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The GE Monogram



By 1900

What Men Build



UR cover this month is more than a beautiful picture, with the graceful Gothic lines of Trinity and its warm colors against the cool, cliff-like masses of stone beyond—it tells part of the story of mankind, of civilization and its descent into darkness before it rose again in this age of science.

All the mysticism of ancient faiths is in the pyramid from the top of which smoke curls up against the blue sky. The mind goes back to Egypt, to the beginnings of history when men groped their way toward knowledge, to their religion with its strange rites. Mystery is in it, the mystery of the east and the unknown, of things lost in the past. That was a great civilization, and men now dig for it in the sand.

Civilization again swung up in its cycle, past Greece and Rome, and then the institutions of men tumbled about them and were lost in the wilderness of the dark ages. Struggling, inarticulate, cut off from their heritage of the past, men finally found expression in Gothic art, and from a disordered world rose those graceful arches, buttresses and spires which Goethe called "frozen music." Then came the Renaissance, when men stepped surely forward again.

How rapidly the world changed after that! America was discovered, printing was invented, the horizon of men's minds was enlarged, the world jumped forward. Art and literature and then science flourished, and culminated in this last wonderful hundred years in which man has harnessed the lightning to do his will. Perhaps nothing is more typical of this age than the lofty structures of large cities. The buildings that men erect in any age typify their accomplishments, their beliefs, their habits of thought. This is an age of business and of science, and Macauley's traveler from New Zealand would know that from our skyscrapers if there were no written records left to enlighten him. They are utilitarian, and it sometimes happens that they are also beautiful.

Above the pyramid, above the slender spire of Trinity, rises the dominant bulk of the Equitable Building, a huge pile of steel and stone, in which the General Electric Company has its New York district offices, its executive and administrative branches. It is one of the greatest office buildings in the world, a monument to our time as much as the Great Pyramid was to Egypt. But how differently and how much more quickly it was built, by means of efficient machines, whirling motors, quick hammers and drills, the products of modern engineering and science. To lift a stone to the pyramid of Cheops required a thousand men; a motor with the power of giants swung a steel girder to the top of the Equitable in a swift, silent rush.

In and out of this vast structure every day flow 100,000 persons. They are lifted on sixty-three electric elevators, and it takes only a few moments to reach the top floor, forty-two stories and 545 feet above the street. There are 5000 electric motors in this great structure, many of them of General Electric manufacture, as well as miles of wire, thousands of lamps, and innumerable switches. Without electricity the great building would be dead, a silent, dim and functionless mass.

Electricity has been the servant of man only a few years. What the future holds men hardly dare guess while they dissect the atom and find electrical energy is its life force. We are a long way from the pyramid tomb of Cheops.

DECEMBER
1923

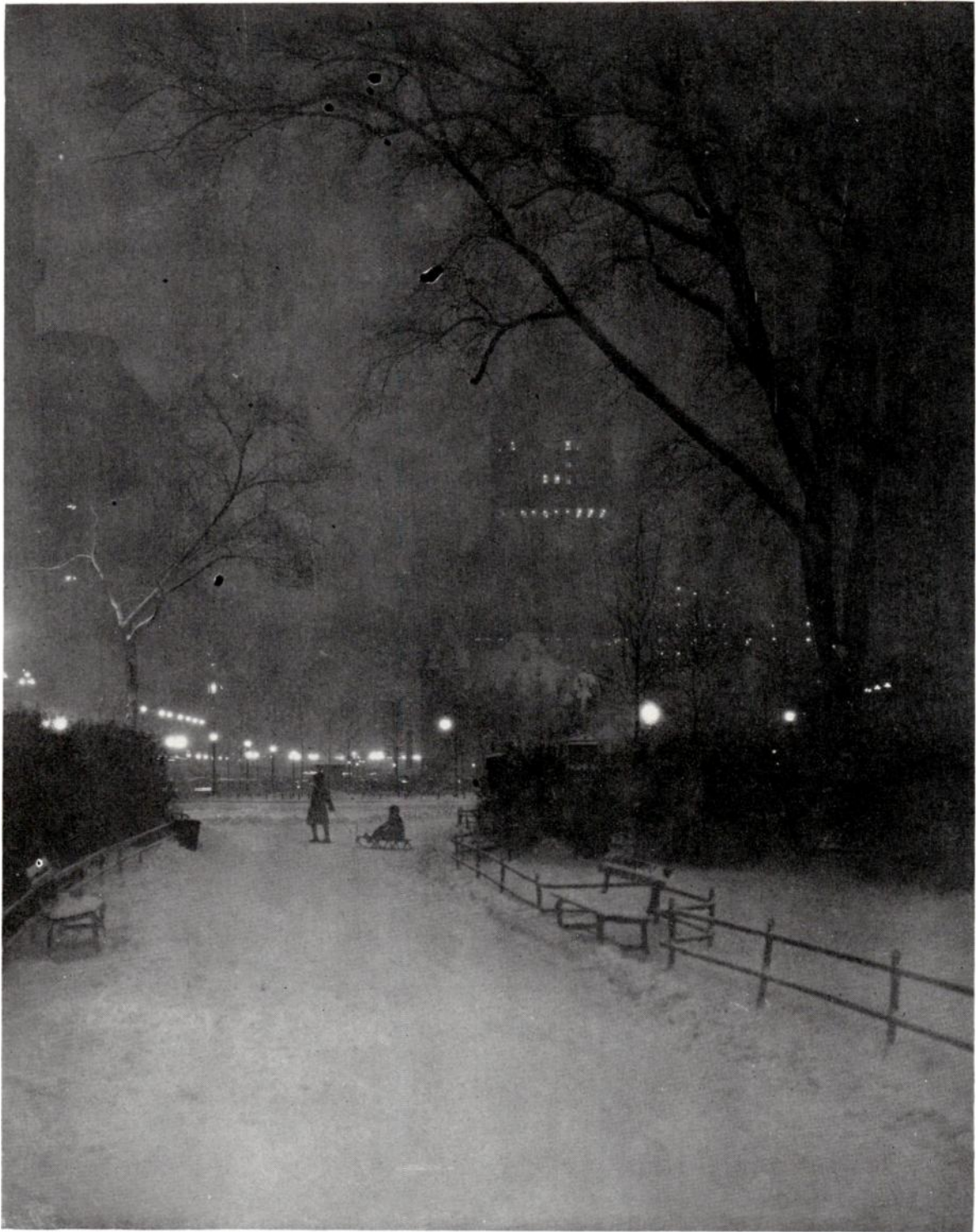
The Monogram

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A Magazine for the Sales Organization, Published Monthly
by General Electric at Schenectady, N. Y.



A WINTER EVENING IN CENTRAL PARK, NEW YORK

Courtesy N. Y. Edison



What Are You Going To Do About It?

By BASSETT JONES

THE annual building budget in this country aggregates six billions of dollars.

Of this amount, and exclusive of industrials, there is an expenditure of between three and five per cent devoted to the purchase of electrical material—a sum between \$180,000,000 and \$300,000,000. In a recently erected bank building in New York City, costing \$10,000,000, the electrical material cost amounted to six per cent, in fact, about \$625,000.

How much of this vast total does any one manufacturing company supply? What ratio does the company's business in electrical material for such buildings bear to its total business and how does this ratio compare with similar ratios for other lines of equipment? Which is the most profitable, and, therefore, most worth the effort to obtain it?

I doubt if any of the larger electrical manufacturing companies can answer these obvious

questions. So far as I know, none of them possesses the organization or means for collecting the necessary data, and, speaking from twenty-five or more years experience of and in the building industry, none of them has the neces-

sary machinery for selling at a profit their share of the total business.

In the first place a building of the type we are here discussing, which excludes industrial buildings, bears little, if any resemblance in use, administration, organization, finance or

structural development to the central station, the railroad, or the manufacturing plant, in other words, to the public utilities and industrials about which the electrical manufacturing industry has largely developed. The long and short of it is, that the needs, the technique or methods of design and construction, and most important, the character of personnel engaged, are so different in the two classes of work that the commercial methods employed to sell the

Bassett Jones is well known in the electrical industry. As a member of the firm of Meyer, Strong & Jones, of New York City, he has a large practice among architects, and was consulting engineer in the design and construction of the Equitable Building, Bankers Trust, Standard Oil, Guaranty Trust and many other large structures.

materials required in one class cannot be successfully employed in the other class. This is a distinction that electrical manufacturers as a whole have not learned.

In connection with the electrification of industrials, central stations and railroads, the electrical manufacturers are in a position to render, and do render a commercial service.

Here, engineers are in contact with engineers. The customer's problems are studied and solved, either with him or for him. For this service the customer gladly pays in the selling price of the equipment he buys. Thus, in order that he can render an intelligent service in the electrification of railroads, the electrical manufacturer studies the transportation problem as a whole. He maintains an expensive corps of railroad experts to guide him in the development of apparatus, and who, therefore, must be familiar with the organization, needs and personnel of the transportation industry. In short, the electrical manufacturer maintains a railroad department.

Does the electrical manufacturer maintain a building department to study and familiarize himself with the building industry and its peculiar needs? Does his organization include a department in which the electrification of buildings as such, and as distinguished from the electrification of railroads, central stations, mines, textile and steel mills, is studied as a whole so that he can render this industry an equal and intelligent service? He does not. Has the electrical manufacturer any one in his employ who can go to the architect, engineer and contractor, one or all, engaged in this industry with an annual purchasing power of 100 millions in electrical material, and intelligently discuss their electrical needs with them, or properly guide them in the selection of apparatus? If the electrical manufacturer has such a one on his payroll he does not appear to realize it.

To illustrate, consider the building shown on page 5. This is a photograph of the model of a projected building which will involve the expenditure of about \$300,000 for electrical material. To you, reader, who are presumed to be a member of an electrical manufacturer's organization, what does this model mean? What electrical problems does it present to your mind, if any? Assume that you are asked to advise with the owner, the architect or the builder as to how he can best and most profitably electrify this building. What suggestions have you to offer? What products of your factory will best meet the situation? And, first and last, what are the owner's electrical problems and how will you familiarize yourself with them?



BASSETT JONES

A modern building such as this is the integration of twenty-five centuries of civilization. In its design and construction, practically every phase of engineering and of art is drawn

upon. Within its four walls are carried on nearly every commercial and professional activity practiced by the human race. It is so completely a self-contained unit that nearly every need of living beings can be met within its confines.

Each of the multifarious services such a building renders its occupants must be studied and proportionally evaluated with relation not only to the present needs of its population, but also to probable future needs. For, this building must be an enduring monument to man's skill and imagination.

How is the electrical manufacturing industry involved in the processes housed in this building? What are these processes and to what extent and how can they be best electrified? It is trite to say that the electrification of this building will require quantities of every sort of material and apparatus the electrical industry makes, from generating, transforming or converting apparatus to lamps and, yes, even X-ray tubes. In it there is certain to be a

doctor's office, a dentist's office and even a hospital of some sort. The building will absorb miles of wire and cable from No. 18 to 1,000,000 c.m.; miles of conduit; between 10,000 and 15,000 outlets of various kinds and equipment; upwards of 3000 luminaires; dozens of panel boards aggregating in the neighborhood of 500 circuits. It will require extensive power, lighting, call, signal, time, fire alarm, telephone and watchman's systems with all the associated devices, and each of these must be so arranged that it may be economically adapted to the requirements of the occupants, both initial and future.

Thousands of fractional horse motors will be installed to operate motor-driven office machinery and for local ventilation. Probably a thousand or fifteen hundred horse power of motors will be required for purposes connected with building operation, elevators, ventilation, water pumps, refrigeration, air compressors, vacuum pumps, circulation, forced draft, fuel handling, and the like, all of widely different duty.

And all of this can be written down before a plan has been prepared, merely from the picture of the building and a general knowledge of its service function.

So it comes about that not only is the quantity of electrical material required in a modern office building often greater than that required in an industrial plant of equal floor area, but, also, its arrangement is more complicated.

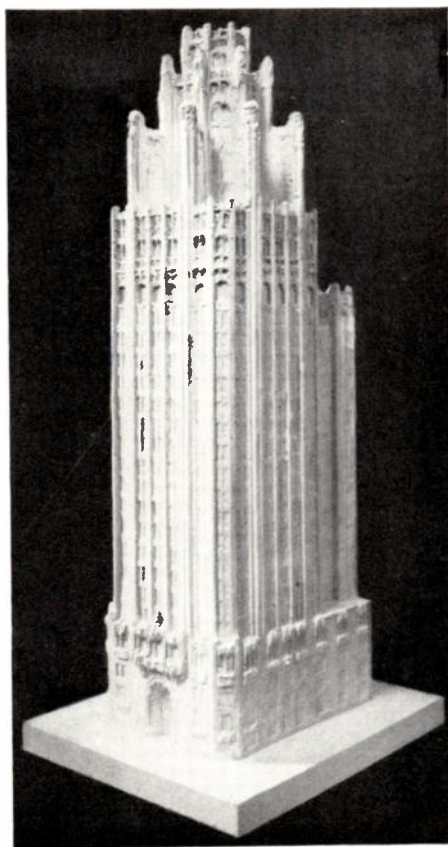
To what will the electrical load in this building probably amount? What are the probable load characteristics? The answer to these questions will have an important bearing on the type of generating and distributing system employed, and its switching and protective arrangements. Talking of distribution, shall the fan system or the trunk

system be used? Do you know the difference, and are you familiar with the different sorts of outlets and wiring devices required with each? You have an available catalogue of 10,000 such devices. Do you know that about 50 of these all told, including outlets and devices, are sufficient to equip any building that was ever built? Why the remaining 9950? Why should the owner of this building pay development and overhead charges on 9950 devices for which neither he nor any other owner has legitimate need?

It is a fact that the average electrical load in commercial buildings has reached, and in some cases exceeded 2.0 watts per square foot of yield area. This is as large or larger than the average load per square foot of floor area in a manufacturing plant employing diversified machine tool processes. Due to the common use of motor-driven office machinery the connected load over considerable areas may reach 5.0 watts per square foot. The accounting department in a modern bank looks and sounds like a machine shop.

But when we step from the office building to the hotel, the change in load requirements and characteristics, as well as the change in distribution, is quite parallel to the similar differences between a machine shop and a textile mill.

Is there an existing department in your organization that is capable of taking this building as a whole and organizing a service and selling campaign about it? If what has been said above carried conviction, it must be obvious that the problem of selling building equipment is as far removed from merchandising as is the selling of a steel mill drive. A merchandising method tells you nothing of the owner's needs and does not avoid the common and serious error of



ARCHITECT'S MODEL OF NEW CHICAGO TRIBUNE BUILDING

selling unfit or uneconomical material and apparatus.

