14-007

B.B.

Hammond opened his history of the General Electric with a quotation from Charles A. Coffin - ~~a prophesy he made in 1872 when as I understand it he was only twenty-eight years of~~ age and ~~was absorbed in the shoe business.~~ (M.S. Page 01 - Prologue)

"Take electricity out of New York and one of the items that comes out with it is a very large percentage of her population. This population is dependent upon traction ----- electric traction. Also upon the telephone. Likewise the electric light.

"The skyscraper would be impossible without electricity. Not only is it dependent upon the electric light and the electric elevator, but the very processes of steel manufacture which make modern construction possible depend at many different stages upon electrical machinery . . .

"Wherever you see a change in the lives of the people of today, it is safe to say that electricity has had much to do with it .... Of one thing only am I certain. That is that we are just in the beginning of the electrical age."

The man who thus spoke had started upon his life-career and traveled a considerable distance without the slightest knowledge or conception of the significance of electricity. Not only that, but he did not dream that he would ever be interested in it beyond the more or less passive interest of every modern individual whose life is indubitably influeneed, whether he is conscious of it or not, by electricity.

Least of all did this man suppose that he would ever be in a

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position to discuss authoritatively the achievements and the future of electricity. He possessed a faculty for foresight surpassed by no American executive of his day, yet, as a young man of twenty-eight, this subtle instinct imparted to him no vision of his future dominance and masterly leadership in the marketing of electricity.

His daily pursuits were as far removed from electrical development as can be imagined. He was neither a scientist, an engineer, nor an inventor. He was simply a manufacturer of shoes in Lynn, Massachusetts. He was senior member of the firm of Charles A. Coffin & Company. Oviously, he was Charles A. Coffin himself."

~~Eleven years later~~ In 1883 an electric light plant was wanted in Lynn, Mass. The reasonsfor this are told in Hammond's manuscript, Page 204.

" Electric lighting, so far as the shoe city was concerned, had been "heard of," but that was about all. Nevertheless the rumor was sufficiently enticing to interest the Lynn Grand Army post, which was just then considering the illumination of its new building.

"The electric light was suggested for the purpose; but the Grand Army men felt that a careful investigation should first be made, to ascertain if electricity, more especially the electric light, was really as excellent as represented.

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Silas A. Barton, a member of the post, was designated to make such an investigation. There is no indication that Barton was particularly pre-disposed in favor of electric lighting. He knew as little about it as anybody else. But Barton was progressive and energetic. The novelty of this idea appealed to him; he welcomed the opportunity to learn more about it.

His first endeavor was to discover somewhere an electric light installation which he could inspect. There was none whatever in Lynn. He heard there were a few plants in Boston, particularly one which was being exhibited by the American Electric Illuminating Company, an enterprise entirely separate from the American Electric Company of New Britain. The business was to install equipment; and at that period it was exploiting the product of the New Britain plant.

Having learned of this exhibition of arc lights, Barton went up to Boston, about ten miles away, to see it. He persuaded his friend Henry A. Pevear, the prominent leather manufacturer, to accompany him. They proceeded to the headquarters of the American Electric and Illuminating Company, in a store on Tremont street, where they saw six arc lamps shining with stimulating radiance.

But the Lynn men wanted to see more than just the lamps. They wanted to look at the dunamo as well; and they wanted to find out all about the manufacturers of the system. Their questions in this direction met with evasive replies, probably because the Boston company was more interested in selling its stock than in facilitating the immediate installation of equipment.

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Finally, it appears, the visitors made their way to the basement, more or less furtively, and there they found the dynamo, which was of the six-light type. The name-plate, which the company exhibiting the lights had forgotten to remove, read: "Manufactured by American Electric Company, New Britain, Conn."

A day or two later, two gentlemen of prosperous bearing got off a train at New Britain and engaged a station hackman to take them out to the plant of the American Electric Company. Upon arriving there, they were greeted by an alert and keen-eyed young man who said he was "Mr. Rice." The "electrician" of the company, Professor Thomson, the visitors were informed, was out of town.

