AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

New York, December 28th, 1898.

The 130th meeting of the INSTITUTE was held this date at 12 West 31st Street, and was called to order by the Secretary.

THE SECRETARY:—I received a telegram to-day from President Kennelly who is in Detroit. He hoped to be able to be with us to-night, but was delayed, and in his absence Mr. Lieb, one of the Managers, will preside.

Mr. Lieb took the Chair and called upon the Secretary to make announcements.

The Secretary read the following names of associate members elected at the meeting on this date of the Executive Committee.

Name.	Address.	Endorsed by
ALLAN, JOHN	Full Partner, H. H. Kingsbury & Co., 54 Margaret St., Sydney, N. S. W.	Jas. S. Fitzmaurice. Gustave Fischer. Eugene Griffin.
BELLMAN, JOHN JACOB	Electrical Engineer, Crocker-Wheeler Electric Co.; residence, 90 King St., New York.	Gano S. Dunn. F. K. Vreeland. F. V. Henshaw.
CROWELL, ROBINSON	Electrical Tester, General Electric Co.; residence, 72 Washington Ave., Schenectady, N. Y.	A. L. Rohrer. D. C. Jackson. C. F. Burgess.
DATES, HENRY B.,	Professor of Electrical Engineering and Physics, Clarkson School of Technology, Potsdam, N. Y.	Chas. R. Cross. Wm. L. Puffer. F. N. Waterman.
FINNEY, JOHN C.,	Cashier, Wisconsin Trust Co.; residence, 34 Prospect Ave., Milwaukee, Wis.	A. S. Hibbard. D. McF. Moore. R. W. Pope.
GLADSON, WM. N.,	Professor of Electrical Engineering, Arkansas Industrial University, Fayetteville, Ark.	Chas. F. Scott. B. J. Arnold. B. F. Thomas.
HILDBURGH, LEO WALTER	Student, Columbia University; residence, 1 West 30th Street, New York.	G. F. Sever. D. R. Lovejoy. W. A. Anthony.

HODGE, WILLIAM B.,	Electrical Engineer, Elmer G. Willyoung & Co.; residence, 707 Spruce St., Philadelphia, Pa.	Jas. G. Biddle. E. G. Willyoung. W. M. Stine.
OI, SAITARO	Chief Engineer to the Bureau of Telegraphs, The Ministry of Communications, 16 Kamitomisakacho, Koishikawa, Tokyo, Japan.	John J. Carty. H. F. Thurber. Geo. A. Hamilton.
TYNG, FRANCIS E.,	Manager, Eastern Engineering Co., New York; residence, Cranford, N. J.	H. C. Cushing, Jr. T. D. Bunce. C. W. Rice.
WOOD, ARTHUR J.,	Associate Editor, <i>Railroad Gazette</i> , 32 Park Place, New York; residence, 162 Washington Park, Brooklyn, N. Y.	W. E. Geyer. C. J. Field. Joseph Wetzler.

Total 11.

THE CHAIRMAN:—(J. W. Lieb, Jr.) We are to be favored this evening, gentlemen, with a lecture by Mr. Arthur A. Hamerschlag, on the "Education of Electrical Apprentices and Journeymen."

THE EDUCATION OF ELECTRICAL APPRENTICES AND JOURNEYMEN.

BY ARTHUR A. HAMERSCHLAG.

I am leaving to a certain extent the beaten path of precedent by giving the INSTITUTE a lecture on a subject which is neither pure science nor engineering. It is because of the importance of the subject and the influence it will exert on the future of the electrical industry that I have been bold enough to broach it. I do so with the hope that some agitation and discussion will point out a solution of a problem which becomes of more vital importance each year:—That of securing the necessary skilled mechanics requisite to the execution of electrical engineering works in a satisfactory and efficient manner.

