THE EVOLUTION OF THE INSTITUTE AND OF ITS MEMBERS

President's Address

BY C. O. MAILLOUX

INTRODUCTION

THE constitution of this Institute prescribes that the president "shall deliver an address at the annual convention." The duty thereby assigned to the president becomes one of his last official ones, when the annual convention falls so near the end of the term of office, as it has in the last few years.

The realization of the approaching end of his term of office made one of my distinguished predecessors feel that his presidential address was a sort of "swan song." It is a cause for congratulation both to the Institute and to him that he has since then contributed several other very good "songs" which have received great applause both here and abroad; and his many friends and admirers all rejoice over the good prospects of his being heard from again, many, many times. The fact that so many of our past-presidents have retained a great interest in the affairs and welfare of the Institute, and have continued to work most loyally and zealously in its service, makes me feel that it would be misleading to ascribe a "valedictory" character to the president's address. I am very certainly not inclined to regard it, in my own case, as an incident of "leave-taking," since I feel the strongest desire and disposition to continue to serve the Institute to the best of my ability after I return to the ranks. I prefer to regard it in the light of a graduation-thesis, constituting one of the requirements for the "honorary degree" of "past-president."

THE DEVELOPMENT AND ACTIVITY OF THE INSTITUTE

The wondrous activity of this Institute, the enormous amount and the magnificent quality of the work which it does each year, are so full of interest and so worthy of attention, that they would easily furnish both the pretext and the inspiration for an interest-

ing and instructive address. To one who, like myself, had the privilege of "enlisting" as one of the founders, and who holds the diploma of charter-member of this Institute, its growth, its expansion, its work, and its achievements have been, from the beginning, and still continue to be, sources of increasing wonder and astonishment. There is, in truth, reason for us to be proud, even to the degree of exultation, over the fact that the American Institute of Electrical Engineers, the youngest in the family of national engineering societies in the United States, has pushed its way to the very first place among them all, not alone in point of membership, but in respect to its subsidiary centers of activity, *i.e.*, its Sections and Branches; also, and more especially, in respect to the number and the character of the contributions to original knowledge of which it has been the depository and the means of dissemination; also in respect to the important role which it has played and the great influence which it has exerted in the entire world, in connection with questions of electrical units and standards and other matters calling for international conference and agreement. There is still at least one other respect in which it need not fear, but could challenge, comparison, (even if the list also included the sister societies in the rest of the world), namely, the proportion of active workers, *i.e.*, the proportion of members who give material evidence of their interest in the work, welfare and development of the Institute by making sacrifices not only of time, but of money through their zeal in its service. So far as I know, there is no other engineering or scientific society in the world which has the good fortune to have at its disposal, free of cost, the services of so many high-grade men.

This willingness and readiness to serve are evident in all the Sections and Branches of the Institute; and that is precisely what has made the plan of forming Sections and Branches so successful. It is in connection with the activities of the central body of the Institute, however, that the results of the devotion of our active members are most apparent and significant. Each month, men who hold most important positions gather at the Institute headquarters from all points, far and near—many of them coming a thousand miles, and some even a still longer distance—to attend meetings of directors and of committees. In general, the attendance at these meetings is surprisingly large. Frequently, there are many different committees holding meetings. Some of these meetings may begin a day or two before, and some may not be over until a day or two after "In-

stitute day." Very often, the committee works until a late hour in the evening, and, occasionally, it continues its work the next day. On at least two occasions, one of our most important committees, the Standards Committee, has been in session day and night for more than three days in succession.

The enthusiasm and the energy of these faithful and devoted workers, their evident desire to collaborate and cooperate to the highest advantage for the good of the cause, cannot fail to excite both wonder and admiration. The interesting and significant thing is that these men work with the same earnest attention and the same desire to produce substantial and useful results that they manifest in dealing with matters of most profound personal interest and importance. Not only is this high grade work done voluntarily, but the men literally pay for the privilege of doing it. The time and traveling expenses of some of these men amount to a large figure at the end of the year; and some of them have been serving the Institute, at that cost, for many years. Moreover, in many cases, notably in the case of chairmen and secretaries of committees, the work done at meetings is in reality only a small part of the total work done by them, which includes a great amount of correspondence. I have deemed it a duty to refer to the amount and the quality of the work that is done by the members without cost to the Institute, for two reasons: First, because the fact that there are so many devoted, earnest, faithful workers rendering such valuable services at more or less great personal sacrifice and expense may not be as well known to the membership at large and as much appreciated as it deserves to be; second, because I wish to pay a well deserved tribute of praise and to do honor to these men. It is a duty and it is also a great pleasure to me to pay a tribute of appreciation and of gratitude, here, for the Institute and for myself, to all these faithful, self-sacrificing workers, to whose zeal, loyalty, energy and generosity, the Institute is so much indebted for its success and for the reputation which it has achieved both here and abroad. It is precisely here, in my opinion, that we find the true explanation of the phenomenal growth and development of the Institute. It has often been remarked, by persons who are informed about the activities of the Institute, especially about the work of its important technical and special committees, that if the time and effort devoted to this work had to be paid for, even at bare cost, the Institute would need an enormous increase in revenue to carry it on. This is a modest