What Professor Thomson was actually doing, in that particular interval, is indicative of his apprehensions over his prospects. He was visiting in turn the large business centers, notably New York and Boston, in an effort to interest capital in the electrical manufacturing business. He hoped to find somebody having both money and vision - - - not to mention courage - - - who would undertake to resuscitate the feeble little enterprise in New Britain, which, after all, needed only an adequate infusion of financial blood. And while he thus sought far afield for a rescuer, the rescuer had suddenly came to see him.

As Barton and Povear went through the little New Britain factory, they were impressed with the practical success of the arc light. They were impressed, also, by young Mr. Rice's personality, enthusiasm and technical knowledge. It is evident that their Yankee business minds sensed here a beckoning opportunity.

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All that was accomplished by this first visit, however, was to make a tentative arrangement for securing a dynamo and some arc lamps. Then the Lynn men went home, called together some of their business friends, and organized, on April 26, 1882, an arc-light central station company, calling it the Lynn Electric Lighting Company."

Into this syndicate came Mr. Coffin, whose prophesy about electricity, made ten years before we have quoted above. As a matter of fact it was a feeling among his associates in the syndicate that he would be the king-pin in it. This is what Hammond said of Coffin (Page 211)

"Among all these men, none was more interested in the new enterprise, aside from Mr. Barton, than Charles A. Coffin. Professor Thomson met Mr. Coffin for the first time in Lynn, in 1882, when, in the course of a long talk, he outlined to the latter all his views, beliefs and predictions as to the future of electricity. Professor Thomson was impressed, during this conversation, by Mr. Coffin's keen appreciation and intelligent appraisal of the possibilities of electric lighting.

"Meanwhile, someone asked Stockly, just about this time, why he had sold his interest in The American Electric Company so soon after he had eagerly sought to acquire it.

"Oh, I've simply sold out to a lot of shoemakers," he answered, indifferently. "They've purchased control of the company, but that won't amount to anything. They don't know a thing about the electrical business."

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But there was one of the shoemakers who if he did not know electricity knew how to learn things. (Page 212)

// He came quietly and unassumingly upon the stage of a great economic drama, and the outcome was different from what it might have been had he not so come. Nevertheless there was nothing of the theatrical about him. Few, if any then discerned in him the principal character in what was next to occur, chosen, by co-incidence and circumstance, to determine policies, sway decisions, direct events. Today, a full generation later, none can be found to question these things.

// But the shuttle of destiny must be allowed to weave its own pattern in those pulsing years --- years as momentous in relation to the new art of electrical design - the young industry of electrical development - as that development is momentous in the annals of the human race.

// Professor Thomson, it appears, was not alone in thinking that, of the men comprising the Lynn syndicate, the quickest at discovering the merits of the electrical business was Charles A. Coffin. Young Mr. Rice, upon first meeting Mr. Coffin in New Britain, had been similarly impressed.

"I had just returned from a trip of inspection," said Mr. Rice, recalling the occasion. "He was on a visit to New Britain, to see the plant of the company which he and his friends had just purchased. I was about twenty and he about thirty-eight. He was already a successful, experienced business, man, I a raw young boy.

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"His kindly, but searching, questions; his intense interest in my story; his sympathy, enthusiasm and understanding were all of a quality I had never met with before.

"This feeling of respect and admiration grew stronger as we knew him better.... I am sure that we both had a confidence in the future of the electrical business which would have been pathetic if it had not been finally justified."

That last was the quality that summed it all up. Mr. Coffin, once he had studied the electrical question, became possessed of a tremendous faith therein. He had, almost overnight, a vision ---- and it never afterwards deserted him.

None of those other Lynn capitalists had that vision as he had it. None of them combined with it such human understanding of other people, such sheer ability as a financier, such resourceful executive talents, such dynamic energy.

As the Lynn period advanced, Coffin's vision seemed always leading still further onward. He was constantly looking ahead, suggesting new plans to the others, pointing out new undertakings, formulating new policies to meet new problems. Yet he never forgot the men who were working in the laboratory and the factory. And he never stopped his own work at sundown.

"Busy as he was with his difficult problems of management and finance," says Mr. Rice, "he found time to interest himself in our problems..... He was not content to merely listen to our tales. He did more. He eagerly sought information ---- asked questions daily, almost hourly. His interest was no mere formal gesture. It

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was a live, active, compelling human interest.

