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THOMAS ALVA EDISON

TRIBUTES FORMING A MEMORIAL PROGRAM GIVEN AT THE NEW ORLEANS MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

AN APPRECIATION OF MR. EDISON BASED ON PERSONAL ACQUAINTANCE

By Dr. CHARLES L. EDGAR

PRESIDENT OF THE EDISON ELECTRIC ILLUMINATING COMPANY OF BOSTON

I AM deeply honored by being asked to address your association, especially upon the subject assigned to me. I note that I am to be followed by three addresses, having to do with the achievements of Mr. Edison, and it is, perhaps, fitting that I should try to give you, in the few minutes at my disposal, a somewhat personal picture of the man as an individual, a friend and an associate. This will, I hope, give a sympathetic setting to the remarks of those who come after me. If I can give you a little of the Edison atmosphere, I think I will have accomplished my purpose.

I have been associated with him or with companies that bore his name for practically fifty years, and I am afraid that, in telling you of some of the incidents connected with our acquaintanceship, I may bring myself too much into the picture. This, I fear, is unavoidable, and I therefore apologize in advance for possibly being too personal.

I was brought up in the Edison atmosphere. I spent my boyhood vacations on my grandfather's farm, located within a few miles of the renowned Menlo Park, where Edison carried on his most important work. We had to pass the laboratory in going to the nearest village, and I came to know the surroundings and the general talk of the neighborhood as to

what Edison was doing. Of course his work did not mean anything to me at that stage of my life, but it was, perhaps, a fitting introduction to some of the things which came later on.

I was a student at Rutgers College in New Brunswick, located about seven miles from Menlo Park, and during my senior year two or three of us went down to the Laboratory one afternoon entirely as a matter of curiosity. A little billiard room was located next to the station, and it was in passing the window of that establishment that I first saw an incandescent lamp burning.

In walking through the machine shop, I saw a group of three well-dressed city men standing alongside one of the benches, apparently talking to a young man in overalls, who was sitting on the bench and swinging his feet. My first thought was that they had happened to stop near where this young man was sitting and that he was inadvertently listening to what they had to say. Some one nudged me and said: "That's Edison." Although I had been in the neighborhood of the laboratory, as I said before, many times as a boy, I had not happened to see him to know him until that day in my senior year.

When I graduated in 1882, I took a postgraduate course in electricity. The instruction was, of course, in those days very crude and the apparatus still more so. We had one or two rather good electric instruments, but most of the apparatus was something that we had made up ourselves. Mr. Edison's laboratory at Menlo Park was in somewhat the same condition.

Our professor in physics was quite an intimate friend of Mr. Edison, and every once in a while I was sent down to Menlo Park either with one of our instruments which Edison wanted to borrow, or to borrow one from him to try on some experiments in our own laboratory. Even on these visits I very seldom saw him, but became quite familiar with his assistants and with the general work in which they were all engaged.

In January, 1883, armed with a letter of introduction from my professor, I went down to Menlo Park to see Mr. Edison and ask him for a job. I knocked at the front door, was sent into the parlor and told to wait. For some time I heard conversation going on in the next room where the family were at breakfast. After a while the conversation ceased and at the end of fifteen or twenty minutes I began to wonder whether I had been forgotten. Apparently I had, because a few minutes later Mr. Edison walked into the parlor, with his hands in the old-fashioned pockets which men wore in those times, a cigar in his mouth, and said: "Where the dickens did you come from?"

I presented my letter which he read and then rather crisply said, "Go down to '65' and see Charlie Clark and tell him I sent you." I was nothing but a youngster and did not have the nerve to ask him for more details. I made some inquiries, however, and the next day went down to what was always called "65." This was the headquarters of the Edison interests, a handsome brownstone house on Fifth Avenue, just below Fourteenth Street, and it was for many years the Mecca of all Edison men. Charlie Clark turned out to be chief engineer of all Edison's work and he sent me down to Goerck Street, which at that time was where the electric dynamos were built.

Clark had fitted up a laboratory which, for those days, was quite elaborate. We must have in mind that, at that time, funds were rather low and elaborateness did not really mean very much. There were, however, a dozen of us, mostly college graduates, all working for glory and not for pay. In fact, the only one actually paid was Mr. Andrews, who was the head of the laboratory.