statement, however; it would be nearer the truth to say that the Institute obtains, without cost, more and better service than it could ever hope to procure for money.

THE EVOLUTION OF THE INSTITUTE

As members of the particular guild of technical specialists who are interested in, and dealing with, the applications of electricity, we all are more or less familiar with, and we all have reason to feel quite content over, what electricity has already done in improving existing facilities and in providing new ones for the world's work, and for the welfare, comfort, and happiness of its inhabitants. Nobody has had more frequent occasion or better cause than have the members of our guild, in the thirty years that have elapsed since its foundation, to realize and to appreciate the fact that we are living in an age of rapid evolution and of wondrous transformations. The fact is that the electrical engineer has played the leading parts in several of those transcendental, epoch-making developments in applied science, which have wrought so numerous and such radical and far-reaching changes in industry, commerce, trade, and even in the conditions of our daily life. Moreover, he is expected and he is preparing, to play an equally important part in many other new, forthcoming transformations of methods and facilities for promoting the progress of the world in the direction of higher civilization and greater benefits for mankind in general, through a more general and a better utilization of the sources of energy which nature has in reserve and which it will yield up to man as soon as he learns how to use them. Some of the electrical engineer's dreams of the past, that seemed, indeed, at the time, as fantastic and impossible of realization as fairy tales, have come true, and in a way which exemplifies the adage that "truth is stranger than fiction;" and he has kept on dreaming, of other, more wonderful, possibilities. Indeed, the realization of the supposed illusory dreams of the past, shows that he was more a clairvoyant than a dreamer.

The fact that our seemingly extravagant expectations have been so often realized in the past, justifies our having other extravagant expectations for the future. I think that we are entitled to say that the electrical engineer has been and that he is still a prophet as well as a minister of the world's progress.

The last century, sometimes characterized as the age of iron and steam, witnessed the great feats which the engineer accom-

plished with iron as a structural material and steam as a source of power. In the present century, steel is taking the place of iron, and electricity that of steam; and the engineering feats of the last century will pale into insignificance, when compared with the vastly greater engineering achievements and wonders which are to come, some of which are, in fact, already impending.

The great diversity in the subjects treated in the technical papers which have been presented before the Institute, in the last ten to fifteen years, shows that our field, instead of contracting and becoming more restricted, as it was feared at one time might happen, is enlarging rapidly, and in all directions. The opportunities for original research and experimentation, the chances of making discoveries, and inventions, and the openings for new specialties in technical work, are becoming more, instead of less, numerous and favorable. The general outlook is therefore encouraging. The prospects for the continuance of the growth and prosperity of our guild were never better, seemingly, than they are now.

Our success as a guild will be sure and complete, on condition, however, that we suffer no loss of cohesion or of solidarity as the result of increased specialization. We must bear in mind constantly that "in union there is strength." We must beware of segregation. This is a point of vital importance. There are delicate problems, here, for the Institute to solve.

The expansion of existing fields of activity or the advance into new ones, leads, very often, to the creation of new specialties. Some of these new specialties have assumed sufficient importance in the number of persons interested, and in the amount of technical work done by them, to attain to the dignity of substantially distinct branches of the engineering profession, for which separate technical societies have been created, like the American Electrochemical Society, and the Illuminating Engineering Society, the former of which is wholly and the latter partly a subdivision of the general field of electrical science and engineering. The subdivision of a large field into smaller independent or subsidiary fields of technical activity, may have been warranted in these two cases, but in other cases, where an attempt was made to follow their example, the results have been far less satisfactory; and it would have been better if, before founding new societies, the persons interested in new specialties had tried to utilize other facilities, including, especially, those which the Institute could offer them.

The technical committees of the Institute represent an honest and earnest effort which has been made—and with considerable success—to secure diversity in technical work and to give scope, individuality, and recognition to the various specialties and activities of the members or of groups of members of the Institute while avoiding their segregation into distinct small societies.