"Many were the times when, tired and discouraged by our own slow progress or lack of success, we would return, after an evening at his home, feeling that, after all, our worries and problems were small compared to his; and the thought gave us new courage to grapple with our own tasks."

Evidently Mr. Coffin worked without regard to time. Edison-like, he busied himself indefatigably with the thronging tasks of his position. He would be found at his desk, night after night, until an hour so late that the whole town was in bed.

Many and many a time he put in a seven-day week. And almost every holiday he spent part or all of the day at his office.

Such an influence as that in any field of human effort could have but one result. In this instance the effect was immediate. The young Thomson-Houston Electric Company began to secure business in increasing bulk, to expand, to flourish --- to attain and maintain prestige.

Its aspect at the end of 1883 was marvelously changed from its aspect of a year previously. The sluggish pulse of the New Britain period was bounding with new life. The plant was teeming with activity. Dynamos and arc lamps were daily rolling away to the freight yards. The shop hands had increased from seventy-five to 150. The net profits had grown from $17,000 to $90,000.

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Page 217)

The Company, at the same time, was selling equipment, as previously, to private individuals and private concerns, for their own private use. But it was not until that year, under the policy suggested to the directors by Charles A. Coffin, that the company paid particular attention to exploiting the commercial central generating plant.

Thereafter Mr. Coffin adhered to this as the one most desirable field for the company's electric lighting activities. It was the outcome of his vision---a vision singularly parallel to that of Edison with his incandescent lamp. It was the vision of electric lights made available to large numbers of the people, large areas of the country, densely-settled urban centers.

In such a field, and in none other, Mr. Coffin foresaw, lay the future destiny of his company, the grand opportunity of electrical science combined with electrical manufacture to be of supreme usefulness to the people.

One of the big moments in Thomson-Houston history and of far spreading influence in the progress of America's electrical expansion occurred when Coffin adopted that idea as above stated.

The two most striking things about it were the idea itself and the man who conceived it. Electrical science, at that moment, abounded in great minds, in pioneer workers ---- men who were technical leaders. Bush, Thomson, Wood and Edison had each displayed the brilliance of his genius. Scientific research, laboratory work

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and invention were in magnificent flower and nothing in America's economic history has ever surpassed the things that these men did. But none of them were leaders of commerce ---- and leaders of commerce were just then the crying need. But these technical leaders were not trained nor were they fitted to raise capital, to finance the marketing of their inventions, and finance it on the tremendous scale which was essential in a country of tremendous size.

It is true, of courwe, that they had vision as well as inventive talent. And this idea of central station systems was not new to them. Brush had it before anyone else. Edison had it and held fast to it through storm and stress. Tet each of these men was glad to relinquish the actual commercial development of the idea to other men, so that they themselves could revert to the congenial work they most enjoyed.

None of these "other men" treated the idea as Coffin did. None of them visualized on a national scale its ultimate possibilities, as did he. None of them looked whole decades into the future, as did he. None of them looked searchingly into the electrical industry itself, analyzing its vital needs, as did he. And none of them adopted and carried out such bold, aggressive and courageous measures., sometimes so daring that they took men's breath away --- as did he.

Undeniably Coffin's influence was the principal factor in shaping the internal development yet to come, which the Thomson-Houston company had inaugurated from the beginning. Unsuspected by

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anyone, a line of succession was being set up. Ultimately this "line of succession" was to consist of two branches; but the second branch did not appear until some years later.

Because of what it led to, and because it was such an unbroken chain of development, we have called it the General Electric succession. The term might have been applied away back at the time the Brush Electric Company came into being; it might have been applied, likewise, when the Edison Electric Light Company was conceived. Both of these came into, or were brought into, the succession in due time, each accompanied by its own valuable contribution. And many other companies came into it as well.

The Thomson-Houston Company was the first in which the succession begins to be actually discernible, as one looks back across the lapse of time. It was the first in which certain policies, methods and achievements, that were later to be perpetuated in the succession itself, took form.