In the same way that our apparatus was crude, the work in which we were engaged was of the same character. We met with new problems almost every day. Some were solved by the construction of new apparatus and others by new methods of using the old apparatus.

It was during my six months at the Goerck Street laboratory that I came into closest contact with Mr. Edison. I could spend the whole evening telling about the various incidents which occurred which brought one or more of us in direct contact with him. I have in mind two specific events, however, which may give us some insight into this relationship.

All the dynamos were tested by our crowd and were regulated for voltage by a resistance box in series with the field, and more or less resistance was cut in by a commutator device turned by a handle. We got the idea that it was possible to have something automatic, and I personally happened to be the one to whom this work was turned over. We designed an automatic regulator, in which the movement of a small arm was actuated by the strength of magnets. The arm was fitted with a brush, which contacted with the segments of the commutator, and the weakening or strengthening of the magnets pulled in more or less resistance.

It worked very well in the laboratory and we thought we would try it on a new installation in the New York Athletic Club, which had just been built. When the current was turned on in the afternoon, the regulator worked perfectly. When, however, a large block of light was added at one time, the regulator started to race and the lights went from one half candle power to double candle power every ten or fifteen seconds. To say that I was frightened

puts it rather mildly. I grabbed the rocker arm with my hand and managed to steady it so that we could get through the evening with comparatively little trouble. The next morning I went down to see Mr. Edison and told him the trouble. His reply was: "Oh, that's easy. I will send you over something in a day or two which you can put on to remedy the trouble."

The device consisted of a small cylinder with a movable piston, which had a small hole in it. The cylinder was filled with glycerine and sealed. The piston was directly connected to the rocker arm and the glycerine was forced through the small hole as the piston moved up and down. The hole was fitted with a plug, which enabled one to change its size at will, and the speed of the rocker arm was thus cut down and absolutely controllable. It seems rather foolish to explain to this audience a device which is now so well known and so simple, but you must remember that this was forty-eight years ago when most of these problems had not arisen and therefore had not been solved.

After the device arrived at the laboratory, I remember that we all put our heads together and wondered why some of us had not thought of the solution, but it remained for Edison to instantly see the problem and its solution.

As many of you may remember, the Edison system made use of the electrolytic meter for a number of years and until the mechanical meter was developed. This meter read amperes rather than watts and was a very ingenious and in fact a very simple chemical process. A number of bugs developed and I found myself more or less of a specialist on this work. While we were carrying on some of the original experiments, Mr. Edison got out what would now be called a questionnaire. He propounded about one hundred questions and passed them out one at a time to the various men in charge of the meter systems of the companies throughout the country. The replies came to me, and it was my job to classify them and to talk them over with Mr. Edison and see if we could get any ideas which would help us. I was no exception to the rule and he gave me the same questions. I have a very distinct recollection of two of his comments. I do not remember the questions, but I remember one of his comments was: "Edgar, this is no good. You ought to know better. Edison." The other was more satisfactory. He said, "Edgar, this is good. Edison"; and then, in his characteristic handwriting he wrote underneath it—"This answer is so good that I wish you would expand it a little, as I want to pass it along to the other boys." These two experiences may give you a little idea of the relationship which existed between him and those in his personal employ.

In 1884 we made a very elaborate exhibit at the Electrical Exhibition in West Philadelphia. I was there for three or four months constructing, operating and demolishing the work. Mr. Edison was a constant visitor. He seemed to take much interest in the exhibits, not only in his own but in those of other exhibitors. During its continuation it was visited by many foreign engineers, and on these occasions they were invariably accompanied by Mr. Edison.

I remember a discussion which took place one afternoon between Sir William Preece and Mr. Edison on some detail of the system which Mr. Edison was showing. They differed in their views, and it was always a source of great satisfaction to me to remember that time proved that Mr. Edison was right.

In 1885 there was a sufficient number of Edison stations established throughout the country to warrant the formation of an organization, bringing these people together. It was called the Association of Edison Illuminating Companies, and I do not believe there was a single meeting that Mr. Edison missed for at least twenty years. He, of course, was not able to take very much part in the discussion, as he was too deaf to hear well what was going on. He got a sufficient idea, however, to call us together informally between meetings and discuss privately most of the subjects which had just been presented publicly.