The world has watched with startled eyes the rapid and far-reaching strides the young electrical industry has made, and the numerous fields in which electricity has entered. Scarcely a decade has passed since the industry, with justice, was called an infant. From a total investment of a few thousand dollars, it has to-day grown to such proportions that it would be impossible to compute with accuracy the value of the various industries in which electricity plays a prominent part. It is almost as difficult to assimilate the figures of value in their proper proportion as it is to define the widening field they have developed for skilled electrical labor. From an industry that gave employment to a few hundred men, in a decade it has expanded until to day it demands the services of tens of thousands of men devoting their services exclusively to this work. It has also demanded men of intelligence of a comparatively high order, well equipped with

mechanical skill. That we have made such astonishing progress is remarkable, but not nearly so wonderful as that we have found in the past, men in sufficiently large numbers capable of devising, developing and manufacturing electrical products on a marketable basis.

Should another generation find a proportional increase in the demand for electrical products and operations (and the prospects are good for such an increase) shall we be equally fortunate in finding the skilled men necessary? Is it just as certain these men will be found? It is the doubt that the condition will be so easily mastered that has given me the courage to speak to you to-night on this subject.

The birth of an industry is not the most potent factor in determining its development; it needs the nourishment and care of those engaged in it to enable it grow to maturity. With its growth it must develop and nurture the individuals upon whom it most depends. Merit alone will not enable it to be perpetuated and put upon a successful basis unless it is capable of placing its raw material in the hands of skilled workers upon whom absolute dependence can be placed.

It is to develop this most essential factor of future success that I believe it time that we give a thought to meeting the coming demand by educating the apprentices and journeymen to that point which will make it possible for our boldest conceptions in electro-technics to be skilfully and economically solved.

As we draw near the closing days of the century—a hundred years pregnant with progress and events, none is more notable in the world of science than electrical achievements. A thought and a backward glance will show American supremacy in this field. In order however to retain this supremacy we cannot afford to rest content with the laurels we have won, else they will be wrested from us.

The old world has given us excellent mechanics through its apprenticeship system: unfortunately even in those countries that system is dying out. This country has never had a well-developed apprenticeship system, and to-day it has almost entirely disappeared because of the peculiar restrictions placed thereon by the unions and associations, and the centralizations of the work under single financial heads, paying men by the hour or day, leading employees to shift from place to place as the demand for their services varies from busy to dull times. In fact to-day the

apprenticeship system is almost impossible for financial and other reasons, so we must devise some other means of educating the youth who wishes to enter the electrical field.

It is true that three or four of the largest electrical concerns do apprentice young men but the number is comparatively small, and it requires considerable influence to secure such indentures. The number of applicants is, however, out of all proportion to the number that can be accommodated, and such openings are almost entirely out of the reach of the vast majority because of isolated location.

Electrical work as a trade and as a profession is now undergoing the same trials and tribulations regarding educational means that other trades and professions have undergone in the past, except that the problem in the electrical industry owing to its rapid growth is of vastly greater urgency. Because of this growth along scientific and mechanical lines, improvements succeed improvements so rapidly that what was considered good practice yesterday becomes obsolete and defective to-morrow. The men are mechanics who but a few years ago handled cleats and mouldings in wiring, but are to-day asked to use iron pipe and conduit requiring entirely different tools, materials and methods. And where do these men acquire the efficiency and facility for this work? They acquire it in the crudest and most wasteful method possible, by experimentally using their employers' material, and at his expense in the time during which he is compelled to pay for skilled labor. These improvements certainly result in the loss of the journeymen's efficiency, and result in "rule of thumb" mechanics. This type of mechanic is to be found in all trades, and sometimes he is exceptionally skilled in his work and thus causes a tendency on the part of employers to desire more of him or men like him, especially when he is placed side by side with the so-called theoretical mechanic who lacks the skill.

The fallacy of this reasoning is at once apparent when the "rule of thumb" mechanics come in competition with the well grounded and educated mechanics who possess an equal amount of skill. Then the efficiency of the latter is so much greater, that there can be no comparison. Oftentimes we meet men with such a vast preponderance of theoretical training, that it has removed the inherent practical skill, and this type of journeyman is almost useless when judged from the working standpoint. This latter

condition is not a rare one by any means and just a few words concerning it may be appropriate.