But the Thomson-Houston Company meant---Charles A. Coffin. For the mild-spoken, amiable, unostentatious former "shoemaker," one of the group that had inspired the skeptical flippancy of Stockly, had become a master mind in guiding really America's progress in this "age of electricity."

There were yet some fascinating bits of electrical drama to be enacted. Brush lights and Edison lights and the arc lamps of Jenney, Wood and other men, drawn unwittingly into the "succession," were helping to pave the way for the great evolution even then setting in, with the rising of the tide.

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IV. J.

Under Coffin's new syndicate went out after business - went out with imagination and ingenuity. Coffin's attitude is well shown by his effort to get another shoemaker of Lynn into his company, J. R. McKee.

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McKee was frankly astonished at the proposal. It was the last thing he had expected to receive in the way of a business offer.

"Why, I don't even know what electricity is!" he said to Coffin.

"That's just our trouble," replied Coffin, with a smile and a twinkle of the eye, "We have already too many men who know what electricity is, or think they do. What we now want is somebody who will care for the commercial side. Perhaps the less you know about 'what electricity is' the better!"

What he seriously meant, as McKee quickly perceived --- for he accepted the opening --- was that the men who would be of the greatest use to Thomson-Houston in the commercial field would be men with pronounced merchandising instincts who yet were free from those elements of conservatism which the technical electricians might display."

McKee joined him and the electrical message began to spread. (Page 311-B)

"McKee would discover, here, there, and everywhere, cases where he thought electric lights or electric power could be applied. He would enthuse over the prospect, would bring in a definite proposition the success of which would be contingent upon the

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electrical technicians, who would have to work out the details of the installation. And Coffin, from what he already knew of his technical men, believed that when put to the test in this manner they would make good."

Exploited an electrical drill and an electrical coal cutting machine, backed an ambitious campaign for equipping mines and a type of electrical mine locomotive. In 1889 in the Erie colliery near Scranton, Pa. a forty horse power electrical locomotive operated on the tracks - the first was installed there. Then came an electrical coal cutter which ran upon a track of its own. Coffin began a system which was later carried to high degrees in the which was to spring from his efforts here in the '80s.

(Page 311-D)

"Young men just out of college, some of them from aristocratic Boston families, were hired to go into the mines and operate the coal-cutting machines, in an untiring endeavor to make them work. Some of these young men rose later to conspicuous poistions in mercantile and professional life. Not one of them knew the first principle of electricity when they went out to the mining fields under McKee's direction; so the latter felt pretty much at home in their company."

It looks as if this may have been the origin of the Test Boys.

In 1884 the Thomson-Houston International Company with a capital of a million dollars was formed.

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Thomson-Houston had sent men abroad from the first, and had found an opportunity for trade in foreign lands equally good as at home. Its South American business in particular became extensive. And within a few years it had put in an arc-light station at Hammerfest, Norway, which was long the most northern electrical installation in the world. Its products were going as far from home as Egypt, Hawaiian Islands, Brazil, Peru, Russia, Belgium, Norway and Spain.

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Page 334 Insert ? note.

Abram S. Hewitt, mayor of New York, who addressed the American Street Railway Association at its convention of 1888 in these words:

"Upon the borders of this land of dreams we stand. You are slowly raising the curtain of the future. I shall not see the drama played out; but there are men in this room who will live to behold society transformed by this new agency. For it is a curious and suggestive fact that all moral forces and all moral questions find their final solution in the facts and laws of physical nature.

"There is where you come at last. If this world is a better world today, a richer, happier world, a more enlightened world than it was a hundred years ago, it is due mostly to the steam engine and its applications. If it is to be, as I believe it is to be, a better world, year by year and century by century, it will be due to discoveries and applications of electrical force, or of some other force which possibly may be hereafter ascertained and developed; but today we must call it by the name which you and I know it by---the electrical force."

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"The forging of policies was trying to catch up with the brilliancy of invention. In various executive offices, at desk or council table, America's economic future was taking form. Quiet, yet momentous, discussions constantly recurred in the nerve centers of the young electrical enterprise; calm, clear-visioned decisions came forth under the insistent pressure of the moment, or in anticipation of developments. Hidden from view, not heralded as were the achievements of the inventors, those executive actions and new-born policies yet had a clearly defined influence through the slow-creeping years. They became the nucleus of new commercial practices, new industrial methods."