In some respects the most interesting part of these conventions were the trips to the convention cities. If they were any distance from New York, we usually had a private train and Mr. Edison was the life of the party. The crowd would group around him in his drawing room and he would tell stories by the hour, some of us even sitting on the floor in order to get close enough to hear what he was saying.

As I tell you this story, it does not seem as if I came in very close contact with him, but as a matter of fact, the opposite was true. His deafness prevented one from getting really intimate. In carrying on a conversation with him, it was rather embarrassing to shout so loud that every one in the room could hear you, and many is the time that I wished that we were by ourselves so that I could express myself more definitely than I could in what was really a public place.

On one of the hottest days in June, 1930, I had to go out to the laboratory and present Mr. Edison with a Memorial which had been passed by The Society for Electrical Development. After making the presentation and chatting for three or four minutes, Mr. Meadowcroft, Mr. Edison's secretary, suggested, as he usually did, that we go outside and have our photographs taken. This picture was published in the Boston papers on the day of Mr. Edison's death, headed, "The last photograph taken of Mr. Edison."

He had on what we would call a pongee suit, al-

though I think he spoke of it as China silk, which it probably was. He reached down, took my hand, and asked me to feel of it and said: "Did you ever see anything quite so thin?" He pulled his trousers nearly up to his knee and said: "And I haven't got anything on under it."

The late Elmer A. Sperry, who was president of the American Society of Mechanical Engineers two years ago and who took part in the fiftieth anniversary celebration to which I later refer, in recounting some anecdotes of Mr. Edison, told the following story, which illustrates the side of his character which those who knew him well were accustomed to see:

"Mr. Edgar has given us all a beautiful picture of Edison, the youth in overalls, swinging his legs from a work bench at Menlo Park. I want to draw a little picture of Mr. Edison at eighty-two.

"When he came in he spied me with a cane. He said: 'Sperry, what are you doing with that cane?' I tried to explain that it was only a habit of mine that I had recently acquired. He said: 'I have no use for a cane, now see me kick!' He jumped up out of his chair and kicked higher than his shoulder instantly.

"Of course we were all wonderfully amused and laughed. I believe I applauded. He said: 'Well, if you laugh at that, I will give you something to laugh at. I was away on one of these here vacations.' He did not speak in very respectful terms of a vacation, although I can not understand how he could resist his friend, Mr. Ford. I think he was the one who teased him into having his first vacation. He said: 'While on one of these here vacations, I kicked like that and Mr. Burbank tried to imitate me and he fell down on his back and hurt the back of his head. Ha! Ha! Ha!'

"He laughed as though he were a boy of ten. We could all see that the picture of Burbank picking himself up out of the leaves and rubbing the back of his head must have been very vivid in his mind, as he recalled it, because he laughed until the tears ran down his face and we shared in his merriment."

Mr. Edison always kept up the acquaintanceship with those whom he called his boys, and as a result of this close relationship, some of his early associates organized, in the year 1918, what they called the Edison Pioneers. Those who have been associated with Edison up to and including the year 1885 were eligible to membership. There were, perhaps, 125 to 150 who joined the association and there are remaining in this class to-day 106 members. We later broadened the organization to take in associate members, those who were connected with Mr. Edison between 1886 and 1900. This class was limited to 150. There are still living 97. We also authorized a descendant membership, consisting of the sons and daughters of either the members or the associate members. There are thirty of these.

It has been our practice to have a dinner on Edison's birthday, February 11, and we have usually had from 150 to 250 present, consisting of the members and their families. One of these dinners was in Mr. Edison's own house, one or two in one of the upper floors of his laboratory, and the remainder in either a New York or a Newark hotel. Until within the last three years Mr. Edison and his entire family have attended these reunions, and he has rubbed shoulders with those who were with him in those early days. For the last two or three years he found it necessary to go to Florida on account of his health before the cold weather set in, and the meetings had to get along without him.

It is on occasions like this that the old acquaintanceships have been renewed, not only between Edison and the boys, but between the boys themselves. For example, at a meeting of the Pioneers held in Orange the day before Edison's funeral, at which 150 were present, I met one man whom I had known intimately but had not seen for forty years. At these meetings Mr. Edison seemed to renew his youth and became really one of the boys himself. It was under these circumstances that we all came to call him "The Old Man."