Each of our technical committees has the resources, the authority, and the prestige of the whole Institute; and every member of the Institute receives the full benefit of the activity and of the work done by the specialists constituting the committee. In effect, the result is the same as if every member belonged to a number of distinct societies specializing in certain subjects. This point is deserving of attention, as disclosing a feature which is not as well understood or as fully appreciated as it deserves, and as suggesting a field for further development.

So far as concerns the specialists themselves who take part in the activities of the technical committees, they are relieved of the responsibilities and burdens of keeping a small society alive to give scant support and limited publicity to their work as specialists. It is obvious that their work reaches a much larger number of people and does much more good when done under the auspices of the Institute. The Institute plan is based upon the principle that “in union there is strength,” and on the economic advantages resulting from concentration of organization and administration. This plan fosters diversity by permitting activity in many directions that would not warrant the formation and could not maintain the existence of separate societies, and, for other specialties which could only hope to maintain a separate society on a small scale, and in a more or less precarious way, it offers a larger field and secures a larger audience, which, as we all know, is a consideration of the highest importance, because it gives the best incentive and is the best stimulus for doing work of the highest grade.

The preceding considerations reveal certain fundamental principles of efficiency and economy with which electrical engineers are all very familiar, namely, the importance of high values for the “diversity” and “load” factors in central stations. The Institute is, in effect, a kind of central station for the generation and distribution of a certain kind of electric “power” which is useful in the production of electrical “work” of greatly diversified character and of extreme importance, as a whole, to the vocation of the electrical engineer, and to the standing and the

advance of the electrical engineering profession. The analogy is perfect; centralization of activity and the superimposition of load-curves,—as the result of increasing the diversity-factor,—lead to a higher load-factor in the Institute, and in about the same way as in an ordinary electric power-station.

The Institute has abundantly realized its objects as we find them stated in the constitution, namely, "The advancement of the theory and practise of electrical engineering and of the allied arts and sciences, and the maintenance of high professional standing among its members." It has amply fulfilled its mission and its trust as the representative of the profession of electrical engineering in the broadest and most comprehensive sense. It gives shelter and support, encouragement and standing, to all the branches and specialties of the profession that are worthy. Its numerous Sections and Branches in North America, and its many groups of specialists working in various electrical fields, suggest a federation of states and territories, whose citizens are amalgamated into a coherent mass, in accordance with the old motto, "E pluribus unum," which the Institute exemplifies and glorifies.

In expressing my gratification over the good work done thus far by the Institute, nothing is farther from my thoughts than the wish to suggest or imply that there is not still more, indeed, very much more, good work ahead, waiting to be done. In truth, my feeling is that it would be very difficult to set any limits to the development of the Institute and its capacity for the further advancement and realization of its aims and objects. There will be no dearth of good opportunities in many directions; and I am confident also that there will be no lack of initiative, interest and effort on the part of the active members whose self-sacrificing devotion has done so much, as I have already indicated, to raise the Institute to its present high plane of efficiency. As time goes on, with better resources and riper experience, the Institute will be able to undertake tasks of greater magnitude and solve problems presenting greater difficulties than would have been possible hitherto.

There is one thought suggested by the foregoing sketch of the Institute's career which deserves to be impressed upon the minds of all its members. It is this: wherever in the extensive fields of electrical theory and practise a man may happen to be stationed, either by his own choice or by circumstances, whether he be genius or plodder, whether he be ambitious or modest, and

regardless of his specialty, or whether he have any specialty at all, there is room for him in these fields, there is a place for him in the Institute, and work for him to do, and there are benefits and honors waiting for him there. The Institute needs him, and he needs the Institute. Each can complement the other and can add to the other's "stature" in many ways.

Although the evolution of the Institute has been rapid, it has been, fortunately, also healthy. It has acquired a strong impetus which should carry it along steadily to ever wider scope and more fruitful influence. There is no reason why the Institute should not continue indefinitely to grow, to expand, and to increase its power for doing good to our profession and for developing a true professional spirit in its members. I trust that you all join me heartily in the wish that the Institute's career may be long and brilliant and I hope sincerely that you will all continue to do your best to help make the wish come true.

THE SOCIAL AND CIVIC EVOLUTION OF THE ENGINEER

The preceding sketch of the evolution and development of this Institute has made it apparent that the particular branch of the engineering profession for which it stands before the world has attained a place of great distinction and high honor in that community of initiates and adepts known as the domain of applied science and technology and sometimes called the engineering world.