After twenty-five years of experience in the design of electrical equipment in buildings, and in the selection of apparatus and material to meet the requirements of such buildings, I have come to certain very definite opinions on



WOOLWORTH TOWER VIEWED
THROUGH ARCH OF MUNI-
CIPAL BUILDING

this subject. Let me put it this way. *Are you seeking the business or must I seek you?*

I do not want a mere catalogue of electrical devices either in human or in printed form. What I say holds good, I believe, for the architect and the contractor, as well as for the engineer. If you want his business, you must first set up an organization suited to cope with the peculiar conditions of the building industry as distinctive from the transportation industry, the central station,

the fishing industry, or the grocery business.

Since the electrical equipment of such buildings will present problems to, and eventually draw upon, every department in the manufacturing company, it is preposterous to suppose that the customer will want to, or will be able to, sub-divide his needs and interview some one from every such department. Nor will the customer be helped, save in a lopsided fashion, by interviewing a single individual from some one department, and who has been immersed in a single interest or controlled by it. This building

equipment department must be headed up by one who knows the character of the building industry, of its technique, and of its personnel, and to whom a picture, such as we have been discussing, means something electrically. He must know where to start with the projected building and so, how to head up a campaign, not about the elevators, the generators, the switchboards, the motors for general power uses, wiring devices or the lighting devices separately, but as a unit, a single service, a single sales argument. The head of this building equipment department must know the steps that lie between the financing of a building and its occupancy, and where and how the electrical manufacturer properly ties into the procedure. He must have ideas to sell that later may be clothed in his company's products, and to do this he must at least appreciate the purport of the questions I have asked, even if he be not able to answer them specifically. He must not so much represent his company in the offices of the architects, the engineers and the contractors, as act the part of their agent in his company's organization.

I do not want to go into unnecessary details but I do wish to point out that the underlying principle of this department must be a broad policy of constructive co-operation between the personnel of the building industry and the personnel of the electrical industry. This is a policy that at present the electrical industry almost totally lacks.

When the electrical manufacturers act as above suggested, I believe a part of the present and growing difficulties in the electrical construction business will disappear. You are not selling canned goods or clothing. Primarily you are, or ought to be, selling service. At any rate, that is all you can sell in my office.

Let me close this rather discursive questionnaire by asking, "What are you going to do about it?"

EDITOR'S NOTE.—Bassett Jones is, undoubtedly, correct in his viewpoint, of not only the electrical industry as a whole, but also the majority of what are called the mechanical trades. However, the General Electric Company has for a long time recognized the necessity of serving the architectural profession and the building industry and has set up for such purposes the Architects and Consulting Engineers Service Bureau under Lyman Clark in the Publicity Department and the Building Equipment Section under C. F. Scott in the Industrial Department.

Selling the Architect

By LYMAN CLARK, *Architects and Consulting Engineers Service Bureau,
Publicity Department*

ARCHITECTURE has for ages been the expression of the people and their environment—the Cathedrals of Florence, Rome, Rheims, Chartres and Toledo; the guild halls of Bruges, Louvain and Nuremberg; the town halls of Ypres, Verona and Seville; and, even the ancient temples of India and China bespeak time in history and the uppermost thought of the people of that time.

Just so with our cover illustration where in the foreground is Old Trinity setting before us the traditions of the past. Then as a background, we have those majestic modern structures that bespeak the American environment and communal spirit more than all words can express. How well they typify our great desire for close relationship, our attitude to efficiency in the use of time, and maybe the picture brings to your mind, as it surely does to mine, our wonderful cohesive means for housing the many different nationals that come to make up our population and take their place in our citizenry.

It is interesting to know something of how these massive structures come into existence and what they mean in the matter of business in their coming. Realty, from time immemorial, has been considered a wise and safe investment both in dull and prosperous times, even though money be cheap or dear. From our methods of taxation, there is created the necessity for continually making adjustments upon the property in order that there be a return upon the investment. So, with the ever enlarging city, the ever increasing taxation, there is created the machinery for readjustments of investments for the creation of earnings rather than losses.

This machinery is quite complex and differs greatly from anything else in business in that there are more groups of enterprises concerned than all others. There is the realtor, the auctioneer, the title guarantor, the mortgagee,



LYMAN CLARK

the bond and banking houses, the architect, the engineer, the contractor, the sub-contractors, the equipment manufacturers, and, although these should be a plenty, we have yet to remember that there are owners and property managers.

To all of these groups do we bear relation, some more and some less but with all we must be acquainted, know of them and about them in order that we may at all times know what we are talking about when we go into the market place, with

our electrical wares for buildings.

What do we find in such a market place of electrical interest? Again, viewing the cover illustration and assuming the buildings shown to be your market, their electrical contents would amount to approximately \$1,500,000. Our annual building program requires something more than \$180,000,000 for electrical material requirements.

While the building industry, as I have pointed out, is a very complex one, we have within it the architect and the engineer and it is to them more than all others that the market first presents itself and, therefore, requires early and concentrated attention.

Who can go out into such a market place with only the training secured from commonplace markets? One can not take a catalogue, or price book, or bulletin into an architect's or engineer's office with the statement, "I understand you are in the market and here is what I have to offer." That may go with the purchasing agent, the utility company or others but not in architecture or the building industry. This could possibly have been done fifty years ago when buildings were structurally simple. But since that time, we have introduced an extended line of electrical apparatus and materials and so have others until today there are 3500 manufacturers of

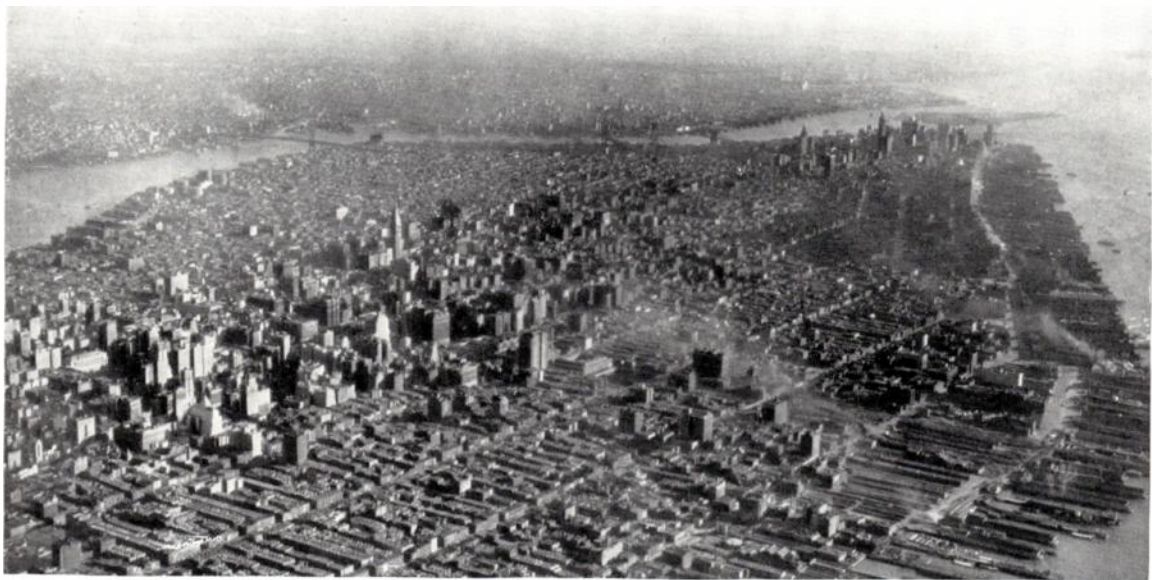
materials and equipments, all nationally seeking the architectural outlet to markets and there are innumerable others seeking only local markets.

Is there any wonder, then, that there exists and is exercised a different code of commercial procedure in architectural markets than in other markets where the purchaser has a simpler problem in knowing what he wants and why he wants it.

Architects are generally talented men, versed in history, literature, painting, sculpture, typography, civics, economics, engineering and other

hospitals or commercial buildings. To each, there is a different set of problems both architecturally and electrically and the time may come when the electrical manufacturer shall need to specialize in each kind of building, in fact, it has come today in the matter of many types of buildings. There are over a dozen hospitals planned weekly in this country, practically every city has a continuous school building program and new factories or factory extensions are under way in every locality.

Probably the most interesting building project outside of a large hotel is the modern large



©—Fairchild Aerial Camera Corp.

AN UNUSUAL VIEW OF MANHATTAN FROM THE AIR SHOWING THE GROWTH OF THE UPTOWN SKYSCRAPER DISTRICT

subjects making for the truly educated man. Gifted with rare comprehensive powers, they are able to supply the shelter of man in both beautiful, utilitarian, and efficient form. Confronted, however, by financial limitations, building codes, ordinances and many other physical and civic restrictions, they have their limitations placed upon them by others rather than themselves.

Of course, all architects are not alike any more than all engineers or doctors or lawyers or other professional men are alike. They have more and more come to specialize until we find one planning mostly schools, another hotels, another factories, and yet others, residences,

urban commercial building. To know this building and its electrical requirements is to know its foundations, its cubical contents, its probable tenant population, its commercial relations to the community and many other important factors that make the structure a success financially, because one, although even only electrically concerned, should treat with the architect in building economics.

Primarily, one must be familiar with various forms of power supply; power and light distribution; ventilation and air conditioning; sanitary and plumbing necessities; the tenant handling problems in relation to elevators; the material handling in relation to dumbwaiters,

ash hoists and conveyors, sidewalk lifts, etc.; both interior and exterior illumination; the uses of recording instruments for keeping records for the building manager; time systems and signal systems and their related applications to efficiency in building management.

Architects are more and more appreciating electrical wants and requirements. Look at the picture of the model of the Chicago Tribune Building to be erected at 431-439 North Michigan Boulevard, Chicago. The *Tribune* set up a prize fund of one hundred thousand dollars to secure this design. Designs were received from twenty-two nations and the first prize awarded to John Mead Howells and Raymond M. Hood, of New York, and this is one of the things Mr. Howells said, "It is perhaps not necessary to call attention to the fact that the upper part of the building has been designed not only for its own outline and composition, but for the possibilities of illumination and reflected lighting at night."

Every new building structure presents a new problem and especially is this true in commercial buildings. In the larger cities where zoning ordinances have been put in force, we find a new type of structure rearing skyward with diminishing dimensions. Building such structures involves doing things differently than in

the old square or rectangular structure where all floors presented the same area. Therefore, we are confronted with a problem simultaneously with the architect, and, consequently, we can keep in step with him on the electrical problems that arise under the circumstances.

Again we have such problems of serving modern buildings with current at 6600 or 13,200 volts and here, again, the architect and we are faced with a problem in which a careful study is necessary and many other daily problems could be recited.

In conclusion, let it be said that for any electrical representative successfully following architectural work, there will be combined with a considerable amount of effort an immense amount of pleasure; the pleasure only secured in being a part of a new creation; the pleasure of lending a hand in the creation of a wonderful structure; the pleasure that makes men efficient.

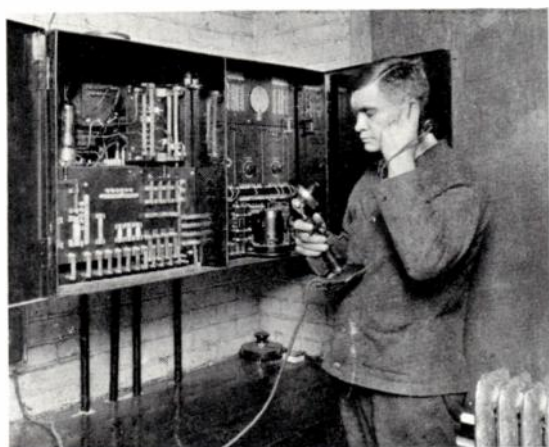
Therefore, selling the architect is serving him, truthfully and unselfishly; serving him in a co-operative manner; serving with that interest in his creation that you feel as a part of his undertaking; feeling the glory that comes in the completed whole; feeling the pleasure and pride you have in the architect, the engineer, your company and yourself.



Use of Carrier Current Increasing

THE carrier current telephone is the latest as well as one of the most interesting electrical developments. It is also the only complete system of communication sold directly by the General Electric Company.

The fundamental principles of carrier current telephony are not new. Many years ago experiments were made in Europe using high frequency currents as communication carriers. The outstanding problem, however, has always been to provide a practical economical high



CLEM HAVENS OF CENTRAL INDIANA POWER CO. USING CARRIER CURRENT TELEPHONE

frequency generator of relatively low power, as would be used for such communication purposes. The particular development, therefore, which brought carrier current telephony from the experimental laboratory to practical application on modern transmission lines, has been the vacuum tube as it is available today—the G-E pliotron.

Carrier current for high tension lines is employed in this country by using all of the overhead conductors as one side of the circuit with a ground return. A carrier current transmitter must supply the line with sufficient power so that when distributed throughout the useful and non-useful loads, in a proportion depending upon their relative impedances, the useful loads—the carrier current receivers—will receive sufficient energy to operate them. The problem lies in determining the non-useful loads or losses, and their impedance to the high frequency

employed. Coupled with this is the determination of certain special losses associated with high frequency currents, such as reflection.

The first customer's order for a carrier current equipment was received in December, 1922, from the Utica Gas and Electric Company, the salesman was S. Dockstader. Since that time, this apparatus has been installed on the systems of twelve other power companies, including the high voltage lines of the Ohio Power Company, between Canton, Ohio, and Windsor, West Virginia, and on the high voltage lines of the Pacific Gas and Electric Company, between the Vaca Substation and Pit River.

The greatest sales activity in connection with this apparatus has been put forth in the Chicago District, under the guidance of Carl Schaus. H. W. Brown has fathered this development at Boston, and in the Philadelphia District J. W. Hicklin, of Philadelphia, and R. C. Faught, of Baltimore, have been the leading salesmen of carrier current. E. F. McLoughlin has sponsored the equipment at Atlanta, while R. S. Griffith, of the Birmingham Office, has succeeded in securing an order from the Alabama Power Company, including the first patrolman's equipment.

On the Pacific Coast, Allen Jones, M. Rhine, J. O. Case and B. G. Hatch have been most active, while C. R. Wallis, at Seattle, and L. Moyer, at Portland, have followed the development most closely in the Northwest. H. T. Plumb has been the carrier specialist at Salt Lake City and W. B. Clayton at Dallas.

In the Cincinnati District, E. D. Monk, Transformer Specialist, has formally taken over this apparatus. H. C. King and W. S. Culver have been very active also in promoting its application.

J. B. Bassett has taken over the work for New York, with R. A. Jones as representative at Syracuse. Credit must go to C. E. Cuddeback at Syracuse for having obtained by far the largest orders for this apparatus in the State, and to J. H. Jump for handling the Buffalo Territory.

Carrier current telephone apparatus is manufactured and sold directly by the Radio Department, E. P. Edwards, Manager. T. Johnson, Jr., is in charge of sales.