There is one thing that you people will have to bear in mind in thinking of the relationship between Mr. Edison and his associates and that is his extreme deafness. For the last two or three years he had been what I should call absolutely deaf. He never learned lip reading, neither was he willing, until very recently, to try any of those mechanisms for the deaf. The result was that his conversation with his friends, with the possible exception of his own family, were quite largely carried on by writing on slips of paper.

When I went out to see him last year with The Society for Electrical Development Memorial, I had to write on a piece of paper, just how I happened to be there, and had to answer in the same way any questions which he asked me about the society. This made it not only difficult, but really embarrassing to try to carry on any conversation with him. Curiously enough, he seemed to understand his wife perfectly, but this was not in any sense lip reading, as she had to put her mouth up close to his ear when communicating with him.

This infirmity sometimes had its ludicrous side. I remember about twenty or more years ago, when a dinner was given to Lord Kelvin, Sir William Thompson, at the Waldorf in New York, Mr. and Mrs. Edison were present, and in the speech-making which took place some very complimentary remarks were made by the chairman regarding Mr. Edison. Everybody, including Mr. Edison, applauded vociferously.

His wife leaned over, pulled down his head, and whispered something to him. He immediately blushed, sank down in his chair and almost disappeared under the table. While he was very much embarrassed, he saw the joke, as did everybody else.

Mr. Edison was given the honorary degree of Ph.D. by Rutgers College quite early in life. Some ten years ago the question came up of giving him the degree of doctor of science. I happened to be on the honorary degree committee, and it developed that two or three years prior to that time he had been approached by one of our leading trustees and had turned down the suggestion with the general expression—"What's the use?" We agreed to make another attempt with considerable hesitation, but after talking the matter over with Mrs. Edison and his secretary, I put my attempts in a somewhat different way from that in which he had been approached before.

I practically said to him: "Of course you don't care anything about this degree. It doesn't mean much to you, you have so many, but I want you to look at the other side of the picture. Rutgers is located within ten miles of where you did your most noted work. You have become a Jerseyman by residence, and Rutgers is distinctly a Jersey institution. More than a dozen Rutgers men have gone into the employ of you or your associate companies upon their graduation. I happen to be one of them. I think you owe it to us and to the college to let us show our appreciation of you." This finally won him over, but even then my job was only half done. He has always had a great habit of forgetting appointments, or rather of becoming so absorbed in his work that he has neglected his appointments. I reported back to the college that he accepted, but that I would not guarantee his presence at the commencement exercises.

When he found that he had to drive over to New Brunswick he demurred again, but finally things were smoothed out and he started for the college. The academic procession was to start at eleven o'clock. At ten minutes of eleven he apparently had not arrived. I was beginning to get very much disturbed and wandered around the campus, thinking that he might have been sidetracked by some acquaintance and had forgotten where he was to meet the other delegates. I finally drifted into the robing room and there I found him, sitting in an armchair way back in the back of the building. I rushed up to him and his only comment was, "I didn't like the looks of that crowd out there, so I sneaked in the back door."

At the collation which succeeded the ceremony, Mr. Edison sat, as he always did on occasions of this kind, looking a trifle bored. He did not hear what was going on and acted as if he wished the thing were over. Finally the glee club grouped themselves around him and commenced to sing some of the college songs. You never saw such a change in a man. He kept time to the music with his feet and with his knuckles on the table and showed very clearly that he was finally thoroughly enjoying himself. As he drove away from the campus that afternoon, Mrs. Edison turned to me and said: "I am so glad we made him come. I think he has had a wonderfully good time."

The incidents which I have recited may give you a slight idea of the kind of a man he was to those who were associated with him personally.

At the annual convention of the National Electric Light Association, held in Atlantic City in the summer of 1929, a day was set aside as "Edison Day." It was, as you know, just prior to the fiftieth anniversary of the invention of the incandescent lamp. It was my good fortune to preside and I opened the meeting with an address which I called: "The Inspiration of a Name." I am not going to read it to you entirely, but there are a number of things in it which, although written before his death, are appropriate to be repeated now. These, I hope, will give you my conception of the other side of the picture. Speaking of the anniversary of the incandescent lamp, I said:

"There will be those who will stress the inestimable value of this invention and his meritorious work leading up to and succeeding its accomplishment, while others, like myself, will be more inclined to consider the character of the man himself, and discuss the individual rather than his achievements."