We might be content and satisfied to rest on our honors in that world, if it gave scope to all our aptitudes, if there were in it opportunities for the cultivation of all our faculties and the development of all our talents, and for the realization of all our ideals and aspirations. Unfortunately, that world is, after all, only a sort of technological workshop of vast proportions and of complex character, wherein one may develop great abilities and talents, it is true, but which aims at one thing only, the performance of scientific and engineering tasks and "stunts" of great commercial interest and industrial value to the whole world. It is not suited for the development of what we are wont to term the higher, better and finer side of human nature, including those important constituents of human character, built up of moral, ethical and spiritual attributes and of sterling qualities of mind and heart, those elements of general culture, high-mindedness and refinement, which breed the feeling and nurture the respect for ideals, and which develop those charms and graces of manner

that raise certain individuals to higher planes, and entitle them to greater respect and consideration than the rest, in human society.

I know that I need not dwell on the desirability of this kind of development, for I am sure that you all concede its necessity and its benefits for all classes of humanity. We all see quickly enough the "mote" that is in the eye of humanity in general; unfortunately, we do not always see the "beam" that is in our own eye, so great is the difference between looking at a thing in the abstract and in the concrete. That is what leads me to mention and to insist upon a point of great moment, not only to ourselves but to the whole world. It is this: we are further behind than we ought to be, in certain phases of that higher development which has just been alluded to; we are merely *followers*, whereas we ought to be *leaders*. I will admit that this condition has not been worse,—in many respects, it has, indeed, been far better,—in our branch than in the other branches of the engineering profession; but, the fact that we have been merely a little less blind to our opportunities and our duties than have our colleagues, is not an adequate excuse for our own delinquency. It is, perhaps, an accusation, as showing that, although more awake, we were not more alert or active.

One of the important objects which I have in mind, in this portion of my address, is to bring to the attention of electrical engineers,—and, incidentally, to the attention of all other engineers or classes of engineers who are "in the same boat,"—the fact that the acquirement of what might be termed "technical adeptness and dexterity," either individually or collectively, by the members of a profession, and the resulting increase of technical knowledge, accumulation of experience and data, and development of engineering methods, do not constitute the *sum-mum bonum* of our professional life, and do not represent our only ideals or the sole end and purpose of our efforts, either in an individual or in a cooperative sense.

In extending and improving our relations to each other, through our Institute, we have laid the foundations for the development of a great guild. Let us remember, however, that in this case we ourselves may not, indeed, we cannot, be the sole judges of greatness. In reality, it is not *self*-recognition, but recognition of a class by *all other classes*, that counts. This is a point to which engineers as a class have given altogether too little attention. They have been too self-conscious

and self-centered; and they have not paid enough attention to their relations to the outside world. They have neglected to cultivate, and, consequently, they lack, the "*guild-spirit*",—that force which makes for the increase of prestige, influence and power of the guild, and secures for it the greater respect and consideration of other guilds and classes. It is high time that engineers should appreciate the importance of "taking their place in the procession", in a social, civil, and civic sense. While, in a professional class, the prominence of *individuals* may depend only or mainly on professional technique and achievements, the prominence, reputation or *caste* of the *class* or *clan*, as a whole, depends mostly, perhaps wholly, on the professional spirit—the "*esprit de corps*",—and on the ability, of the guild or class, to hold its own with the other guilds and classes, on common grounds, in social, civic, political and other life, in the outer world. The next point of interest is that we really have duties to perform and are entitled to benefits, in that outer world. Moreover, our neglect to preempt or to occupy the place that belongs to us there, is a serious handicap to the prestige or influence of our particular professional class, and places it in a condition of relative disparity, before the world, as compared with other professional classes,—such as those of law, medicine, the fine arts, etc., which assert their rights and utilize their opportunities systematically.

When people speak of the "upper crust" of society, they imply and recognize, tacitly, the existence of lower layers, strata or classes in human society. It were indeed idle to deny the existence of classes, orders or groups in human society, any more than in the rest of nature. It seems to be in nature's general program. We find classes in the infinitely great worlds of the astronomer, and we find them in the infinitely small worlds of the bacteriologist, and in that of the physicist; and we find them everywhere between these two extremes, in the animal, vegetable and mineral kingdoms. An interesting example of the stratification of life was noted by the Prince of Monaco in his deep sea explorations. He found that the ocean had upper and lower "layers", or "tiers" of inhabitants, with an indefinitely great number of intermediate layers; moreover each kind of life, indeed each species of fish or animalcule, has its place at a certain depth, where it is "at home", and above or below which it is "out of its element", and may be so uncomfortable or so handicapped that it cannot live.