Charles Proteus Steinmetz

An Appreciation of His Contribution to Science and Humanity

By E. W. RICE, JR., Honorary Chairman of the Board, General Electric Company

THE whole world, through its orators and writers, has expressed so beautifully and so well its appreciation of Charles Proteus Steinmetz, that if I attempted to express what is in my heart, it would be but to repeat what has already been said much better by others. However, as his devoted friend and intimate associate for one-third of a century, as one who recognized his great talents when he was unknown, and surrounded him with a favorable environment for the development of his genius, I regard it as a privilege to publicly endorse all that has been said of his usefulness, his commanding genius, his inspiring personality. This cheerful, patient, kindly spirit, this zealous student of nature and lover of humanity, was your friend and my friend.

I have been asked to speak of his scientific attainments and their meaning to the world. To do this properly would be to cover much of the history of the electrical industry during the past 30 years. I must confine myself to sketching such features as seem of most importance and possibly of greatest interest.

Thirty years ago I first met Steinmetz.

The General Electric Company had been recently formed by the union of the Edison Company and the Thomson-Houston Company, which brought into one enterprise the results of the work of Edison, Elihu Thomson, and many other early pioneers in the fields of arc and incandescent lighting, electric traction, and industrial motor application.

Rudolph Eickemeyer of Yonkers had developed some interesting designs for electric traction purposes, and certain novel and economical forms of windings for armatures of electrical machines. I was then in charge of the manufacturing and engineering of our Company and my views were sought as to the

desirability of acquiring Eickemeyer's work. I remember giving hearty approval, with the understanding that we should thereby secure the services for our Company of a young engineer named Steinmetz. I had read articles by him which impressed me with his originality and intellectual power, and believed that he would prove a valuable addition to our engineering force.

I shall never forget our first meeting at Eickemeyer's workshop in Yonkers. I was startled, and somewhat disappointed by the strange sight of a small, frail body surmounted by a large head, with long hair hanging to the shoulders, clothed in an old cardigan jacket, cigar in mouth, sitting crosslegged on a laboratory work table. My disappointment was but

momentary, and completely disappeared the moment he began to talk. I instantly felt the strange power of his piercing but kindly eyes, and as he continued, his enthusiasm, his earnestness, his clear conceptions and marvelous grasp of engineering problems convinced me that we had indeed made a great find. It needed no prophetic insight to realize that here was a great man; one who spoke with the authority of accurate and profound knowledge, and one who, if given the opportunity, was destined to render great service to our industry.

I was delighted when, without a moment's hesitation, he accepted my suggestion that he come with us.

Steinmetz had already made his first important contribution to electrical science in investigations of magnetism, and especially in formulating and determining the laws governing the losses in iron subjected to varying magnetic induction. He showed that the hysteresis varied as the 1.6 power of the density of magnetic flux. This made possible for the first time the exact predetermination of the so-

Dr. Charles P. Steinmetz died October 26th. His western trip, during which he made several speeches, was too great a strain and he was ill when he returned to Schenectady. It was thought that he was recovering when in the morning, while waiting for breakfast, his heart simply stopped beating. The night before he had been cheerful and apparently better, and spent some time reading a book on physics of the air.

called iron losses in the armatures of electric motors and generators and in the transformers and other electrical apparatus employing iron. As a result, the quality of our electrical machinery was improved, and the weight and costs reduced. It is difficult at this date to realize the fundamental importance of this one contribution to the orderly and definite progress of the electrical industry.

During most of the first decade of the commercial application of electricity to light and power which may be said to cover the period between 1880 and 1890, direct current only was used. This was the basis of the Edison system, the Thomson-Houston arc system, the Vanderpool and Sprague railway motor systems. The laws governing the flow of direct current were simple and easily understood, and could be treated by mathematics of the most elementary character.

About the time Steinmetz came with the General Electric Company in 1893, the use of alternating current for lighting, power, and other purposes was just beginning to be of demonstrated commercial value. Advance in the commercial use of alternating current was hindered by the extreme difficulty of understanding the technical nature of its action and of the various phenomena connected therewith. The engineer who had been working with direct current found it difficult to understand, and therefore to correctly design alternating-current apparatus. While the problems of the direct-current apparatus and electric circuits could be treated by the simplest mathematics such as ordinary arithmetic, the alternating current, involving such phenomena as reactance, capacity, leading and lagging currents, phase displacements, etc., could apparently only be solved by higher mathematics involving the use of calculus—methods which were not generally familiar to the engineers of those days. Even skilled mathematicians familiar with such methods made slow and difficult progress in the solution of the problems which arose daily.

Steinmetz took hold of this situation with characteristic energy, and soon brought order out of chaos. He abolished the mystery and obscurity surrounding alternating-current apparatus and soon taught our engineers how to

design such machines with as much ease and certainty as those employing the old familiar direct current.

He had already made the discovery that alternating-current problems could be attacked and solved with success by the use of what was known as complex quantities. By the use of this system he not only was able to solve these problems himself, but to teach our engineers to do the same work by methods almost as simple as ordinary arithmetic and algebra. Steinmetz himself always regarded this as one of his greatest contributions and called it the development of the "Symbolic Method of Alternating-current Calculations." This method was found to be so powerful, accurate and rapid that its use was not confined to the engineers of our Company, but rapidly spread throughout the world. He preferred to use this mathematical method in the treatment of all the problems of alternating-current engineering which arose and advocated its use before the American Society of Electrical Engineers in numerous papers, and embodied it in the textbooks of which he was author.

Not only did the adoption of these mathematical methods open the door to many to do useful design work who otherwise could not have done so, but it enormously increased the speed with which definite and accurate calculations and designs could be made. It furnished the engineer with a powerful tool which multiplied his power with just as much certainty as the machine tool improves and multiplies the usefulness of the ordinary workman.

It was fortunate indeed for our Company and for the electrical industry that Steinmetz became associated with us at the critical time when the alternating-current development had just started. It is not too much to say that his genius and creative ability, not only in his own personal work, but in advocating and obtaining the general use of a simple mathematical system (for treatment of alternating-current problems) was largely responsible for the rapid progress made in the commercial introduction of alternating-current apparatus.

Steinmetz's practical inventions literally cover the entire field of electrical applications: generators, motors, transformers, lightning arresters,

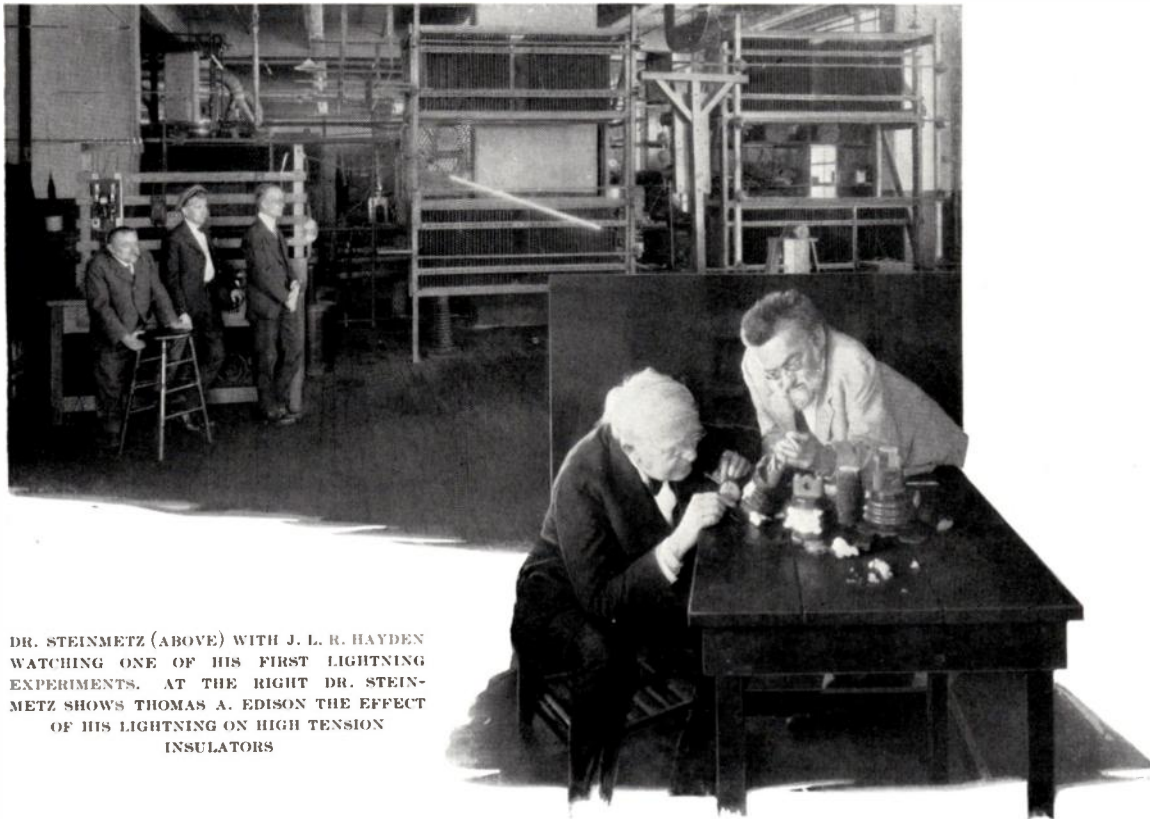
lighting, heating and electro-chemical operations. Of these many inventions, which were set forth in some 200 patents, perhaps the most important are the induction regulator, the method of phase transformation, as from two-phase to three-phase, and the metallic electrode arc lamp.

His experimental work in arc lighting led to the production of the magnetite arc. The practical advantage of this type of lamp is found in the extreme length of time which the metallic electrode will burn without recharging—these electrodes burning 200 hours contrasted with a life of 70 hours in the carbon arc used before his time. The efficiency also of this type of lamp, especially in small units of illumination, was of great commercial value.

He devoted much time to the development of the mercury arc and by his masterly methods did much to improve this interesting and important type of illumination. These and many other of his inventions have found permanent and extensive use in the industry.

During the last ten years when alternating-current power transmission lines of great

length, carrying large amounts of energy, have spread all over the country, to use his own words—"an old enemy became more and more formidable—lightning, and for many years the great problem which pertained to the successful development of electrical engineering was that of protection from lightning. Before this could be undertaken with reasonable hope of success we had to know a great deal more about lightning and centered phenomena. This led to the investigation of transient phenomena. It was soon found that while lightning might have been the criminal which started the trouble in the electrical system, the damage and destruction was not done by lightning, but by the electric machine power back of the circuit which was let loose and got out of control by the disturbance initiated by lightning." He goes on to say that "the study of the phenomena produced by lightning effects could in general be grouped under the name of 'transients' because, unlike the direct and alternating currents which flow continuously, these disturbances last a limited time only."



DR. STEINMETZ (ABOVE) WITH J. L. R. HAYDEN WATCHING ONE OF HIS FIRST LIGHTNING EXPERIMENTS. AT THE RIGHT DR. STEINMETZ SHOWS THOMAS A. EDISON THE EFFECT OF HIS LIGHTNING ON HIGH TENSION INSULATORS

The study of this problem led him to produce his famous "lightning" generator of which so much has been told in the public press. In the hands of Steinmetz and his assistants such progress has been made that the nature of the phenomenon has been so elucidated that as a result it is possible to proceed with confidence in the further development of the large high powered transmission systems, making possible Steinmetz's vision that the day was rapidly



DR. STEINMETZ AMONG HIS RARE PLANTS

approaching when the electrical engineer would supply the world's requirements of energy over transmission lines which would cover the country with a network similar to that of the railways, the one taking care of the distribution and supply of energy, and the other carrying the materials.

Steinmetz was an ardent believer in the value of education. He not only found time to aid the educational work of Schenectady, but became President of the National Association of Corporation Schools, and lecturer at Union College. In a masterly address, upon retiring as President of the A.I.E.E. in 1902, he stated

that "all future progress in science and engineering depends upon the young generation, and to insure unbroken advance it is of pre-eminent importance that the coming generation enters the field properly fitted for the work."

His personal example, his spoken words, and his writings have had a powerful and beneficial influence upon the development of education, especially technical education in this country.

I must now bring to a close this inadequate sketch of the contributions of this remarkable man to the development of the electrical science and industry. During his short life he rendered services of the most conspicuous character and inestimable value.

He was the author of many original scientific papers and of a large number of electrical books which have been the accepted standards in colleges, laboratories and workshops everywhere.

He was a prolific inventor, a skilled mathematician, a trained engineer, and an inspiring teacher. Our generation has produced men who have equalled or excelled him in some one of these fields, but no one has arisen who, to such a superlative degree, combined the qualities of inventor, mathematician, engineer and teacher.

He possessed a marvelous insight into scientific phenomena, and unequalled ability to explain in simple language the most difficult and abstruse problems.

Countless electrical engineers now occupying positions of great importance in our Company and elsewhere in the world gladly give testimony of their debt to him.

He was patient, sympathetic, cheerful, and ever willing to share his great gifts with all those who sought his counsel.

He loved children and they loved him. A neighbor and his wife were mourning his loss in the presence of their children, when the father exclaimed with deep emotion, "and he was my friend." His little son of seven years looked up from his play and said, "He was my friend too, daddy."

We, his fellow citizens, friends and associates, join the great world in mourning his loss, but may our grief be tempered by the memory of his great achievements which make his name the synonym of high service to humanity.

Dr. Steinmetz's Own Estimate of His Work

WHEN I arrived in New York, on June 1, 1889, in the steerage of the French Liner *La Champagne*, I spoke no English. I had tried to learn it during the eight days of our voyage, but not very successfully.

Towards the end of the same year I joined the American Institute of Electrical Engineers and the New York Mathematical Society (now the American Mathematical Society). In the Mathematical Society I took an active part for some years, and read a few original papers. Gradually I drifted out of pure mathematics, to my very great regret, but engineering occupied all my time.

My first appearance in public was at a meeting of the American Institute of Electrical Engineers. A paper was read on the "Armature Reaction of Alternators," and I took part in the discussion, and criticized the theory as incomplete, because the third harmonics had not been considered. The author challenged the criticism by stating that the consideration of the third harmonics made the theory too complicated. I then worked out the theory including the third harmonics, and presented it as a paper before the American Institute of Electrical Engineers, months afterwards. This was my first paper read before the American Institute of Electrical Engineers. The author of the paper, Mr. Thorburn Reid, afterwards was a good friend of mine, my assistant in the General Electric Company, and assisted me in the publication of the first edition of "Alternating-current Phenomena."

As my three most important works I consider: (1) The Investigations on Magnetism (The Law of Hysteresis); (2) The Development of the Symbolic Method of Alternating-current Calculations (Complex Quantities); (3) The General Theory of Electrical Transients.

(1) In most electrical apparatus magnetism is used. Sometimes the magnetism remains constant, as in the fields of direct-current

machines; sometimes the magnetism alternates, as in transformers. When the magnetism alternates, it consumes power. Such power consumption means loss of efficiency and heating, and it therefore is of importance to the builder of electrical apparatus to make the designs so that this loss of power by alternating magnetism (called "hysteresis") is as small as possible. However, the laws of this power loss were entirely unknown, and many en-

gineers even doubted its existence, and the designer of electrical apparatus simply built the apparatus, then tested it, and when the hysteresis loss was found too high and the efficiency too low or the machine too hot, they tried again. This obviously was not a satis-

factory way. Mr. Eickemeyer, who was interested in the development of the alternating-current motor, did a great deal of experimenting resulting in a number of valuable inventions, which led the General Electric Company afterwards to buy up the Eickemeyer interests, and so I came to the General Electric Company.