A glance over a list of our numerous educational institutions causes us to feel proud of our achievements in this line. In almost every settlement or city throughout the country, some school, college or university is supported upon as lavish a scale as one could desire. Endless seem the opportunities which the young American has, to acquire the learning and higher education which are prized and cherished in the world to-day. We have schools for every conceivable purpose; we have colleges and universities for every profession, and we have technical institutions almost unmatched in efficiency. But we have only a very few practical trade schools, and for the education of electrical mechanics, fewer still. And yet, in which field can we utilize, at present and in the future, the greatest number of skilled men. In the engineering branch or in the skilled labor branch? The answer must obviously be in the latter. Still, parents will persist in sending their children, regardless of their inherent qualities, to the colleges and universities to master a profession without giving a thought to the field in which their future labors must be conducted, without considering the compensation they will receive. And what is the result? There can be only one general reply.

After years of study and much money spent in acquiring the profession, and an early association with children of wealth and refinement, the born mechanic becomes ruined for the sake of posing as a genius, or a great engineer. The field for mediocre engineers is just as narrow and confined as it is for the mediocre artist, and the compensation for his labor is correspondingly curtailed. As a result, when the young man is thrown on his own resources, he must suffer that genteel poverty which his training in refined circles has bound him to. He can no longer look with pride upon the work of his hands, and his brain power being but the average he suffers acutely, and eventually becomes neither an excellent mechanic nor an excellent engineer.

Each year the colleges and universities are sending into the world large numbers of young men, who after years of work, take the title of "Electrical Engineer." How many of these will ever have an opportunity to do any genuine electrical engineering. How many of them are destined never to earn, in the electrical line, \$1,000 or so a year, the pay of a skilled mechanic.

For every single opening for an electrical engineer, there are

a hundred openings for the skilled journeyman, and for every successful engineer there are a hundred successful journeymen. And to be a journeyman does not mean to be debarred from engineering.

Who have made the notable inventions, who have carried out the greatest engineering problems? Not the trained engineer, but the journeymen who have started at the bottom and by their individual efforts raised themselves to the highest level. "By their deeds ye shall judge them," is true of men, whether they have been educated up to a high standard or not, and self-training is often the more effective.

The compensation for skilled electrical labor, such as journeymen bring into the market, has been on the increase, it will continue to increase, and in an unfair degree unless employers think in time of a method of supplying the increasing demand, or of making the labor which is offered, worth the increase, in results achieved.

Every new electrical equipment, each railroad equipped electrically, and each industry which depends on electricity, is taking some of our skilled men from the open market and retaining them permanently, and confining their energy to maintaining such equipment.

Whence will come the men to replace these defections. Has no one a solution to offer as to the best way of replenishing the supply? Many methods of solving this problem have been tried, some of them without proper consideration of the case.

Some have been the education of journeymen in other trades, such as carpenters, draughtsmen, etc., by means of actual experience during their employers' time, a poor means at best, and which places the burden directly on the shoulders of the employers, while the resultant mechanic leaves much to be desired in all around efficiency.

Oftentimes untried young men with the desire to be electrical artisans attend, in a desultory fashion, popular lecture courses, witness a few experiments in static and galvanic electricity and find them of such interest that even though they possess little or no qualifications, and have been educated and trained for other lines they determine to make electricity their life work. Their methods of securing the necessary instruction is usually a so-called apprenticeship in a shop manufacturing some article, which in itself gives them comparatively little instruction and which

makes them eventually skilled in hand work without giving them any breadth of training, and merely enables them to fill the position of a simple automatic machine.

Sometimes they read electrical lectures and trade papers, in many instances finding themselves very much at sea because of the technical character of the papers and articles, which their previous training has done nothing to enable them to understand.

Sometimes as a final resort they become recipients of the training offered by correspondence schools, and these schools are certainly gathering an ever increasing clientele which their merit justifies.

In very rare instances they attend by far the best and most modern form of securing this training, and that through the trade school. There are however such a very few of the latter institutions in spite of their acknowledged merit, and they are so little known that only a very small percentage of the number who wish to become electrical craftsmen can reap their benefits.