In this entire system of stratification in the universe, the relative location of each layer may be the result of accident or circumstances, but it is always liable to change. In the case of the "layers" of human society, some important changes have been effected rather suddenly by *revolution*; but most of the changes occur by the slower and better process of *evolution*. The important principle of the "survival of the fittest" is always in operation here, for there is continual battling by contending forces, the weak being crushed or thrust aside by the strong. The social or civic level occupied by any class in human society is at the point of balance or equilibrium between its own efforts to rise to higher levels and the efforts of other classes to prevent them from rising in order to take their place.

It is my opinion, as it is also that of many of my colleagues who have given careful thought to the matter, that as a professional class, we are entitled to occupy a higher station and to receive greater consideration and respect than have been accorded us by the public. I will not deny that we have made considerable progress in the direction of social respectability and higher civil status. A recent review of the evolution of the engineer, in the London *Times*, contains the interesting statement that "Considerably less than a hundred years ago engineers in the navy took rank *next below carpenters*". It is most gratifying to realize that, in the present day, in all the navies of the world, the engineer is in the "officer" class and that, at least in our navy, many of them have attained the "Admiral" class.

In an address on "the position of the engineer in civic and social life" presented before an Austrian technical society in 1877*, one finds ample evidence that the civil and social status of the engineer were then far from satisfactory to the engineers themselves. There is lament over the fact that the older professional classes, which had hitherto divided the world amongst themselves, looked upon engineers as "upstarts" and "intruders". We may still be considered "intruders" by the lawyers and politicians who fill the positions that we engineers alone are qualified to fill properly on public service, public works, and

* "Die Stellung der Techniker in staatlichen und sozialen Leben." Vortrag des Herrn Hofrathes M.M. Freiherr von Weber. Gehalten am 17 Feb. 1877. Wochenschrift des Oesterreichischen Ingenieur und Architekten Vereins. Vol. II, Feb. 1877, pp. 59-60. Mar. pp. 85-88. (To be found in A. I. E. E. Library, Mailloux collection).

other commissions dealing mostly with engineering questions; but, at least, we are no longer called such harsh names. So we have made some progress,—just enough, perhaps, to show how far we are still from where we ought to be. The following passage in the address is well worth quoting: “Only in rare, exceptional cases, do we see engineers, even in matters of specifically technical character, vested with the authority which gives the ultimate final decision; indeed, they are never in the majority in the deciding body”. Further on, in the same address the statement is made that the final deciding power in matters of the kind already mentioned remains “in the hands of laymen, and that the preponderating majority is composed of amateurs generally having a pronounced legal ‘tinge’”.

These remarks, thirty-seven years old, need practically no revision for presentation before an American engineering society today. They still report the conditions quite correctly. The author calls attention to the fact that the civil and social status of the engineer are higher in France and in England than in the German countries. The engineer has never been regarded and treated in the former countries as an “upstart” or an “intruder”. Of the French engineer, the paper says that his education not only equips him with the necessary knowledge and preparation for the fulfillment of all his technical duties, but that it makes him, in general culture, good breeding and social tone, equal to members of all other social classes, and that he is, therefore, received and acknowledged as such without any opposition. This passage is interesting as evidence of the benefits attainable from the kind of training which supplements technical adeptness and dexterity by the development of personal character along intellectual, cultural, social, civic and ethical lines. The article concludes as follows:

“Let us set aside small jealousies and controversies, let us help uplift each other reciprocally and in that way also raise ourselves in the estimation of the world,—let us stand fast, shoulder to shoulder, in healthy solidarity against the outside influences which begrudge us equality of privilege with the older professional classes, and which strive to shut us out;—let us show, by our own discipline, that we are qualified to advise, to direct, to lead, in the highest capacities, and let us be on all occasions gentlemen in disposition and deportment.

“The conquest of that position in civil and social life for which we are striving and which belongs of right to us, on the strength of our knowledge and ability, will then result without fail.”

It would be difficult to improve upon this good advice even at this later date. The fact that it is still so good shows that it is

still needed; for the millenium expected thirty-seven years ago is not yet quite here.