Now in this experimental work, I was Mr. Eickemeyer's assistant, and I had to calculate and design an alternating-current commutator motor. I knew there would be a loss of power in the alternating magnetism of the motor, and I wished to calculate this hysteresis loss, to get the efficiency of the motor. I therefore looked through the literature and found two tables of hysteresis loss given, one by Ewing in his book on magnetism, and one by Kapp in his little book on alternating currents. Unfortunately, the two tables very much disagreed with each other, and the curves given by the tables differed in shape from each other. I then studied both tables and found that Kapp's table must contain a typographical error. From Ewing's table of hysteresis losses, however, I derived mathematically a law, the "Law of Hysteresis," showing how the hysteresis loss

After Dr. Steinmetz's death this brief and modest evaluation of his mathematical contribution to electrical science was found among his papers. His clarity of mind and the ease with which he went to the bottom of a complex problem are shown strikingly in the simplicity of his style. At the end he speaks of his unfinished work.

increases with the increase of magnetization; roughly, it is that every time the magnetization doubles, the hysteresis loss trebles.

This law of hysteresis, as derived from Ewing's data, I published in the *Electrical Engineer*, of December 9, 1891. Then I started testing the various kinds of iron and steel and other magnetic materials which were available, and gave the results of these tests



TALKING TO THOUSANDS FROM WGY

in the first paper on the law of hysteresis, before the American Institute of Electrical Engineers in 1892. The main paper, however, is the second paper on the law of hysteresis, read before the Institute. This paper gives practically complete data on the magnetic constants such as the coefficient of hysteresis, for all magnetic materials known at that time. Other work then withdrew my attention from magnetic investigations, but I have always remained very much interested in magnetic research, and encouraged my assistants to carry out such investigations, and some valuable papers have been the result.

The second paper also gave complete data on the magnetic characteristics and the saturation values of all available known materials, that is, the maximum value of magnetism which a material can carry. In electrical machines, such as generators and motors, the so-

called "field" of the machine carries magnetism, and this magnetism, combined with the rotation, produces (or, in a motor consumes) the voltage and so gives the power of the machine. It therefore is of the greatest importance in design to have the iron of the field poles carry as much magnetism as possible, and to be able to calculate how much magnetism it can carry. For instance, cast iron—which was extensively used in those days—can carry only about half as much magnetism as wrought iron, and cast steel—which then was just beginning to come into use for electrical machinery—is intermediate between cast iron and wrought iron, some as high as the latter.

Mr. Eickemeyer then had designed and built a very ingenious instrument, the magnetic bridge, which permitted the comparison of the magnetic carrying capacity of different materials. He adopted a sample of very soft Swedish iron as standard, and gave the quality of the other iron samples in per cent of this standard. Thus in building electric machines, when casting the field frame, a piece was cut off, turned to size and magnetically tested, and the field winding of the machine then calculated from this data. Then we made extensive tests on cast steel, for the various manufacturers of cast steel. Mr. Eickemeyer, being very much interested in magnetism, therefore encouraged my investigations, and for a long period I spent practically all my time in magnetic research and testing, and Mr. Eickemeyer materially assisted with advice and kindness, so that considerable credit for the results of the magnetic investigations is due to Mr. Eickemeyer. Much of the work on the determination of the constants given in the second paper was done on Mr. Eickemeyer's magnetic bridge. While this instrument had the disadvantage of giving only comparative results, when carefully handled it was very satisfactory, and its use constituted probably the first systematic testing of all the magnetic materials used in electrical machine manufacture.

(2) There are two kinds of electric currents in industrial use: direct currents and alternating currents. The direct current continuously flows in the same direction, thus can be measured in amperes, and its action calculated numerically in a simple manner. The alternating current

is a current which continuously changes: it rises from nothing to a maximum, then decreasing again to nothing, reverses and rises to a maximum in opposite direction and decreases again to zero, again reverses and starts again in the first direction, and so on, reversing usually 120 times in a second. Both types of current were used since the early days of electrical engineering, and there was no difficulty in making calculations with the direct current: it had a direction and a value, which could be measured by an ammeter, and calculations made with it. But the alternating current had no value and no direction, its value continuously changed, and so the direction; and in all calculations with alternating current, instead of a simple mechanical value of the direct current theory, the investigator had to use a complicated function of time to represent the alternating current, and the theory of alternating-current apparatus thereby became so complicated that the investigator never got very far. In the meantime the practical electricians who built and ran alternating-current machinery, put an ammeter in the alternating-current circuit and found that some ammeters (those having permanent magnets) showed nothing, but other ammeters showed a value, and that they called the value of the alternating current. It is what we now call the "effective" or *rms* value of the alternating current. The practical engineer so got a numerical value of the alternating current, but you could not make any calculations with it. For instance, two such alternating currents combined gave a resultant current, which usually was smaller than the sum of the currents, and sometimes even smaller than either of the currents.

The invention of the alternating-current transformer made it clear that electrical power transmission and distribution would have to be by alternating current. But the alternating-current theory appeared almost hopeless in its complexity. Attempts were made to simplify the alternating-current theory by graphical methods, and various diagrams for alternating-current calculation were devised by Kapp, Blakesley and others. So I published a theory of the alternating-current transformer in the *Electrical Engineer*, in 1890, and in the same year in German in the *Elektrotechnische Zeit-*

schrift, in graphical treatment. Such graphic methods have been and are still to some extent used, and are good in getting a conception of the relation of the different alternating currents, voltage, etc., to each other. For calculation, however, they are of very limited value. Graphical methods can be used only where all the quantities which are used do not differ much in size from each other.

All these graphical methods represented alternating currents by diagrammatic figures in a plane. Some very interesting mathematical work had been done by representing the point of a plane or surface by the complex number. For instance, in a very interesting investigation of the surfaces of minimum area between given boundaries, by the great German mathematician Riemann. The idea therefore suggested itself



EXAMINING PIECES OF WOOD SPLIT BY ARTIFICIAL LIGHTNING

to represent the alternating current by a single complex number or "general number," as it is better called. This proved the solution of the problem of alternating-current calculation. It gave to the alternating current a single numerical value, instead of the complicated function of time of previous theory, and thereby made alternating-current calculations practically as simple as direct-current calculations; indeed, the same calculations apply, except that the numer-

ical value explaining the alternating is a general number, while that explaining the direct current is an ordinary number.

When I realized the enormous power of this method in resolving the apparently most complicated problems of alternating-current theory, into simple algebraic equations, I wrote out a rather complicated outline of this new method, giving first the explanation of the method, and then its application to the more important alternating-current circuits and apparatus, and presented this as a paper to the International Electrical Congress at Chicago, in 1893. This Congress was divided into three sections: theory, theory and practice, and practice. The paper was presented as the second paper of a morning session in the section "Theory."

The first paper was a highly theoretical one, and to my dismay I watched one hearer after the other silently rise, edge to the door and disappear, and I began to fear that I would have no hearers left. But fortunately, just before I began, some very interesting paper in another section, which had numerous hearers, finished and was followed by a rather uninteresting paper. Most of the hearers of this section therefore left, and many of them felt it their duty to attend some more papers, and so they came in my section and filled it up again. We had an hour given to present a paper, and if needed could get a ten-minute extension. I got two extensions of ten minutes each, and then was almost through with the introduction.

Then there was no money to publish the Congress paper, and the paper remained unpublished for years, and the symbolic method unknown. In the meantime I developed it further in its application to all kinds of alternating-current apparatus and phenomena, and presented it in a number of papers before the American Institute of Electrical Engineers. I believe it is due largely to the grand old man of the A.I.E.E., the ex-secretary R. W. Pope, that these papers were accepted, and I believe practically nobody read or understood them, as might be expected, since they used the symbolic method, which was still unpublished in the manuscripts of the Congress papers.

Finally I took it up with the McGraw-Hill Publishing Company (or rather its predecessor), to publish my Congress paper on the symbolic

method, and the papers following it. I thus collected all these papers, rounded it out and worked the Congress paper and the following A.I.E.E. paper on the symbolic method up into a general system, and this became my first electrical book, "Theory and Calculation of Alternating-current Phenomena," which appeared in 1897. About the same time, the Congress proceedings, and in them my original papers, were finally published by the McGraw-Hill Book Company.

Since that time, the symbolic method of alternating-current calculation has become generally known and generally used, and even complicated phenomena of alternating-current distribution, such as those of the transmission line with its distribution inductance and capacity, have ceased to hold out any terror of complexity, but are easily calculated, and with the great development of alternating-current engineering, in power transmission and distribution, we never have any phenomena any more which could not be solved and calculated.

Alternating-current phenomena dealt only with alternating currents. A series of lectures given before Union College graduate students on electrical apparatus also dealt with direct-current apparatus, and dealt with the alternating-current apparatus from a somewhat different viewpoint, and so suggested publication. In the meantime, the symbolic method of alternating-current calculations was new to the instructors, and so still newer to the students; also, the general number of complex quantity, though a part of elementary algebra and introduced in the high schools, was so little used that the students meeting it in alternating currents had forgotten it, and found it strange and difficult to understand. Thus I wrote an introduction to "Alternating-current Phenomena," and this, together with the college lectures above mentioned, was then published as "Theoretical Elements of Electrical Engineering."

Finally, seeing the lack of familiarity of the student with the general number, and the difficulty of getting it more thoroughly understood in the high school, I wrote "Engineering Mathematics," as a complete elementary treatise on the general number, on the trigonometric series, and on the differential equation of electrical engineering, as the three mathematical

tools, which are of fundamental importance in electrical engineering, and in which the mathematical preparation of the student is entirely inadequate even in the college mathematics course.

In the meantime, "Alternating-current Phenomena" increased in bulk from edition to edition, with the rapid advance of engineering, until finally it became too much for one volume and was divided into three volumes: "Alternating-current Phenomena," "Electric Circuits," and "Electrical Apparatus."

(3) When alternating currents had finally been conquered, and alternating-current transmission lines spread all over the country an old enemy became more and more formidable: lightning, and for many years the great problem, which delayed the further successful development of electrical engineering, was that of the protection from lightning. But before this could be undertaken with reasonable hope of success, we had to know a great deal more about lightning and centered phenomena.

This led to the investigation on transient phenomena, first with regard to individual problems, such as the effects of lightning on transmission lines, etc. It was very soon found that while lightning may have been the criminal which started the trouble in the electric system, the damage and destruction was not done by lightning, but by the electric machine power back of the circuit, which was let loose and got

out of control by the disturbance initiated by lightning, and with the increasing size of the systems, from thousands to ten thousands, and from ten thousands to hundred thousands of horse power, this danger became increasingly greater, so that for many years much of the study had to be devoted to the study of these phenomena, which in general are grouped under the name of "transients," because unlike the direct currents and alternating currents, which flow continuously, these disturbances last a limited time only—though they may become practically continuous by periodically recurring,

After many specific investigations of transients had been made, and some published as papers, finally a systematic study of the general equation of the electric circuit was undertaken and published as a paper before the A.I.E.E., in 1907. Ten years afterwards, the further work in this investigation of the general theory of transients was given by a second paper, and later a third paper was published. All this work of transients then was collected and systematically rounded out and published in the book "Theory and Calculation of Transient Electrical Phenomena and Oscillation."

While this makes it possible to systematically study and calculate the transient phenomena, which are all the undesired electrical phenomena of our electric circuits, the work is not completed but still in progress.



To Have and to Hold

By M. O. TROY, Executive Ass't Manager, Central Station Department

IN all lines of electrical business handled by the Company where the percentage of the available business secured is high, it is viewed by competitors with longing eyes and fights are constantly being launched by them to increase their quotas and efforts made to reduce the percentage of the available business which we secure. Our primary fight in such situations is to hold that which we have more than to increase the percentage obtained. Both are important but the first consideration is of prime importance. In those situations where we enjoy a large percentage of the business, it will be found almost invariably that it has been developed by many years of keen specialization in engineering, manufacture, sales, and exploitation. Our competitors have come to realize this and are rapidly devising schemes which largely parallel our own and are launching new campaigns of development, exploitation, or methods of sale to weaken our hold on the business.

The Company's business, as a whole, is large and business in many individual lines is large. Because of this fact, we are prone to think that it comes to us easily and relax our efforts, or because we have up a number of large and important transactions, we are apt not to give due consideration to the smaller ones. This is notably true in periods of high demand. In the past we have given too great consideration to the volume of business secured as contrasted with some other period, and have given insufficient study to the percentage of the available business secured in different periods. Fighting for business when the demand is great, if we are to hold, not our volume, but our percentage of business secured, requires as much intensive effort on our part as fighting for business when the demand is small. Competitors look at the big business of prosperous periods with the same longing eyes that they view the small business of dull periods when they

are fighting to keep their factories in commission. Fighting for business on the peak, if secured by competitors, enables them to expand their facilities and to be ready for an increased quota of business; that is, an increased percentage of the available business.

It is not sufficient that we analyze our Lost Business Reports and add to the report that this

business was lost on one score or another, or that the competitor resorted to some unusual tactics, or put forth unusual effort to secure the business. We must have these facts and we must face these situations, not only with the statement of facts as to what happened, but by answering the question—"What are we going to do about it?"