The pages of history are illuminated with the names of those who have attained renown through some distinguished service for the welfare of mankind. I shall classify these illustrious personages into two separate and distinct groups.

In the first group the much larger number devoted their individual efforts to a cause which was dear to the hearts of their fellow men.

Washington, the beloved Father of His Country, is a shining example of this type. He was called into service during a great national crisis which existed even before he responded to the summons. It may be said to his everlasting credit and honor that he carried out his task to a most successful conclusion. He found a struggling colony oppressed by the heel of a tyrant; he left a peaceful republic happy in its hard-earned freedom.

Lincoln, the Great Emancipator, is another outstanding example of this type of famous men. He was called to preserve a nation. He not only threw off the shackles of the oppressed, but he perpetuated a union which was threatened with disruption and disaster.

Throughout all times and in all nations of the world there have been numerous other examples of

this devoted type. Many of these, as in the cases of Washington and Lincoln, dedicated themselves to the preservation and upbuilding of their country, while others were inspired to action not by love of country, but through their consecration to religion. Contrast with these others who have used their talents in an attempt to break down and destroy civilization. These are the Caesars and the Napoleons—warriors who have risen to fame as the conquerors of hostile nations, rulers who have reared vast empires to satisfy their ambition and lust for power. The former type, working for the upbuilding of some lofty principles, and the latter, disrupting the order of the world to satisfy their selfish desires, have all obtained the plaudits of the multitude. In almost every case they had been working for a cause, whether it had for its object creation, preservation or destruction.

It is most difficult to analyze the thrill and emotion with which we look back upon the achievements of these striking personalities to determine how much of it is due to their individual efforts and what part is the result of an interest in the cause which they represented. The two are so clearly associated that, unconsciously perhaps, we have lost sight of the cause and have placed the individual upon the pedestal, due to our fascination for the man himself.

The other group to which I refer includes those who have risen to fame through accomplishments which were the result of a thought or an idea originating in each inner consciousness. They were not called to preserve existing conditions, to introduce reforms, or to advance the interests of the church or state. They were pure individualists who assumed their tasks, not in response to a popular demand for a leader to accomplish some desired result, but inspired only by their own visions. They had a conviction that there was some specific object which they could accomplish, and they carried their work to a successful conclusion without outside advice or assistance.

The poets, the philosophers, the painters, the musicians and the scientists are all men of this type. They have delved into the mines of nature's mysteries and have brought to light gems of truth and beauty which have added to the wisdom and culture of the ages, and it remained for Edison to discover the source from which, at his magic touch, was created a new sun for a new world, dispelling darkness and bringing added comfort into the homes and revolutionizing the life and methods of a grateful world. For him nature revealed her hidden secrets, and through him a new industry sprang into being. After centuries of unconscious waiting, the world awoke to realize that the dark watches of the night had wasted away and a new day of light and gladness had dawned for mankind.

I shall not attempt to recount the practical results which have followed this invention. I am leaving that as a theme for others. The thought which is uppermost in my mind has to do with Edison, the individual and the friend, rather than with Edison, the inventor and the discoverer. There are many members of the Edison Pioneers still carrying on and I feel that their thoughts are running parallel with mine, and that they will agree with me when I state that we are inspired not so much by what he has done as by what he really was. Those of us who have been closely associated with him and knew him intimately have received an inspiration which, though difficult to describe, is nevertheless profound and enduring. While we have been amazed at the volume of his achievements, and spellbound by his energy and perseverance, we have been especially touched by the warmth of his affection. Though he may be acclaimed a leading scientist and inventor, though he may be pointed out as the highest type of American citizen, those of us who knew him best will ever proclaim him, above all, a staunch and faithful friend.

Always modest and of a retiring nature, he has not desired fame or honors, although his fellowmen have praised him for his integrity of character, have honored him for his achievements and loved him for his self-sacrificing regard for others. Throughout his whole life no labor was too great to be undertaken for the accomplishment of a purpose when once his mind was determined to pursue it. Truly his life was a life of service, and we of the utility industry, whose basic principle is service, find in his life and work an example which it is an honor to follow. When confronted with a problem, the solution of which taxes our utmost powers, we may be encouraged to persevere when we remember how Edison conquered the apparently unattainable by dint of hard work, untiring zeal and unlimited perseverance. While we credit Edison with a remarkable degree of genius, we have his own modest testimony that much that he had accomplished has been due to hard work and perseverance; though we lack the natural powers which he possessed, we may be inspired by his example to accomplish much in the world if we apply ourselves to the tasks which are ours with his determination and his willingness to labor. To follow is the lot of the multitude; to lead is the privilege and responsibility of the master mind who dares to stand alone, if necessary, while adhering to the principles which he believes to be sound and logical.