This plea for the proper recognition of engineers, as a professional class, though based upon justice, is, in a sense, a selfish one, and, in urging it too strongly, we might expose ourselves to the charge of being actuated by a desire to gratify professional pride or vanity. Fortunately, the real motive for the evolution of the engineer in social and civic directions is one that is quite altruistic, for the benefits which will result from it for the engineering profession will be trifling in comparison with the benefits to the community, to the state, and to humanity in general. This may seem to be a broad statement, but it can be demonstrated.

We know that it is the engineer who, in the last hundred years, has effected the marvelous transformation in the material conditions of life and in the activity of communities which are startling to the historian, and which seem revolutionary to the superficial observer. The engineer has been too busy himself with the multifarious details of this gigantic task to note that what he has done has, in reality, reacted upon the whole structure of civilization to an extent so great that profound alterations, if not entire remodeling and reconstruction, are needed to restore balance and equilibrium. Now, in this task of industrial, social, economic, and political rearrangement and readjustment, there is work for all classes; and, considering the highly technical character of many of the problems involved, there is, especially, much work for which the training and experience of the engineer are important if not indispensable qualifications. It is here that we need the voice and authority of the citizen who is also an engineer; but his place is taken and his authority assumed by the lawyer, the politician, the agitator and the utopist, each having as little useful technical knowledge as the other, but each presuming, nevertheless, to be an expert and an authority on questions that are beyond his ken. Let us note here a significant fact. Public opinion holds so much consideration and has so much respect for the older professional classes,—law, medicine and theology,—that it would not tolerate the suggestion that the tribunals of justice should be administered by others than jurists, that questions of sanitation or hygiene should be decided by others than medical men, or that moral questions should be settled by others than clergymen. When, however, it comes to questions involving scientific and engineering knowledge, public opinion seems to be satisfied to let them be discussed and settled by anybody whatever, preferably by *others* than engineers.

In older times, men could qualify for handling the problems of the civilization of their day without reference to technical science, as knowledge of law and religion was the fundamental requirement. A very little science went a long way in an age when sophistry and credulity were at a premium. As a result of the rapid progress of civilization along scientific lines, the importance of law and religion now sinks into insignificance, in comparison with science and technical knowledge as qualifications for dealing with the problems presented for solution. It does not require much thought or imagination to see that, in a society which is becoming daily more and more dependent upon science and engineering for its welfare and well-being, aye, for its very existence, there is more and more room and need for men of technical training at the helm in public affairs.

Some thirty years ago, the then president of these United States stated that "we are confronted by a condition, not a theory." Today, we have a different state of affairs. We are confronted by both conditions and theories, more especially by a great number and variety of theories, many of them of questionable soundness. This conglomerate condition is owing to the fact that we have too many "quacks", and not enough "doctors", in economics.

A sage of bygone times uttered the aphorism that there is no royal road to learning. Now, the world would not be so much disturbed or inconvenienced, if it were only royalty that aspired to acquire learning without having to pay the price. Unfortunately, that disposition has become epidemic at the present time, and what is still worse, the appearance is often accepted for the reality, so far as knowledge is concerned, more especially knowledge of civics and economics.

The framers of the constitution of the United States, in making a general statement that "all men are born free and equal," without making it clear that they meant freedom and equality in a civic and legal sense, rather than in a social or intellectual sense, left room for much misunderstanding and confusion. The untutored mind finds encouragement here for the notion that one man's opinion is as good as another's. He does not distinguish between the *right* to express an opinion, which is a matter of *law*, and the *value* and *authority* of that opinion, which are matters of *knowledge*. He forgets that while the right may not be disputed, the authority may be both disputed and denied. This self-constituted authority is a source of great

mischief, and it is, perhaps, the indirect cause of much of our social unrest or political inconsistencies and our economic disturbances. We are forced to realize and to admit that it puts a premium on ignorance.

The same process of reasoning that makes a man think he is an authority on all political questions makes him a partisan of direct legislation in its most radical forms. Instead of matters being improved, they are made worse. The reason can readily be seen. The burdens thrown upon the individual increase in proportion with the responsibilities which he assumes. In presuming to deal with and pass upon all civic, economic and political questions directly, instead of delegating them to representatives, he assumes implicitly the responsibility for informing himself about every matter, and getting at least as intelligent a grasp and comprehension of it as the representative is presumed to have. But here is precisely where the trouble arises. Many of the questions which he has undertaken to answer for himself, in doing away with representatives and proxies, and in becoming his own authority and guide, are questions involving and requiring more or less thought and study and inquiry into facts. It is work of a kind for which the average citizen has not the time or the inclination, even if he had the aptitude and the training. How can enlightened thought and opinion and rational action be realized under such circumstances? It seems natural to expect that most of the untutored and indifferent minds in the community will either jump at conclusions or arrive at them in a very superficial way, very much as one may try to get the news by merely reading the heavy headlines in a newspaper. In such a case, it is very important that the headlines should be set up by men who are intelligent, well informed and honest.