In a great many situations, we have been pioneers, built up the business, and established ourselves in the field in such a way as to create a very real asset for the Company. Because we enjoy these

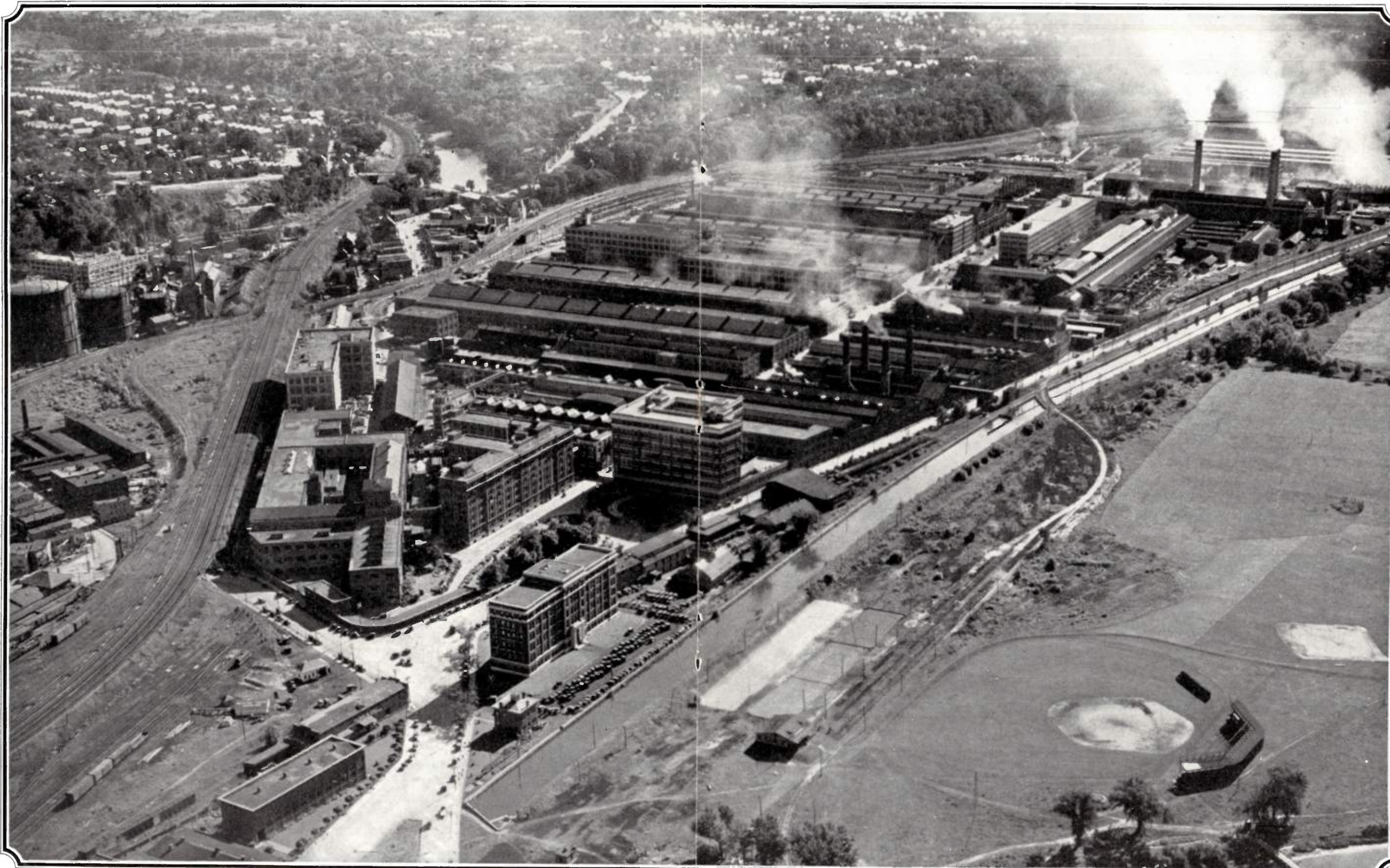
privileges and are securing a large percentage of the available business, we at times tend to lean toward complacency.

For years there may have been disparity between the manufacturing facilities of competitors and ourselves, their ability to give service, their knowledge of the problems involved, and the quality of their product and ours, but as they have gained in experience and improved their quality, even though we may have retained the leadership, the gap to a large extent may have closed up.

In gauging our strength, the measure must always be a comparative one. It is not a question alone as to whether we are so good or so bad but it is how our accomplishments show up as compared with the accomplishments of others. Because we have been strong at one time and have led the field does not signify that we are strong today unless as our competitors have advanced, we, too, have advanced. Our great strength of one period, while a very desirable asset, may be converted into a liability if it leads us into a false sense of security.



M. O. TROY



THIS VIEW OF THE SCHENECTADY WORKS WAS TAKEN BY AN AVIATOR FLYING AT A HEIGHT OF ABOUT 1000 FEET. IT SHOWS THE LARGEST OF THE COMPANY'S PLANTS, FROM WHICH LAST YEAR 150,000 TONS OF COMPLETED ELECTRICAL APPARATUS WERE SHIPPED TO ALL PARTS OF THE WORLD. AT THIS TIME THERE ARE 21,000 EMPLOYEES IN THE PLANT EXCLUSIVE OF GENERAL OFFICE EMPLOYEES. THERE ARE 310 FACTORY BUILDINGS, HAVING A FLOOR SPACE OF 6,000,000 SQUARE FEET. THE PLANT COVERS A GROUND AREA OF 523 ACRES

The "West Virginia" Completes the Electric Fleet

ELECTRICITY plays so big a part in the operation of a modern battleship that there is little wonder the six electrically driven ships in the Navy are called the "electric fleet." The last of the six, the *West Virginia*, will be commissioned about December 1st, at the Newport News Shipbuilding yard.

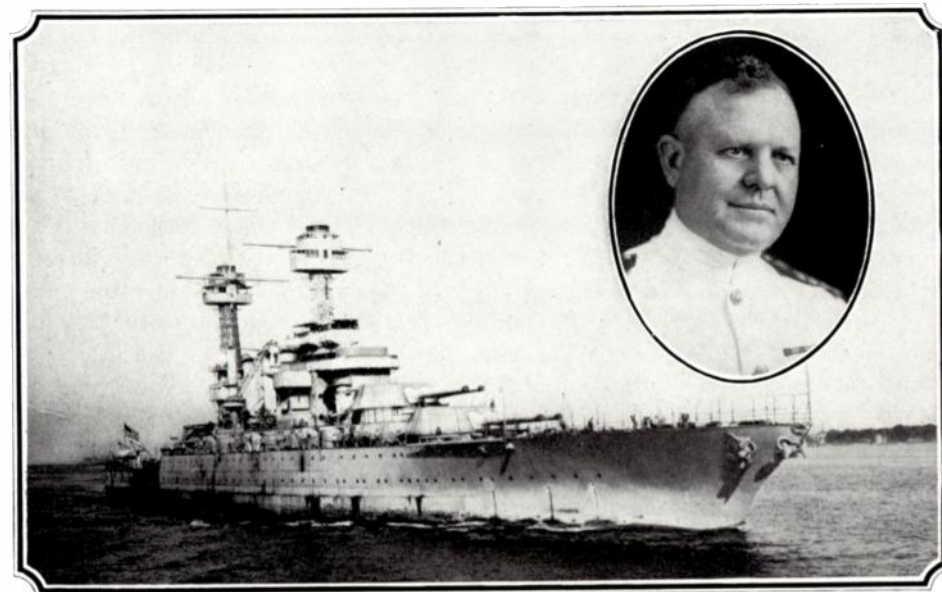
Almost everything about the *West Virginia* is electrical, from the capstan to the potato peeler, not to mention the fire control and the propulsion machinery. If it were all enumerated it would suggest the electrical equipment of a city, for the 30,000-kw. generated on the ship would supply light, heat and power for a community of 500,000 persons, and the entire fleet would furnish that energy for 3,000,000 people, or half the population of New York City.

A battleship and a tugboat have one thing in common, they are largely filled with machinery. The power plant of the *West Virginia* is a tremendous thing. Her main propulsion machinery consists of two Curtis steam turbo-generators, designed to develop 12,600 kilowatts each at a speed of 2150 revolutions a minute to drive the ship 21 knots. These supply power to four 8000-horse power General Electric induction motors, directly connected with the four propellers which turn at 177 revolutions a

minute. The motors, among the largest ever built, are 12 feet in diameter and each weighs 62 tons.

The two turbo-generators, supplied with steam from eight oil-burning boilers, can be run independently. Either is capable of driving the ship up to a speed of about 18 knots, and anyone who has seen a huge battleship of 32,600 tons, the weight of the *West Virginia*, being hurled through the water, gets a faint idea of the power necessary to do it. Electrical current for other needs than propulsion is supplied by six 300-kw. turbo-generators, and two 400-kw. Diesel generators.

The power expressed in all these figures is almost incomprehensible. It has been estimated that if it were possible to apply the power of the dynamos of the six battleships to the propulsion of projectiles, shooting directly upward, they could bombard the moon at the rate of 200 tons of shells a day. If it could be used to pump water it could lower the level of Lake Michigan by ten feet in a year, delivering the water at the present shore level. The energy output of one ship for an hour would be sufficient to keep an ordinary Mazda lamp burning for 657 years, which would have put the vestal virgins out of a job.



OUR NEWEST
ELECTRIC
BATTLESHIP—
THE "WEST
VIRGINIA."
(INSERT) CAPTAIN
THOMAS J. SENN

The solution of these problems cannot be worked out in a published article, but if we know how to make use of the statistics which are available to us, how to analyze the situations which arise in our daily work, and to properly ascertain the real reasons of lost business in a given situation—in other words, know how to obtain the real facts—we can with our resources work out our solution and better direct our efforts, once our weaknesses are determined and realized.

We are in a very much stronger position if we face the issues squarely and plan our campaigns with a full knowledge as to our weakness or our strength. Certainly in those situations where our position in the past has been very strong, we have much to fear in the growing activities of our competitors, their aggressiveness, and their hard fight to weaken the structure which we have, over a long period of years, built up. We must make greater use of a study of the percentages of business secured and lost and the trend of the curve showing the percentage of

available business secured at present and during the past. These figures are now made available to the district organizations and are far more important in measuring our comparative strength than an analysis which shows that we are 10 per cent behind or ahead of some other period.

The particular object of this article is to emphasize the importance of a careful scrutiny and study of the percentage of available business being secured at present and in the past and the trend of the curve. If the percentage secured is dwindling, it should be taken as a danger signal, even though our volume looks very attractive as compared with past periods. We should study all these figures carefully, work to secure and maintain them accurately, and make use of them. If we do this and determine the facts and prepare our campaigns with a full knowledge of the facts before us, I have sufficient confidence in our district and general office organizations to know that we will fight—not only to hold that which we have, but to add thereto.

Selling by 'Phone

THE treatment of customers and prospects over the telephone is a subject worthy of every salesman's consideration. As a matter of fact, the telephone, one of the indispensables of modern business, is at times a very much misused instrument. Very often curtness is mistaken for crispness, and statements are made which would not be thought of were we face to face with the person on the other end. R. M. Alvord, Local Sales Manager of the San Francisco Office, makes the following pertinent remarks in this connection.

"The sales work which we do over the telephone is of great importance to our success. Prospects can be made into good friends and customers by proper handling over the telephone and in turn good customers and friends can be turned away from us by improper handling.

"I have had cases called to my attention in recent months where customers have indicated

their reluctance to call our office for information because some one of our organization in talking with them over the telephone had given them the idea that we would not give them service. This was apparently in nothing that was said directly, but rather an impression gained from the attitude of the salesman at this end of the telephone as it was received at the other end.

"I have also had cases called to my attention where people indicated that they liked to call this office and enjoyed doing business with us because certain people in our organization, whom they have mentioned by name, gave them good service and seemed desirous of serving them in every possible way. This is the attitude which we all want to reflect to our prospects, to our friends and to our customers. We can all help in this if we will be particularly careful to indicate over the telephone in a cordial way our desire, as well as our willingness, to serve them."

The *West Virginia* is the last battleship to be built by this country under the Washington Arms Conference limitation, and will take the place of the *North Dakota*, which will be scrapped when she goes into commission. She is the last word in fighting ships, and carries eight sixteen-inch guns, capable of dropping eight tons of steel and explosives upon the deck of an enemy ship twenty miles away. There is a secondary battery of fourteen five-inch guns, four three-

inch anti-aircraft guns, and two submerged twenty-one-inch torpedo tubes for firing the largest and longest range torpedoes.

The commander of the *West Virginia* will be Captain Thomas J. Senn, who was also commander of the *North Dakota*. The entire crew of the *North Dakota* will be assigned to the new ship, and they will have quarters which for comfort and convenience have never been excelled on a battleship.

The Business Outlook

By D. F. JORDAN, *Consulting Economist, G-E Company*

AS this article is being written, the business outlook for the ensuing six months is only fair. Business has been slackening since the abnormal activity of the early spring, and will probably slacken further. Such a prospect, however, should not cause any particular pessimism in commerce. The pessimist sees only the decline in trade; the optimist remembers that trade was unduly extended and that therefore a decline was to be expected.

The fluctuations of business activity are not so great as is generally understood. Consumption is fairly regular even though production may not be. The necessities of a populace of 110,000,000 persons with high standards of living are very large. Food, clothing, and shelter must constantly be supplied, as well as the conveniences of life such as light, heat, power, water, transportation, communication and education. It is true that production of a basic commodity such as pig-iron may fall in a period of depression to as low as 30 per cent of estimated normal. But it is likewise true that production of other commodities at the same time is not so adversely affected. The electrical output of central stations at the lowest point of the 1921 depression was above 80 per cent of estimated normal.

Fluctuations of general business activity are believed to range between 75 per cent of normal in periods of great depressions to 120 per cent of normal in times of great prosperity. In May of 1923, business activity was estimated to be at 108 per cent of normal; and in October, as this article is being written, at just about

normal. It would not be surprising if the downward trend in activity should carry into the winter months; in fact, it will be surprising if it does not. But the fundamental economic condition of the country appears to preclude the possibility of a severe depression in the near future. Business activity may fall to 90 per cent of normal but is unlikely to go lower than that during the present movement.

The significant point is that even though business activity may fall off, a lot of business will continue to be done. A decline of 10 per cent still leaves 90 per cent remaining even during a period of comparative dullness in the markets.

A noteworthy fact may well be pointed out at this time. The degree to which individual enterprises feel the influence of changing business conditions depends largely upon how close they are to the ultimate consumer. Central stations are in direct contact with the consumers of power and therefore feel only slightly the effects of alternating phases of business. Manufacturers of scissors are less affected than producers of pig-iron. Sales effort will be more productive if intelligent application of this condition is made during times when business is declining.

Moreover it should be well appreciated that recessions in business activity in a growing country are but temporary hesitations; that the retarding of the current of business progress simply gives it increased volume and force, and that the result must be even greater strength when the recession ends.

The Importance of Industrial Control

By WM. C. YATES, *Manager, Industrial Control Sales*

THE rapid growth of the field of application of the electric motor to the drive of industrial machinery may be appreciated in a general way, but it is safe to say that it is only those engineers who are engaged in that particular field that realize at all fully the part that motor drive has come to play in the economies of industry.

As soon as reasonably well-designed motors were available, their advantages over other kinds of drive were easily demonstrated. One particularly important factor was the ease with which the motor could be controlled. This, with other advantages, influenced the early introduction of motors to drive line shafting, replacing steam engines, ropes, belts, etc., and has become the prime consideration in the application of the electric motor to the individual drive of industrial machines.

There is no desire to minimize the remarkable achievements that have been made in the quality, costs, and characteristics of motors for use on all kinds of power service. Unquestionably such improvements have tremendously broadened the field of application, but it remains true nevertheless that the possibilities as to control have long and increasingly been the chief factor involved. Motor designers will probably take exception to such a broad statement, as much has been accomplished in the improvement of motors that has simplified the control and the threat is not infrequently heard that motors are in course of development that will not require starters.

However, the control engineer is not anticipating any immediate collapse of his specialty. Motors will always require means for connecting them to the line; means for limiting the starting current and the resulting shock to the power lines, the motor, the machine or the fabric in it; means for speed control, reversing, and quick stop; protection against overload, overspeed, phase failure and power failure; and in

addition to these varied responsibilities the control must assume others more serious in the safeguarding of life and limb.