The superiority of the trade school for educating and equipping young men for trade work is so vastly superior to any other form of acquiring the result, that to it in the future must we look to solve this very serious problem. Foreign countries have realized this fact for many years and profited by it. Is it not time that this progressive country began to realize it also and to stimulate and support such institutions? They certainly are bound to spring into existence, and those that exist and have an honorable record are bound to improve that record, and it is but a question of time when intelligent thinkers must give them their proper place and dues.

It has been my good fortune to have been connected with trade schools for some years, notably with the New York Trade School, St. George's Evening Trade School of New York, and the Highland Falls Trade School of Highland Falls, New York. They have taught me a lesson which I hope to profit by in the future, not alone concerning the electrical industry but concerning many trades. It is a lesson however which applies in an equal measure to them all, and that is that trade schools have an equally high aim and purpose as compared with any educational institution in the country. That their field cannot be covered in any other way, and if they were accorded the same support and encouragement by the fraternity and the public that other educational institutions receive, their effect and beneficent influence

would be as widespread, if not felt in even a greater degree, because of the class which they aim to assist.

It seems strange to me that trade schools should be subject to such marked indifference by the employers, and by such intense persecution and criticism by the fraternity which they aim to assist, merely because of the possible future competition their graduates will cause when they have come to the journeyman's estate.

Was there ever a scientific institution aiming at higher education, a medical college, a law or an art school, but received the support and endorsement of the leaders of the respective professions, if its object was not to make money, but to benefit the respective branches?

Are the prominent lawyers, physicians, the artist or the men of any other profession less free from the thought of future competition than the journeymen and the employer, that the latter should be found wanting in that which tends to advance his profession?

The governing societies, the trade associations and the employers' associations must eventually see the wisdom of the trade schools, and perhaps when they realize the necessity for them and are compelled to support them, they will indeed see the error of their ways.

A society like the AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, whose members comprise a very large number of the engineers engaged in electrical enterprises, can do much to bring this problem before the men of their line, and can materially assist in a solution of this problem of so much importance to the welfare of the electrical industry. The youth of the country imbued with the desire to become electricians will force their way in, and the inevitable is bound to occur. These young men will eventually enter the field of their choice. Why not help them and encourage them to enter under the best conditions and highest possible standard, instead of leaving them to drift in, unequipped, inefficient and lacking in essential requirements. Is it not the best for them to live up to the studies exacted by skilled artisans in other lines, so that they can not only become self-reliant and successful, but reflect credit on the fraternity to which they have given their allegiance.

Trade schools have in the past done much to assist young men to acquire the rudiments of trades in other lines; they have

tended to raise the standard of the individuals styling themselves helpers and journeymen, by showing the capacity of the beginner, and they have put the highest premium on skill and efficiency.

What I wish to impress most seriously on my hearers, is that this question of educating apprentices and journeymen, bears a vital and urgent relation to the future success or failure of an industry in which we all feel commendable pride.

The New York Trade School, owing to the far-sightedness and philanthropy of its founder Col. R. Tylden Auchmuty, has been in the field to remedy this coming dearth of skilled mechanics and the crowding out of our home industries of the native born American workers by foreign skilled labor. Aided by the munificence of Mr. J. Pierpont Morgan and other gentlemen, it has been able to broaden its scope until to-day it ranks as the pioneer and largest trade school in the country. With its six thousand graduates it has demonstrated its utility and shown the way to those who wish to follow.

Three years ago it took cognizance of the electrical situation and immediately established a thoroughly practical course for electrical workers, which became at once an assured success, filling the class room to its fullest capacity and having a waiting list of young men eager to enter the classes.

The first year the class numbered thirty-two. The second year a large department was opened and fifty were accommodated, and still the waiting list continued to be as large. This year fifty are again at work and fully that number were turned away.

The course is thoroughly practical because nothing is taught which is not done by the students themselves and tested and proved before acceptance.

This year a course for journeymen workers in the form of practical lessons will be established. Its success is problematical, but should it show any signs of growth and interest it may lead to future results which cannot fail to be of interest to the whole electrical fraternity.

The lantern slides show the classes at work and a few samples of work, but give but a vague impression of the school, which all members of the INSTITUTE are cordially invited to visit.