It is a momentous question which is asked when we inquire whither the untutored citizens, who constitute always such a large part of the whole mass, will turn to read these headlines, in their search for information; and the answer is far from reassuring. Some may read them in the sermon of a popular divine who is trying to fill the pews by observations on civics, economics, and other technical subjects of which he knows precious little. Others may read them in the speeches and harangues of agitators and fanatics, and no doubt many others find them in the corner saloons in the vaporings of some would-be sage, who, after finding inspiration at the bar, tries to imitate the sapient "Mr. Dooley" in solving the world's problems.

The sum total, the net result, of all this dilettantism is a condition wherein the blind are leading the blind. All this confusion, and all the blundering which it entails, could be and may be avoided by putting men and things back into their proper places. In seeking for causes, we are brought face to face with important facts. First, the present disregard for knowledge and authority among the masses, and the transition from a state or condition where a few privileged professional classes or sects were the only ones who presumed and were permitted to think and pronounce on public questions, to a state where all classes and, in fact, all individuals, assume the right and authority to do so, are undoubtedly consequences of long-continued abuse of authority by those who presumed to be the oracles of the people, and made believe that they knew all about things which, in reality, they did not know. Second, it is mainly lack of *scientific* knowledge that has caused the old-time oracles to fall from grace in the popular estimation. The days when scientific facts could be over-ridden and overshadowed by rhetoric and oratory, are passed. An ounce of technical knowledge is worth a ton of imagination, when it comes to handling scientific facts. The public lost confidence in its oracles because it found out, in time, that it is more important for statements to be *true* than to be merely *plausible*. Third, the public is not to blame for not having given to men of scientific training an opportunity to enlighten and advise it in matters of scientific fact and knowledge. The blame lies with the men of the scientific class themselves, for having allowed the public, as a body politic, to remain in ignorance of their very existence, to say nothing of their qualifications. It is unfortunately too true that the civil and social status of the professional engineer are far from being well defined in the mind of the general public. Indeed, there are indications that the scientific education, training, and experience of the professional engineer are very little understood and appreciated in the community. It is not strange, therefore, that the professional engineer should, by many, be regarded as merely a higher grade of skilled mechanic or artisan. To remedy this condition, steps should be taken to inaugurate and carry on a campaign of education of the public, with the object of acquainting it with the engineering class. It is time that engineers should assert themselves as a class and let the public see that they satisfy very substantially the requirements of an intellectual class, and one of more than

average grade, as well as of high civic character; that, as such, they are qualified to render important service to the community and to the state, and are entitled to recognition.

I wish, at this point, to make it plain and emphatic that the kinds of service and of recognition that I have in mind are not of political, but more of civic, social and ethical nature and character. I would be sorry to see any body of scientific men become a political force and acquire ambition for political power. It would be a lamentable waste and perversion of mental energy of high quality and development. In the beginning of this portion of my address I spoke of the development of the higher and better sides of human nature, and of the evolution of character along the lines of highmindedness and refinement, as the path over which man can attain to the highest civic and social planes. It is my opinion that not only the engineering class is capable of this higher development, but that it can serve as a strong leaven to promote that development in the community. In a word, I believe that, just as engineering has helped materially to improve physical conditions, so the engineering class can help materially to improve civic, ethical, economic and even moral conditions, in modern life. The education, the training and the experience of the engineer fit him especially for such a mission. He has to deal less with fiction and more with facts than most men of other intellectual classes. He learns early to understand and appreciate the value and the utility of scientific method and precision in his habits of thought and expression as well as in his work. He also learns early to distinguish between the classes of subjects with which he is competent to deal, and on which he may presume to speak authoritatively, and those classes of subjects which are not within his sphere or his scope, and in reference to which it would be absurd or even impertinent for him to pose as an authority. He knows that specialties in intellectual work arise from the limitations of individual mental aptitude and energy, and he is willing to concede that the specialist is likely to have more and better knowledge of a given subject than the amateur. He *might presume* to express an opinion on subjects involving *scientific or technical facts*; he *would hesitate* to express one on subjects involving scientific *hypotheses or theories*; and he *would be quite reticent* on subjects involving *metaphysical* considerations or speculations. The subjects of the class first mentioned may be presumed to be wholly within