For many reasons—humanitarian, economic and legal—much attention is given to the safety precautions surrounding industrial machinery and this is particularly true of the electrical equipment where we find many safety features embodied in up-to-date control that afford security to the operator, repair men, and other persons. Some of these features are:

Under-voltage protection automatically prevents the motor from re-starting, without personal intervention, after failure of power. The casualties that might result from the unexpected starting of machinery are obvious.

Enclosure of the live and working parts of the control equipment, as a safeguard against shock or burn, is now the rule and there is no excuse for the installation of open type starters or control of

any kind except where isolated and accessible only to qualified persons. Suitable enclosing cases also exclude inflammable dust and will prevent the arcing of the controller contacts from being communicated to an explosive atmosphere.

Locking features are available to prevent operation while work is being done in inspecting, cleaning, adjusting, or repairing the machine or its equipment. Where a machine, such as a printing press, is controlled from several stations, it is possible at any station to lock against operation from any other.

Emergency stops in case of need can be provided to shut down the motor from any given point and to quickly stop it by braking or plugging. Limit switches to prevent over-travel as for elevators, cranes and valves, and devices to prevent overspeed in handling dangerous material such as molten metal are an every day requirement.

Much of the increased usefulness of the electric drive in its application to machinery per-



W. C. YATES

forming more or less complicated evolutions has been made possible by the remarkable developments in the art of magnetic control. Improvements in magnetic contactors, prolonging the life of the contacts and the wear of the device as a whole, have permitted frequent duty cycles of starting, stopping and reversing so that now we see motors direct connected to reversing planers, slotters and similar machines and put through their paces, as demanded by such service, easily and safely by an automatic magnetic control that chatters along incessantly with little attention.

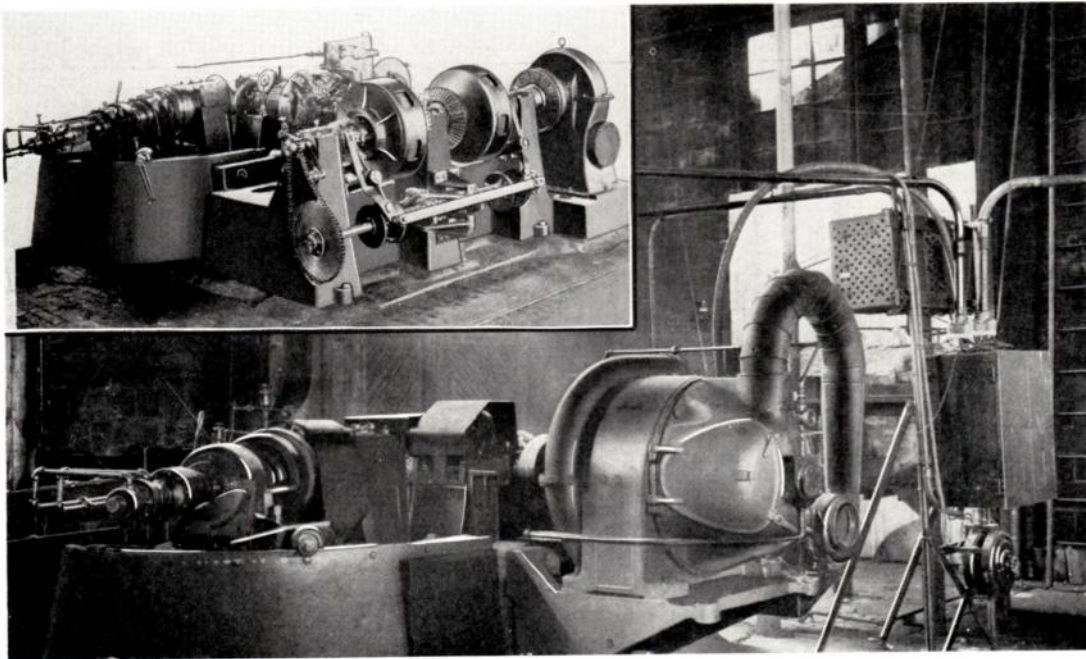
Magnetic control provides for remote operation from push-button stations or other forms of master switches from one or any number of points; for automatic pumping equipments governed by a float or pressure switch; for automatic acceleration by current-limit, time element or other systems; for protection of the motor, machine, and man against carelessness or ignorance; and for safety, convenience and economy in installation, maintenance, and operation.

Manual starters and controllers have undergone many recent improvements particularly as regards safety precautions and are fully suitable for the purposes intended particularly where the motors are small or the service infre-

quent. Magnetic control, however, is the rapidly growing branch of the art in both size and variety and has outgrown the ability of many people interested in the application of industrial motors to keep up with the advance made. Thus we find Industrial Control Specialists on the firing line.

Countless specific examples of the economies made possible by proper control are available but one will suffice for the purpose of this article. The insert below illustrates a rolled gear machine with its one-time mechanical automatic reversing equipment. The 125-h.p. motor needed to drive the outfit is not in the picture but the worm gear to which it was attached is shown at the right. The large view shows the same gear machine with the power consuming mechanical drive abandoned and with a 17½-h.p. motor easily taking care of the requirements. The smaller motor is direct connected and is caused to perform the desired cycle of operation by the magnetic control at the right.

It is plain that there has been an immense saving in the first cost of the complete machine, a great saving in power consumption, and a decided improvement in the convenience of operation. This is a typical illustration of what can be accomplished by the intelligent application of Industrial Control.



INTELLIGENT APPLICATION OF CONTROL SAVES SPACE AND POWER



THE EDITOR'S DESK

Martin P. Rice, *Manager*
R. D. Owen, *Editor*

F. H. Field, *Circulation Manager*

J. A. Horne, *Managing Editor*
W. J. Reagles, *Art Editor*

Matter for publication should reach Schenectady not later than the 8th of each month preceding the month of issue. District and local office correspondents will be announced later.

Charles P. Steinmetz

FEW men have gained a high place in public esteem when their actual accomplishments were so little known and understood as those of Charles P. Steinmetz. People all over the country knew he was a notable engineer, but only a few were aware of what his contribution had been to the electrical industry.

That Steinmetz should be nearly as well known as Edison without producing a single thing with which the average man was familiar was remarkable. It was a tribute to his personality as much as to his ability. His whole story was one of courage, of indomitable perseverance, of triumph over physical obstacles which would have daunted most men.

Above all, he lived in what to most men was an atmosphere of mystery, of dealing with unknown forces. He was known as the seer of electrical science, a man whose mind worked in ways of which the average man could have no conception. His was the tribute the Greeks paid to their ancient wise men, appreciation without complete understanding.

Few men knew that his work was a substantial share in laying the foundations of the electrical

industry. To the others Steinmetz may have been a genius, but he was at the same time a man, a man of strange and fascinating personality. His magnificent head, with its piercing and yet kindly eyes, dominated his slight figure. Fate had robbed Steinmetz of the complete life which is the birthright of most men, but had endowed him with a remarkable mind. Everything in Steinmetz seemed sacrificed to intellect.

He had the gifts of a philosopher as well as a scientist. His mind was speculative as well as keenly analytical. It worked so simply that when he dealt with topics familiar to the public he found expression in words and ideas a child could have understood. When, as occasionally happened, he indulged in speculative fancies, he was captivating. Children loved him as much as he loved them.

He was a scientist closely in touch with people. He understood them, and sympathized with them. And he appealed to their imaginations as have few men whose lives have been spent in the realms of mathematics and the laboratory.

Who's Who in General Electric

Myron F. Westover

MYRON F. WESTOVER—repository of official knowledge, crack rifle shot, student, lawyer, author, naturalist, geologist, big game hunter, six feet of reticence—rather a different picture than one would be apt to form from merely glancing at the signature which appears on company statements.

Add to this a marvelous memory, a ready wit, and an innate sense of justice and fairness which distinguishes all his dealings with others, and one is apt to glance with more interest at the tall figure which occasionally slips out of his office with the easy movements of an athlete to drop some important letter in the mail chute.



MYRON F. WESTOVER

His appearance belies the fact that he was born in July, 1860, on a farm near Vinton, Iowa. He can still tote a rifle in the woods and sight a long shot as well as Natty Bumpo. He has hunted all over America, in Nova Scotia and New Brunswick, down in Mexico, in the Adirondacks and out in the Rockies. He has written several essays based on his observations of nature.

He taught school to get money to go to college, and when he entered the University of Iowa wanted to finish the course in three years. The faculty would not let him, said it would ruin his health, so he quit and entered the law school. He was graduated and admitted to the bar in 1882, but two years later gave up law. He went to Boston in 1886. Always a great reader he found in the old Boston Book Store some of the delight which has made the place famous in New England literary history.

He became secretary to Charles A. Coffin, in 1888, and in 1894 came to Schenectady as secretary of the General Electric Company.

John Paul Jones

LIKE his well known namesake, John Paul Jones, of Control Sales, gets away with whatever he starts. Perhaps his 200 pounds have something to do with it. But the fact remains that John Paul can get things done, and the districts having learned that, send to him for help whenever anything seems lost in the factory.

Then Jones storms down there, and what with the way of him and his smile and manner of talking—which is copyrighted—the stuff gets on the express train a lot quicker than it might have otherwise. John Paul Jones spells service to a lot of people out where the orders come from.

He started being thorough, as so many other men have, when he played football at Tufts.

After being graduated in 1906, he came to Schenectady and went in the factory for five weeks, and then on test. When he got out of test he went in the control section of the Transformer Department, and has been in control ever since. Sometimes he gets out of control when he gets a letter from a district office, but it only seems to make him work harder.

The village of Finesville, N. J., which he thinks has a trolley car running through Main Street now, first saw John Paul Jones in 1884, and it may be that from this early rural atmosphere he gets his appreciation of cows. He is something of a cattle fancier and whenever there is some blooded stock being shown near Schenectady he is apt to be on hand.

He also bowls, where his inimitable conversational powers are called into play, as well as his right arm. It does seem at times as if John Paul would hurl the ball through the rear wall but he restrains himself. Again showing the value of control. Golf appeals to him nowadays, but he doesn't show his score card.



JOHN PAUL JONES



Let Us Help You with Your Set

THERE have been a number of requests that THE MONOGRAM start a radio department to help some of the ardent radio fans in the districts solve their problems. We will be glad to do it. That is the thing we are here for, to serve the districts in every possible way.

Just what that department should be is for you to decide. The services of our research laboratory experts, of our engineers and others in the Radio Department are at your command, and there is no better radio advice in the country than these men can give you. If you want the answer to some question that has been troubling you, if the set doesn't work just right, if there are local difficulties to be overcome, let us know the circumstances and we will send you the answer based on the best judgment of G-E radio engineers.

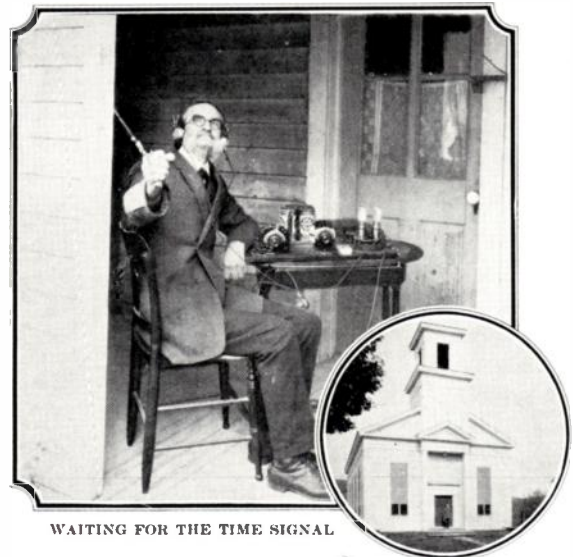
It may be that some practical suggestions on how to set up your apparatus or how to get the best results from a set would be of value to you. Let us know what would be of the greatest interest and aid to you and we will try to supply it. Perhaps you are doing something that would interest other amateurs in the Company. Tell us about it, and we can tell them. Let THE MONOGRAM be your radio service station.

WGY Told the Sexton and the Sexton Told the Bell

MANY stages of amplification and three different wavelengths are used to get Arlington time signals to the farmers in the vicinity of Medusa, Albany County, N. Y.

C. J. Waldron, a Medusa resident, lives next door to the church. He has added a few feet to the length of the bell rope and every noon, after tuning in WGY, the General Electric Company

station at Schenectady, N. Y., he sits in his chair with the phones on his head and the bell rope in his hand, waiting for the long Arlington note which marks twelve o'clock. At the long note he pulls the bell rope, and the bell, which is a big one, broadcasts the time signal miles around.



WAITING FOR THE TIME SIGNAL

By the time the farmer gets the signal it has passed through three different wavelengths, Arlington broadcasts on 2500 meters wavelength. WGY receives the signals on a special apparatus and then amplifies the received signals and rebroadcasts on 380 meters. Mr. Waldron again amplifies the signal for the farmers. The wavelength of the bell tone has not been measured.

Definition of a radio fan: One who adds \$100 worth of doodads to his set so he can get Schenectady, and then adds another \$100 worth of doodads to his set so he can tune Schenectady out.

—Chicago Evening Post.

Organization Changes

SOME of the most important organization changes in many years were recently announced. D. R. Bullen, Manager of the Supply Department, was appointed Assistant Vice President on the staff of the Vice Presidents in charge of sales of general apparatus and supplies.

The Power and Mining Department was changed to Industrial Department, A. R. Bush, Manager. The Lighting Department was changed to the Central Station Department, C. W. Stone, Manager. The functions of the Supply Department were merged with three apparatus departments, Central Station, Industrial and Railway.

M. O. Troy, former Manager Transformer Sales at Pittsfield, was appointed Executive Assistant Manager of Central Station Department, and with his present staff will be at Schenectady.

Other transfers from the Supply Department to the Central Station Department were:

F. G. Vaughen and present staff. Mr. Vaughen will continue in charge of meter business retaining the title of Sales Manager, Meter Department.

W. M. Stearns and present staff. Mr. Stearns was appointed Assistant Manager Central Station Department, in charge of the street lighting, switchboard devices, holding companies contract, and the supply and order sections of the Supply Department.

W. S. Clark and present staff in charge of wire and cable business.

R. D. Mure was appointed Assistant Manager Central Station Department in charge apparatus sales.

The Railway Supply Section and present staff of the Supply Department conducting our business on railway motor and control parts, railway line material and rail bonds, were merged with the Railway Department.

The Industrial Heating Device Section, the Industrial Control Section, and Mine Locomotive and Stationary Motor Repair Parts, Fabroil, Textoil and Textolite Gears were merged with the Industrial Department.

N. R. Birge, Assistant Manager Supply Department, was assigned to the staff of the President, and will assist in the supervision of associated manufacturing companies, being associated with D. C. Durland.

