stock and domestic purposes, and there was not a drop of standing water anywhere in our vicinity till after the mosquito season was over, yet we never had so many of them about the house and garden as then, and the woods were swarming with them. I recall being driven out of the garden one day, where I had been at work near a heavy grass plot, heavy on account of previous washings from the barnyard.

This has not happened this year, though there has been so much rain during the mosquito season of June that it was difficult to work uplands, and lowland cultivation had to be abandoned till July. The inference is unavoidable that the mosquito was content to make headquarters in the swamp districts when there was standing water there sufficient for its purposes, and when that failed there was nothing to do but make a selection of the most favorable dry lands, such as heavy grass plots and deep woods. Nobody who saw the myriads of these insects in such places during the late dry seasons could have the least doubt that they were hatched out there, for where else could they have come from? And at the same time the much smaller showing during the present wet season was good evidence that the insect had remained in its favorite reproducing localities.

Now as to the bearing of this point on the proposition to exterminate, or at least greatly thin out, the mosquito by kerosene applications. It will be seen that though the effort may meet with some success where marshes are regular every June, there can be very little done in dry sections, or still worse, occasionally dry ones. The scourge is not by any means so severe in such localities as it is near marsh lands, but it is quite often of considerable account and quite enough to neutralize the effort to stop the spread of malaria and yellow fever by that means, for it will surely be found that if the mosquito can reproduce itself in temperate regions without the use of standing water, it can do so much more easily in the tropics, where the light soil is deeply covered with undergrowth and the shade is deep. In such places the food of the larvæ, decaying vegetable matter, is abundant.

American Association for the Advancement of Science.

The fiftieth annual meeting of the association opened on August 26 at Denver, Colo., with an attendance of nearly 200 members, and the city of Pittsburgh, Pa., was chosen for the annual meeting of 1902.

The general session was called to order by the retiring president, Professor R. S. Woodward, of Columbia University, New York, who introduced the new president, Dr. C. S. Minot, of Boston. Addresses of welcome were made by Mayor Wright, of Denver, and others. During the afternoon the new officers were installed.

The following vice-presidents made their farewell addresses: Vice-President Davenport, before the section of zoology, on "The Zoology of the Twentieth Century"; Vice-President Brashear, before the section of mechanical science and engineering, "The Carnegie Technical School"; Vice-President Butler, before the section of anthropology, on "A Notable Factor in Social Degeneration"; Vice-President Long, before the section on chemistry, on "Some Points in the Early History and the Present Conditions of the Teaching of Chemistry in the Medical Schools of the United States," and Vice-President Woodward, before the section of social and economic science.

Several express cars are now in use on the surface lines in New York city, the old mail cars of the Third Avenue road being used for the purpose. Operations are under way to establish terminals in important places in Westchester County.