At this time, that is, of the removal to Lynn under Coffin the General Superintendent of the Thomson-Houston Electric Company was Edwin W. Rice, Jr. To him fell the task of handling all of the perplexing situations intimated in the paragraph quoted above. He was particularly interested in factory efficiency. How were you going to keep up with this constant expansion - handle the revolutionary and incessent changes and demands? It could not be done by the old hit-and-miss practice and Rice began an analytical study of the factories needs. What inspiration he may have gotten from Taylor I do not know but it is well to ask. At all events between 1884 and 1886 he divided his plant operations along functional lines and built up a staff something new of the supervisory officials. All of them familiar with present day industry. but an unknown breed, as Hammond puts it, in the early and middle

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ages. He introduced perduction managers, responsible for getting a manufactured product out in time. Page 347

"Production manager, responsible for getting the manufactured product out on time; a mechanical superintendent, in charge of mechanical work, new building construction, and factory discipline; a cost manager, with jurisdiction over cost accounting, bookkeeping, and pay-roll; a purchasing agent, directing the purchase of all raw materials, supplies, and equipment; and a technical superintendent, supervising engineering, research and drafting. All had full power over their respective departments; all reported directly to the factory manager.

From this moment the Jack-of-all-trades vanished from among the factory foremen of the Thomson-Houston Company. That is to say, no longer were demands put upon the foremen which required an almost unlimited versatility to meet."

Page 349) "But there were also plenty of men in the Thomson-Houston organization who resolved to give the method a chance. The new managers exerted themselves to co-operate; and it was not long before the plant was running smoothly on the new basis and with much greater efficiency and speed of operation. This was one of the earliest ventures by American industry into the virgin realm of scientific management."

One of the things which in the '80's upset and forced new efforts on the electric lighting system was the introduction of the alternating current. Something that Edison

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fought but Thomson had used already in his work but not yet commercialized. This was being used by the Westinghouse Company. In 1887 Professor Thomson placed an alternating current dynamo upon the market.

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"Professor Thomson did not place an alternating-current dynamo upon the market until the spring of 1887. He went about his experimental work, preparatory to this move, altogether in his own way. Not only was he uninfluenced by anything done by others, but he followed a policy which, in one regard, was quite contrary to that of Westinghouse and Stanley. His technical familiarity with this kind of electricity was unquestionable. His realization of its significance was equally sound.

"Professor Thomson thoroughly understood, possibly better than anyone else," said E. W. Rice, Jr., in reviewing this period, "the technical advantages of the alternating-current system with transformers, and believed in the efficiency of transformers when others thought they were inefficient."

"Among the pioneer electrical engineers," said F. A. Barron, speaking before the Western Association of Electrical Inspectors, "there was one who, in the early days, was given a prophetic vision of the alternating-current phenomenon, so clear, indeed, was his foresight that history shall record him as the father of the commercial development of the alternating-current systems of today. I refer to Professor Elihu Thomson."

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Then followed what Hammond called the "war of the current." His reason for not having put it out before is explained:

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"Professor Thomson believed, contrary to the opinions of others, that the high-voltage systems, which obviously would grow up as the alternating current came into extensive use, required protective devices to safeguard the customers of electric lighting companies from possible accidents. That was his attitude all through 1885 and 1886. In that interval he himself devised such protective equipment and incorporated it into his first commercial transformers. Until he had done this he would not allow the Thomson-Houston Company to exploit the alternating current commercially.

"His felling on that point was inflexible. It readily won the endorsement of Charles A. Coffin and E. W. Rice, Jr. The professor told his colleagues plainly that he would not permit an alternating-current system to enter his own house without some protective arrangement, and therefore he would not think of offering it to the public, to be used in the houses of others.

"The attitude of Westinghouse and Stanley was one of honest disagreement, although not openly expressed, simply because no occasion arose for expressing it. They also recognized the latent danger in a highvoltage line, but they held that this danger was greatly exaggerated. So they want ahead, while Professor Thomson and the Thomson-Houston company held back and did not provoke a controversy but simply kept out of the alternating-current field

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and refrained from condemning or even criticising competitors.