The Publication Department and the Advertising Department have been combined, effective December 1st, forming the Publicity Department. M. P. Rice has been appointed Manager with headquarters at Schenectady on the staff of the Vice Presidents in charge of sales.

F. H. Gale has been appointed Manager of Conventions and Exhibits, and assigned to the staff of Assistant Vice President D. R. Bullen.

T. J. McManis has been transferred from the Edison Lamp Division and appointed Assistant Manager of the Publicity Department.

C. H. Lang has been appointed Assistant Manager of the Publicity Department.

An Advertising Council of the Company has been created, with the following members:

Chairman of the Council, J. G. Barry.

Manager of the Publicity Department, M. P. Rice

Assistant Manager of the Publicity Department, T. J. McManis

P. B. Zimmerman

George C. Osborne

L. P. Sawyer

G. P. Baldwin

Advertising Counsel, Bruce Barton

Secretary of the Council, C. H. Lang.

Director B. G. Tremaine, Vice Presidents J. R. Lovejoy, G. F. Morrison and F. S. Terry, and A. D. Page, will act as ex-officio members of the Council.

Death Benefits Paid During October

DURING the month of October, General and District Office employees who died, with the amount paid under the terms of the Company's plan of group insurance were:

Office	Name	Died	Beneficiary	Amount
New York	Frederick C. Bates	Oct. 2	Wife	\$1500
Chicago	Amy E. Fonner	9	Mother	1500
Philadelphia	Michael McClorkey	15	Sister	150
Schenectady	Chas. P. Steinmetz	26	Sister	1500
Chicago	Jordan A. Mason	29	Mother	1500
San Francisco	Leonard E. Voyer	27	Wife	1500
				\$7650

Giant G-E Searchlight Aids Fire Fighters

During the conflagration which destroyed much of the finest residential section of Berkeley, California, a General Electric 60-inch, high intensity searchlight furnished illumination which proved of marked assistance to the fire fighters and police of the stricken city.



THE GIANT SEARCHLIGHT

The projector was originally brought to the Coast for installation on Mt. Tamalpais, on the north side of the Golden Gate but was finally installed in Idora Park, about two miles from the fire area. An actual account of the use of the big light is reprinted from the columns of the *San Francisco Examiner*.

"The great searchlight at Idora Park was pressed into service last night to help the fire fighters in Berkeley as they battled the flames after dark. At the request of Chief of Police C. D. Lee the great light was turned on shortly after dark and by telephone connection to Luis Desimoine, in charge of the light, the great ray was directed to different parts of the burned area while the firemen completed their work and the guards marked out their patrols to prevent looting. The light was used at the direction of the police until nearly midnight."

The Value of Understanding

Where there is understanding between customer and salesman there is apt to be good service. Frankness and honesty are the foundations for service, for where no false impressions are created there is no necessity for explanations. The value of understanding is emphasized by George H. Pride of the Autocar Company, in a letter to Fred M. Kimball, Manager of the Small Motor Department, as the result of satisfactory delivery made by General Electric on motors.

In a letter to Mr. Kimball, after delivery of the first order of motors a week before completion was due, Mr. Pride said he had found when investigating promises of delivery by various electrical companies that there was an inclination to distrust such promises. He added:

"I felt perfectly certain, however, that there was no real basic reason for this provided a complete understanding were initially arrived at by both parties to such a transaction. Without the slightest desire of flattery on my part, I wish to say that after having met you I felt there was no occasion to worry on anything that was promised by your company through you.

"I have some slight realization of the enormous amount of detail that surrounds the work of your department and we will endeavor to regulate our requirements in such a fashion as will afford you the maximum amount of time to comply with them.

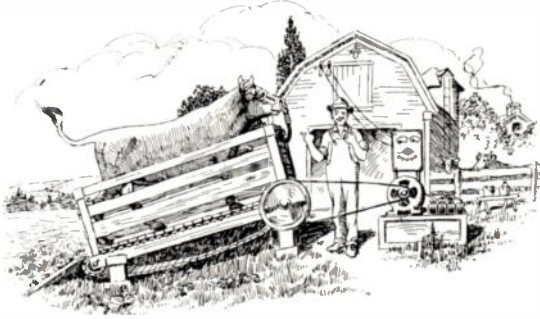
"I feel that your company has exerted itself to the utmost to manifest good faith and we shall endeavor to reciprocate in the same way."

Farmer Proposes Unique Power Plant

V. A. Wolcott, Manager of the Butte Office, tells of a letter he recently received which proposes a rather unique generator installation. We hesitate to recommend the scheme to G-E salesmen since the efficiency of the plant must vary greatly with the tractability of the prime mover. At any rate it makes a good story.

"We have just received an inquiry from one of our potential rural customers which leads us to believe that the scope of possible electrical applications for the relief of humanity

from many burdens is practically limitless. This possible customer, who is out of reach of power lines, has a bunch of milch cows and a bull. As evening draws nigh he proposes to



ELECTRICITY ON THE FARM

install the bull in a tread mill and desires recommendations on a small generator to be belted to the tread mill, and in turn furnish current for operating a milking machine, lighting the farm house and the barn. This man gives signs of real intelligence when he remarks that possibly his peak load would be a little bit more than the bull-driven tread mill could deliver, and possibly it would be well for us to figure on a storage battery with a view of having the bull charge the battery before the milking period commenced.

In answering this customer's inquiry we cannot but feel that G-E Service is capable of meeting most any demand."

Service by Cullen

The Elmhurst Ice Company, Elmhurst, N. Y., was recently placed in a serious predicament by the burnout of a 25-h.p. motor used in the unloading of coal. Twenty-five carloads of coal were on the siding, and they either had to be unloaded from the cars, or the cars taken from the siding. Word reached R. J. F. Cullen, of the New York Office, at his home at 7:30 p.m. Saturday evening.



R. J. F. CULLEN

Mr. Cullen immediately recognized the urgency of the situation and at 10:00 p.m. was at the New York warehouse. He located the motor on the fifth floor and with the help of the watchman got a hand truck and brought the motor down on the elevator to the door. It was called for by a taxicab at 7 o'clock Sunday morning, less than twelve hours after Mr. Cullen had been called, and was installed and operating by noon.

Frank Dehn, President of the Elmhurst Ice Company, expressed his high appreciation of Mr. Cullen's efforts in a letter to Mr. Beran.

R. S. (Bob) Paden

WHEN we get a picture that suggests so much action on the part of a salesman we simply have to print it. This shows "Bob" Paden of Atlanta starting out to sell G-E supplies in a territory which includes 100 towns. He has been with the General Electric Company since 1916.

During the World War, he had a leave of absence, being seventeen months in the service, twelve months of which was spent in France as 2nd Lieutenant with the Motor

Transport Corps. He married a Schenectady girl and they have two children.

R. S. (BOB) PADEN



In common with most other hard workers, "Bob" has a hobby—the breeding of a special strain of barred Plymouth Rocks.

He travels his territory in a Buick roadster, is an all-around capable salesman, with a fine personality, and stands high with his customers. He knows his goods—he has confidence in his Company—and he sees that his customers get good service.



INTERESTING ORDERS

A CONTRACT of interest in the Indianapolis Office territory was recently closed with the Northern Indiana Power Company. This contract includes: seven FKO-136 400-amp. 73,000-volt and eight FKO-136 400-amp. 37,000-volt oil circuit breakers. Each breaker is equipped with bushing type current transformers and in addition the contract includes outdoor potential transformers and an outdoor steel instrument house for each circuit breaker installation.

The Northern Indiana Power Company and the Wabash Valley Electric Company are recently acquired Kelsey-Brewer holdings. These two companies are supplying energy for light and power to a large number of cities and towns in the northern and western portions of Indiana. A super-power plant located on the Wabash River and right in the coal fields is nearing completion. Transmission lines totaling approximately 800 miles are now under construction from this super-power plant to Clinton, Sullivan, Greencastle, Kokomo, Noblesville, Wabash, Rochester, and Logansport. The high-tension switching equipment previously mentioned will be used for inter-connecting and synchronizing the transmission system.

A G-E switchboard and several FH-209 motor-operated, cell-mounted station circuit breakers for the super-power plant were contracted for by Stone and Webster who are building this station complete for the Kelsey-Brewer interests.

Power-plants as auxiliaries to the super-plant are located in the cities previously mentioned and the Northern Indiana Power Company was quick to see that saving as well as operating advantages of the carrier current telephone over the ordinary wired telephone system. Two G-E 50-watt carrier telephone equipments are now operating successfully between Wabash and Rochester and three 50-watt equipments were included in the high tension switching equipment contract and are now being installed at Indianapolis, Noblesville, and Kokomo, Indiana. These when installed will provide carrier communication for a total mileage of 141 miles. It is anticipated that several of the 50-watt equipments will later be replaced by 250-watt equipments to give a longer range of communication.

The Chile Exploration Company recently placed an order with the International G-E covering a 3480/1440-kw., 290/120-volt, 12,000-ampere synchronous converter with revolving armature type booster, and a 3700-kv-a., three- to six-phase water-cooled transformer with reactors and switching equipment for tap changing underload. This apparatus will be installed in the Chuquicamata plant of the Chile Exploration Company and will be used for copper refining. This is in the nature of a repeat order, a similar converter of G-E manufacture having been in service at this plant for some time.

When designing their present motor, the Buick Motor Company, at Flint, Michigan, seriously considered the installation of a timing chain in the front of the motor. At this time we submitted samples of our textolite gears for tests in the Buick experimental department, and pending the results of those tests the installation of chains was held up.

The tests were severe and the results remarkable. In one instance a motor was run the equivalent of 32,000 miles, during which time the gears operated noiselessly and with but a fraction of a thousandth of an inch wear.

Textolite gears were chosen in preference to chains and the first order, placed June 15, 1923, called for 17,500 gears. Since then we have received several orders aggregating 85,100 gears, and at the present time the requirements for Buick motors approximate 17,000 gears a month.

Two years ago the Yale & Towne Manufacturing Company, Stamford, Conn., purchased the patent rights of the C. W. Hunt Company, of Staten Island, covering the manufacture of baggage trucks. The Yale & Towne Company completely redesigned the trucks with respect to both electrical and mechanical details. G-E engineers placed their services at the disposal of the Yale & Towne Manufacturing Company. As a result we secured an initial order for 200 motors and have recently received a repeat order for 200 additional.

The Eastern and Western Lumber Company, of Portland, Oregon, recently placed an order with us calling for complete electrical equipment to change their mill from steam to electric drive. The equipment consists of a 2500-kw. steam turbine, a switchboard and a number of motors for driving the various machines used throughout the plant.

The main drive motors are equipped with magnetic control, this being the second mill in the northwest to install such control.

The Eastern and Western Lumber Company is one of the oldest operating mills on the coast. The mill has a capacity of 225,000 feet of lumber per eight-hour shift.

Recent orders for Automatic Switching Equipments included a number of interesting items. The Conestoga Traction Co. ordered from us three 300-kw. complete automatic stations after several years experience with one G-E automatic and one of our competitor's automatics. The Philadelphia & Reading Coal & Iron Co. have ordered five of our automatic switching equipments for mining motor-generators. These are unique in that they have been placed on a standard basis and are now called for in the factory by the new factory order drawing which reduces the engineering and drafting time and permits shorter delivery.

Repeat orders for automatic switching equipments have been received from a number of our customers during the past month. The Holyoke Water Power Company has ordered a 1500-kw. automatic hydro-electric station, the Los Angeles Railway Corporation, a 1000-kw. automatic synchronous converter station and a switch power control and indicating system has been shipped to the Kansas City Power & Light Company.

The New York Office reports the sale of eleven FK-130 oil circuit breakers, three 10,000-kv-a. auto-transformers, thirteen 10,000-kv-a. transformers and a number of reactors to the Brooklyn Edison Company. This apparatus will be installed in the new Hudson Ave. station of that company, a station which upon completion will be able to supply 500,000-kw. of electrical energy. This order was taken in the face of considerable competition by G. S. Rose, of the Railway and Lighting Department, New York Office.

The Brooklyn Edison Company is one of the most progressive of public utilities and is of particular interest to G-E employees since it is one of the companies in which the G.E. Employees Securities Corporation has invested.

Brooklyn Edison serves practically the entire Borough of Brooklyn, an area which on January 1st of this year had an estimated population of 2,082,000. Last year the company sold a total of 381,232,300 kilowatt-hours of electricity, an amount double the figure of 1917, and four times that of 1914.

We recently received orders from the Western United Corporation at Aurora, Ill., for two 6000-kw., 13,800-volt steam turbines, a switchboard, transformers, switching equipment, and all the electrical equipment for station auxiliaries for a new power station.

This customer recently agreed to take over the entire load of the Fox River Division of the Aurora, Elgin & Chicago Railroad at a definite date. The assumption of this load necessitated the erection of a new power plant and the complete installation of generating apparatus within a five month period.

The placing of this contract with our Company was largely due to a visit which the General Manager of the Western United Corporation made to our turbine factory. After reviewing the proposed production schedules he decided to place his entire requirements in our hands. The first turbine was shipped exactly as scheduled.

E. Farber, of the Lighting Department, Chicago, negotiated this transaction.

The Syracuse Lighting Company at Syracuse, N. Y., is installing new lighting units in the business section and also in James Street, the leading residential street of Syracuse, N. Y. The units for the business section are 6.6-ampere, ornamental, luminous arc lamps with alabaster ripple globes. Two are being mounted on each pole. We procured the order for these units together with rectifier units and the necessary switchboard. James Street will be lighted with very beautiful lantern type Novalux Form 18 fixtures using 400 candle-power, 7½-ampere series incandescents. These are also supplied by constant current transformers of our manufacture. This transaction was negotiated by C. C. Crowell, salesman at our Syracuse Office.

The Interstate Public Service Co. has increased the capacity of their Goshen, Indiana, plant by the addition of a 15-panel switchboard to take care of their 2300-volt power distribution. Their 33,000-volt distribution will be extended by the use of two Type FKO-136 37,000-volt oil circuit breakers and auxiliary equipment.

Four modern G-E elevator equipments are now being installed in the Marquette Building, 140 Dearborn Street, Chicago, Ill. This sixteen-story building was formerly served by eleven elevators, ten of which were of the hydraulic type. The new equipments will replace four of the hydraulics and consist of four 25-h.p., 65-r.p.m., gearless traction motors, each motor being operated from a 20-kw., 1200-r.p.m. motor-generator set by generator field control. The elevators will run at a rate of 600 feet per minute.

An interesting feature of the installation is that under all conditions of loading, the variation of elevator car speed from normal is reduced to a very small percentage. The slow speed points on the car switch used for making floor landings are also effected by the special control design, making it relatively simple for the operator to bring the car to the floor level with practically no false stops.

The Columbus, Ohio, local office reports the sale of 304 Form 8 Novalux fixtures with Type II transformers, to the village of Bexley, Ohio. Bexley is a small town of but 3500 inhabitants and the bond issue to cover the cost of the lighting scheme is approximately \$90,000. The sale was made through our distributor, the Erner and Hopkins Company.