Edison has blazed the trail through unknown wilds, while others looked on with unbelief. His was the task to lead the way and true to his high calling, he emerged with the fruits of victory amid the plaudits of those who had been unbelievers.

In looking back to review the wonderful results

which he has accomplished during his fourscore years, we are again astounded that this man of mature years, but young in mental capacity and in resourcefulness, has within very recent years taken up a new line of endeavor and, we have every reason to believe, has brought to a successful conclusion an important development in one of the leading commercial industries of our times. Apparently there has been no limit to his possibilities. When those of us who knew him intimately and were inspired by his personality shall have faded from memory, the name of Edison will still live and grow with the years, an inspiration of the sons and daughters of every tongue and every nation who see the light and render thanks to him who invented it.

There are undoubtedly many of you who are listening to me to-day who either do not appreciate or who underestimate what this means. All I can say is that I am sorry for what you have missed. While all of us engaged in the public utility business are proud of our industry and really feel and believe that it is one of the most important as well as interesting businesses in the world, I want you to realize that there are some of us, perhaps few in number, who have a deeper feeling than that felt by the greater majority. It is a feeling of pride, experienced not so much on account of what Mr. Edison himself has done as for what he has inspired us to do. I do not think that any one could have been associated with him for a generation and not be influenced, perhaps unconsciously, by the spirit which has actuated him. It is hard to put into words just how we feel. Personally, I feel like bowing my head and being thankful that my good fortune enabled me to live my life in the atmosphere he has created and under the inspiration of his name.

EDISON'S CONTRIBUTIONS TO SCIENCE AND INDUSTRY

By Dr. F. B. JEWETT

VICE-PRESIDENT OF THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY

To undertake, within a few weeks of his death, anything like a judicial appraisement of Thomas Alva Edison in the matter of his contributions to science and industry is to attempt the essentially impossible. Even had he been a man of lesser stature, insufficient time would have elapsed in which to develop a fair perspective of his achievements. In Edison's case a longer period than usual must ensue before we can see clearly just how his work has fitted in with that of his contemporaries and into the foundations on which subsequent structures of science and engineering and industry grounded in engineering have been built.

Despite the limitations which the undoubted greatness of Edison imposes on us at the moment, it is nevertheless fitting that a tribute to him and his work should be made at this the first meeting, following his death, of the American Association for the Advancement of Science. Clearly any tribute to the man or any appraisement of his work, if it is to be of real worth, should be by those having the right of classification among Edison's peers in his own field. In this respect I feel myself incompetent, and my sole justification for appearing before you is that I may have a right to voice an opinion of those who, while not of Edison's stature, were nevertheless his contemporaries and workers in the fields which he enriched by his contributions.

Because Edison's name has been a household word throughout the world for nearly half a century—a name to conjure with and to many that of a somewhat mythical personage against whose inquiry no doors of science were locked—one runs the distinct risk of overvaluing Edison's real achievements. On the other hand, one runs equally the risk of underrating these same achievements in endeavoring to avoid the obstacles of the first dilemma. If therefore any of you should feel at the conclusion of these remarks that I have erred in my appraisal, I trust you will appreciate the situation in which I am placed in attempting to do now, in respect to a man for whose attainments I have the highest regard, something which would best be done ten or fifteen years hence.

While the titles for Dr. Millikan's appraisement of Edison and mine are the same, we have agreed to approach the matter from different angles—he from the point of view of fundamental science, on which all engineering is founded, and I from the point of view of those practical applications of science which are peculiarly the province of the engineer.

Whatever additions to fame and recognition may have come to Edison in his more mature years, a survey of his achievements as an inventor, engineer and pioneer in industries grounded in engineering makes it clear that he did relatively little during the last forty years of his life to add luster to the fame of his earlier achievements. As a matter of fact practically all Edison's claim to the title of the greatest