his sphere; those of the next class are likely to be only partly so; and those of the last class are, as a rule, entirely outside of his sphere. The man who has been taught and trained to exercise such discrimination and discretion is qualified for sane, sound, rational, logical, thinking; he is apt to be more careful and accurate in his statements; he usually says what he means and means what he says; and his opinions are bound to carry weight and receive consideration. They make an interesting contrast with those of the man who undertakes to cover all subjects with equal "fluency". It is well known that, as a rule, engineers and scientific men are more conservative in their statements than most men of the other educated and intellectual classes. This is the result of a better appreciation of the limitations of all human knowledge and of the importance of precision in thought and expression; it is, in a word, the result of better intellectual perspective and mental balance. These qualities are very valuable in the citizen, in the member of a community, as they are known to be in the engineer entrusted with important tasks. They only need to be known to be appreciated. They should enable the engineer to command the respect and receive the consideration of the general public, for they are bound to place him on a high civic plane, and make him an exemplar for the rest of the community.

That is the position to which I would like to see the engineering class attain. The other educated intellectual classes have had their "inning,"—their opportunity. Ours is yet to come. Deserve success and you shall command it. We must deserve and we shall obtain the confidence of the community; and when we secure it we must retain it, by continuing to deserve it. The engineering class can scarcely expect to reach the goal at one bound. It must expect to attain the higher position to which it is entitled among the thinking and intellectual classes by successive stages. It should delay no longer, however, in making a start and in taking the first steps.

I have not by any means exhausted the subject. There is a great deal more to be said, but I shall be content if I have aroused your attention to the importance of not neglecting our evolution along social and civic lines, and beyond the purely technical and professional lines which we have hitherto looked upon too much as being our final goal and the highest realization of our ideals.

I will offer, by way of conclusion, some thoughts summing up the situation, which, I hope, will receive your careful considera-

tion and will be borne in mind by you as having an important bearing upon the further evolution, in a civic and social sense, of the members of this Institute.

I. The Institute has made most satisfactory progress in the development of the activities and forces which conduce to its efficiency, which enhance its merits and enlarge its reputation as a forum for the discussion of questions and the study of problems in theoretical and applied electrical science. Its evolution in that sense and direction has been rapid and healthy; and it bids fair to continue to expand its sphere of usefulness.

II. The membership of the Institute, as a whole, has shown extraordinary devotion and loyalty to its interests, and a most edifying zeal in constant efforts to place it on a high plane among the engineering societies of the world.

III. The members of the Institute, as a class, have great respect for high professional ideals and ethics, and they have given enthusiastic and strong support to all movements and measures tending to their development in the Institute.

IV. The members of the Institute, in common with those in the other engineering societies in this country, have paid but little attention to the cultivation of professional ideals outside of the Institute.

V. As electrical men we have pre-empted and we hold a high position in that inner world which constitutes the engineering hierarchy. We have not attained the same high relative rank and position in the outer world, in civil and social life.

VI. In spite of the wonderful achievements which we have performed and the great contributions to the progress of civilization for which we deserve substantially the entire credit, we do not hold the place in the social scale that is commensurate with our professional attainments and our social qualifications.

VII. We have measured our weight and influence as a class by reference to what we think of each other, and by our mutual respect and consideration for each other, forgetting that our social position and status are determined wholly by what the outside world thinks of us, or the respect and consideration which it accords us, or which we demand and obtain from it.

VIII. The time has arrived when the members of the Institute should develop a class spirit through which a man in the engineering profession can attain to the place and high honor and consideration to which he is entitled among the other professional classes.

IX. We must show to the rest of the world that engineers are, by education, training, and experience, as well qualified as any professional class, to discuss, and deal with, public questions and problems, and that in the case of technical questions we are better qualified than are the other classes.

X. We not only fail in our duty to our professional class, but we also fall short of doing our full duty to the community, by remaining silent, in the social and civil background, and by hiding the important light which we are most able to shed on many public matters, by virtue of our scientific and technical training.

XI. We must dispel the popular notion that clergymen, lawyers, physicians, and literary people are still, as in bygone ages, the incarnation of civic wisdom and the epitome of social philosophy, or that they still constitute the only available source of intellectual "high potential" and the only dispensary of advanced thought and knowledge concerning the problems of civilization and human progress.

XII. The engineering class must take its place on a social plane parallel with that of the other professional classes, and must claim, in connection with technical matters within its province, the same consideration and deference to its opinions and decisions that are shown to the other classes under similar circumstances.