"Not so the Edison Electric Light Company. Vehemently and continually the latter assailed the alternating current on the ground of its supposedly greater danger. Yet in that very year Vice-President Edward H. Johnson of that company---he was elected president before the year ended---had received from Frank J. Sprague, at his own request, a report upholding the alternating current and recommending its use because it would permit of economical transmission to great distances. "You cannot too soon take steps to prevent someone from getting in the field ahead of you," wrote Sprague in that report, which bore date of September 13, 1886.

"The suggestion was ignored. The Edison company, from that time forward, beginning with its very next annual report, kept up its attack against any competitor that ventured to advocate the alternating current. At first it turned its guns upon the Westinghouse Company, which, for a while, was the sole advocate of the controverted method. Later the Thomson-Houston company, fortified by Professor Thomson's inventive work, took up a similar position. Its transformer was safe in usage, and its sales agents had no trouble in convincing customers of this.

"Yet the hostility of the Edison Company toward the alternating current was all-inclusive. The Thomson-Houston company, notwithstanding its precautions to safeguard its system, made use of the alternaing current. That was enough to cause the direct-current adherents to criticise it, along with the Westinghouse company.

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"It would appear that this was all largely a matter of deep-seated technical prejudice. Edison himself stuck to the direct current. He was convinced that it was less "deadly" than the alternating current. His Company took pains to say so. It issued a printed pronouncement, its famous "Red Book," bound in scarlet covers, in which, under the somewhat startling title of "A Warning from the Edison Electric Light Company," it sought to show that the alternating current was a menace to life and limb. On every occasion that offered, the Edison company had something derogatory to say about "the deadly alternating current." And this attitude persisted despite the obvious electrical advantages of utilizing that kind of current.

"The clash of opinion was greatly intensified, just at that moment, by the decision of the New York state prison authorities to adopt electrocution for capital punishment--and to emply the alternating current for the purpose! That was a fine bit of ammunition for the direct-current artillerists! And they proceeded to make the most of it, reiterating with trumpetings and flourishes that this established, beyond all contravention, the deadliness of the alternating current. What could be more convincing, they demanded, than its official selection as the most efficacious means of executing men condemned to die?

"So there grew up, with sudden swiftness, this curious conflict, known as the Wwar of the currents." It lasted, off and on, for several years. The Westinghouse group would often strike back at the Edison camp, and these became the two principal antagonists.

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"But the Thomson-Houston contingent never deliberately participated in the skirmishing. Charles A. Coffin would not permit it. He insisted that his men simply keep quiet and "saw wood." And so they did.

"That the danger really was somewhat exaggerated is certain. In the Thomson-Houston system it was non-existent, from every practical consideration.

"As between the two kinds of currents, however, there never was quite the protective advantage in the direct current that its protagonists supposed. Professor Thomson expressed it when he remarked, long after the uproar had passed away, "the alternating current, at equal voltages, is less deadly than the direct current."

Very interesting today how indifferent parts of the country in Cleveland in in New Jersey and New York under in Pittsburg, under Westinghouse - in western Mass. under Sprague, electrical centers are growing - centers both of the most acting, inventive /development and also full hearted efficient commercial development.

It was in 1886 that the Edison of New Jersey made a move that was to have a future meaning for Thomson, Rice and Coffin. had been greatly disturbed because of a strike at his machine works in Brooklyn. The plant was shut down for some two weeks and Edison thought the men's /demands were unreasonable, determined to leave the town and seek the country and began looking for a possible location - ont on Long Island, out in New Jersey, in Pennsylvania and up state New York. It was up state New York that he finally heard from an old friend of deserted factory

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buildings in the outskirts of Schenectady on the "Big Flat," as it was called.

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Edison promptly went up to look this site over taking with him ... Samuel Insull, then his private secretary. He liked the place and took it with the help of certain interested citizens of the town.

Hammonds

In the fall of 1886 the Edison works were moved to the "big flat" under what was known as the "Big Shop," a building which you still see as you go about the General Electric.

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