This contract is of interest since it clearly demonstrates that even the small towns have a good appreciation of the benefits of adequate street lighting.

We have just closed a contract with the New England Power Company for a 7500-kv-a. synchronous condenser with complete automatic control. This apparatus will be installed in the plant of the American Steel & Wire Company, Worcester, Mass., and will be utilized primarily for voltage regulation, power-factor control being a secondary consideration. To the best of our knowledge this is the largest automatic synchronous condenser equipment yet ordered in this country. Available records indicate that but four automatic synchronous condenser equipments are now in operation in the United States, three of which are G-E.

The Georgia Railway & Power Company has purchased three 30-kw. and two 20-kw. Type RO, pole-mounted constant current transformers for supplying current to its 80- and 600-candle-power street lights.

These are the first outdoor type constant current transformers to be used by this company. The lighting program for the coming year includes thirty-five additional transformers of this type which will eventually replace all station type constant current transformers.

The new Gandy Bridge now under construction across Tampa Bay between Tampa and St. Petersburg will be lighted by ninety-three Novalux highway lighting units. They will be attached to tubular steel poles spaced 300 feet apart and at a height of 30 feet from the road surface. The system will make use of lead covered cable laid in conduit and will be fed by a Type RV constant current transformer operated by the bridge tender. This will be the longest stretch of road surface lighted in this manner in this section of the country.

The Pacific Gas & Electric Company has just ordered six Type LSB-2C 6-ton electric storage battery locomotives each complete with MV-17 exide ironclad batteries and HN-825 170-volt motors.

The order also includes six complete extra battery compartments and batteries and four 15-kw. charging equipments complete with CR7002 automatic starting compensators and charging panels.

This equipment will be used by the purchaser in the construction of the tunnel for the new power house known as Pitt No. 3.

The Philadelphia Rapid Transit Company has recently installed nine trolley busses, equipped throughout with General Electric apparatus. These busses will operate on Oregon Avenue, Philadelphia, and serve as feeders to trolley lines until such time as the traffic justifies the heavy investment necessary for regular trolley rail lines. This service has made a strong appeal to the public and is being well patronized.

During the past year we have sold a number of repulsion induction furnaces for melting non-ferrous metals. The desirability of this type of furnace is indicated by repeat orders recently received from the Rome Brass & Copper Company, Rome, N. Y., and the Western Cartridge Company, of East Alton, Ill. These concerns each ordered two additional furnaces.

Heating by induction is the most desirable method, particularly for brasses and bronzes, and other copper alloys, and it is the most economical when used continuously. There are but two types of brass melting induction furnaces on the market, and ours is the only one which will successfully handle copper, bronzes and red brasses. The repulsion induction furnace is described in publication 69712.

Way down in southwest Texas is located a town of less than 20,000 people, known as Abilene, which for years was referred to as just a little "cowtown" on the T. & P. Railroad. But Abilene recently signed a contract with the West Texas Utilities Company, and it soon will be the best lighted town of its size in the Southwest. Work has begun on the installation of a White Way system consisting of 465 Form 8, G-E Novalux units mounted on Union Metal standards.

The Mount Shasta Power Corporation has ordered for their Pitt No. 3 development fourteen Type FH-209 oil circuit breakers with auxiliary equipment for the control of three 27,000-kv-a. turbo-generators described in a previous issue of THE MONOGRAM.

A contract of interest was awarded our Company by the Illinois Power and Light Corporation. Materials purchased were for Topeka, Kansas, and Venice, Ill., properties of that corporation.

The Topeka Edison Co. has under way a new power house in which will be installed two 7500-kv-a. and two 1563-kv-a. Curtis steam turbines.

G-E apparatus on order for Venice consists of seven FKO-39, 73,000-volt oil circuit breakers, six 66,000-volt oxide film lightning arresters, three 33,000-volt arresters, and sixty-three 73,000-volt Type LG-207 disconnecting switches.

An order from the Milwaukee Electric Railway and Light Company includes thirteen of the Type FHD-17 15,000-volt oil circuit breakers having horizontal isolated phase arrangement. The breakers and their control equipment are for the control of a 30,000-kv-a. turbo-generator and five new 13,200-volt feeder circuits. This order is the fourth received from this company within two years for the Type FHD-17 breakers.

We have received two orders from the Lehigh Coal and Navigation Company which include truck type safety first enclosed oil circuit breakers. One order covers eight Type FK-130-20-B oil circuit breakers mounted on trucks for use on 11,000-volt circuits. The other includes ten Type FK-132-A and seven Type FK-53-B oil circuit breakers mounted on trucks for use on 11,000-volt circuits.

A recent order from the Adirondack Power and Light Corporation, Schenectady, N. Y., calls for a 7300-kv-a. vertical waterwheel-driven generator with complete automatic control. This equipment will be installed at the Sprite Creek power plant of the Adirondack Corporation and it is believed to be the largest waterwheel generator yet ordered with full automatic control.

We recently sold a 20,000-kw. steam turbine, a switchboard, a 50,000-kv-a. bank of step-up transformers together with oil switches and lightning arresters to the Tennessee Electric Power Company. The apparatus will be installed in a new steam station which that company is erecting at Hales Bar, Tennessee. The new station is being built adjacent to the large Hales Bar hydro-electric station.

A Bit of History

THE far-sighted policy of General Electric in advocating three-phase alternating-current apparatus for central station use is shown in an old letter turned up in the files of the Bronx Gas & Electric Co., of New York City, by Stuart Wilder, electrical engineer of the company, and sent to T. Beran, New York District Manager. Mr. Wilder wrote:

"In looking over some old papers, I found a proposal from the General Electric Company, dated May 23, 1894, a copy of which I am enclosing, and as we have just decided to change from a two-phase, four-wire system, to a three-phase, four-wire, it is interesting at this time."

The old letter urged the use of three-phase systems, because "it is entirely possible to operate not only incandescent lights, but arc lights and motors from the same machine and from the same circuits at the same time. Any company installing incandescent apparatus should adopt this system because from it motors can be operated and power furnished up to the full capacity of the dynamos during the

day time, thus enabling the machines to earn a double income and not, as hitherto, necessitating the installation of separate, independent machines and independent circuits for power—in short, the alternating-current machine with its regular circuits can be utilized for furnishing power, distributing current by means of a new type induction motor, which is the most perfect piece of electrical mechanism this Company has as yet turned out.

"It operates without brushes or commutator with no movable connections between armature and fields, and its only wearing parts are the bearings. These motors are absolutely without spark, cannot be burned out and start up carrying full load."

The letter was signed "General Electric Co., Curtis & Dean." Curtis & Dean was a firm representing the Thomson-Houston Electric Co., and for a few years after the amalgamation Curtis & Dean signed the original firm name to their correspondence. C. R. Dean is still in the New York Office.

AROUND THE CIRCUIT



E. E. Dawes, of the Apparatus Section, who has been away from the office for some time on account of illness, is back on the job, feeling much improved.

Miss Suzelle Miller, one of the file clerks in the Apparatus Order Section, was seriously injured in a recent automobile accident. Miss Clarice Way is temporarily replacing Miss Miller.

At the advice of her physician, Mrs. C. F. Nix has asked for a temporary leave of absence. We hope that she will regain her strength rapidly and soon be back on the job.

There has been added to the Supply Department routine section the following new clerks: Miss Leona Hunter and Miss Claire Lee Taylor.

A. K. Baylor, of the New York Office, paid us a visit last week, stopping here for a day enroute to the Coast.

We were represented at the recent Street Railway Convention at Atlantic City by E. H. Ginn and F. A. Kroner, of the Atlanta Office, and B. Willard, of the New Orleans Office.

E. M. Clapp, of the Mill Power Department, attended the Boston Textile Exposition held the first week in November.

Frank Stanton, of the Warehouse Supervision Department, at Schenectady, spent several days in Atlanta, going over our warehouse and order routine.

Miss Essie Langford, one of the stenographers in the Lamp Department, resigned as of October 1st, and shortly afterwards changed her name to Mrs. Carl Elmer Thornton. We all wish her much happiness.

E. F. Pearce, of the Motor Division of the P. & M. Department, attended the Small Motor Conference recently held at Lynn.

E. T. Austin, our Street Lighting Specialist, attended the Street Lighting Specialists' Meeting at Swampscott, Mass., October 3rd, 4th, 5th. He reports a number of interesting developments.

F. H. Bailey, our District Meter and Transformer Specialist, has returned from attending meetings covering these and kindred lines and reports many things of interest, particularly the new line of regulators that we are marketing.

T. M. Salisbury has been added to our supply organization at New Orleans. Mr. Salisbury is a Columbus, Ga., boy and a graduate of Georgia Tech. and we are glad to add him to our family.

Because of the very fine football team that Georgia Tech. has this year, we are having quite a few week-end visitors. Among these was H. R. Worthington, President and Manager of the G-E Jobbing House, at Jacksonville, Florida, the Florida Electric Supply Company, who came up to see the University of Florida play Georgia Tech. Tech. was expected to win but Florida played a wonderful game and held Tech. to a 7 to 7 tie. "Worthy," as he is affectionately known, had some inside information as to the caliber of his team and went home a happier and richer man since he cashed in on several small wagers.

J. W. Vaughan, Jr., has been appointed Resident Agent at Greenville, South Carolina, with offices at 901 Woodside Build-

ing. Mr. Vaughan's territory will include the counties of Greenville, Spartanburg, Anderson, Pickens and Oconee.

Products of our Company were prominently exhibited at the recent electric show held by the Contractor Dealers Association at Charleston, S. C. O. H. Beymer, Supply Salesman in South Carolina, and D. A. Amme, salesman for one of our distributors, the Perry Mann Company, rendered valuable aid in making this show an unqualified success.

We had a delightful visit a few days ago from W. M. Perry, President of our South Carolina Distributing House, the Perry-Mann Electric Company, who spent the day with us enroute to Birmingham where he attended a meeting of the Southern jobbers.

Our District Engineer, H. E. Bussey, attended Camp Rice. He reported an interesting time.

E. T. Austin, street lighting specialist at the Atlanta Office, recently prepared a report detailing a comprehensive system of ornamental street lighting for the principal business thoroughfares of Charleston, S. C. The painstaking efforts of Mr. Austin are reflected in the following letter from the Charleston Chamber of Commerce.

The General Electric Company,
Atlanta, Ga.
Gentlemen:

Permit us, on behalf of the Charleston Chamber of Commerce, to thank your Company for the great assistance which has been rendered to the Street Lighting Committee of the Chamber of Commerce, in planning and formulating the report, which has been forwarded to the City Council, providing for a uniform system of ornamental street lighting throughout the principal business streets of Charleston.

The service rendered by your illuminating engineer has been invaluable and is greatly appreciated by the entire Chamber of Commerce.

Very truly yours,
Meigs B. Russell,
Manager.



Frank L. Healy, specialist on shoe and leather work, was married on October 6th, at Natick, Mass., to Miss Katharine McManus, a graduate of Wellesley College and for several years a teacher in the Girls English High School of Boston. Mr. Healy has been in the employ of the Company for 20 years.

Leroy B. Morrill, of the Power and Mining Department, was married on September 22nd to Miss Ruby B. Jacques, of Malden, Mass. Mr. Morrill has been with the Company eight years in the Lamp and Construction Departments and the Lynn factory. He is a graduate of the Lowell Institute.

The International Textile Exposition was held in Boston at the Mechanics Building the first week in November. The General Electric display of enclosed magnetic control devices for textile mill motors attracted considerable attention.

Approximately 75 G-E motors with control were used for operating the running exhibits of about 30 exhibitors. Charles A. Chase, Assistant Manager of the Mill Power Department, was in charge of the exhibit.



Cincinnati

who arrived September 27th, weight, 9½ pounds.

W. G. Stierhoff, for many years supply salesman at the Columbus, Ohio, Office, has resigned to become sales manager of the State Automobile Insurance Association.

Mr. and Mrs. C. J. Leesman announce the arrival, on August 22nd, of C. J. Leesman, Jr. "Junior" arrived on his father's birthday.

It is not too late to congratulate

Mr. and Mrs. Percy Worth upon the birth of their third daughter, Laura Dell,



New York

Frederick Clark Bates, 55, for the last twenty-seven years connected with the New York Office, died Tuesday, October 2nd, in his home at 117 Amity Street, Brooklyn. He was a trustee of the South Brooklyn Savings Bank and a member of the New York Engineers Club and the American Institute of Electrical Engineers. He leaves his wife, one daughter and one son.

Theodore Beran, for six and a half years president of the Sibley-Pitman Electric Corporation, New York City, electrical distributors, resigned from that position October 8th. Mr. Beran occupied this position in addition to his duties as New York District Manager of the Company. The increasing business of the Sibley-Pitman Electric Corporation requires the entire time of its president and Mr. Beran has withdrawn in order that the office may be filled by someone who can devote his whole attention to the affairs of the Company.

At a meeting of the Board of Directors, October 2nd, J. G. Johannesen, Manager of the Southern Electric Company, Baltimore, was elected president to fill the vacancy caused by Mr. Beran's resignation. Mr. Johannesen has been prominent in the affairs of the Supply Jobbers Association and is well known in the electrical industry.

Frederic Cutts, Manager, New Haven Office, addressed a recent luncheon gathering of the New Britain Rotary Club. Mr. Cutts took as his subject the more recent developments, and mentioned specifically the electrification of steam railroads, and the development of steam and mercury turbines. He laid particular stress on the need of higher lighting intensities for manufacturing plants as a means of increasing production, citing many facts and figures which can not fail to stimulate interest in better lighting.

The New Britain Rotary Club is very active and the membership consists of prominent manufacturers and merchants.

Construction work in the New Haven territory continues to be attended to with the usual energy, as evidenced by the recent installation of a 20,000-kw. turbo-generator at the South Meadow Station of the Hartford Electric Light Co. The total time required to install and place the unit in service was thirty-six days. The comments of Mr. T. H. Soren, Vice President of the Hartford Electric Light Co., are of sufficient interest to quote.

"Your Construction Department here did fine work, and the machine is highly satisfactory. In this connection, I can not too highly commend the service of your man in charge, Mr. Warnky."

Cuyler C. Supplee, who for the past four years has been with the Industrial Department, has been transferred to the Public Utility Department of the Philadelphia Office and

assigned to Public Utility customers in southern New Jersey and the subsidiaries of Holding Companies in the vicinity of Philadelphia. This arrangement reestablishes his relations with many customers with whom he had very close relations when he was acting as a Supply Salesman in that territory. His former associates and old customers have extended to him a warm welcome.

R. E. Strickland, of the Schenectady Local Sales Office, now has the laugh on the rest of us. At the old home week in Scotia, he recently won a new Hanson Six, and is no longer forced to tolerate his old car.

P. A. Dyer has been appointed superintendent of the New York Service Shop.

E. G. Kniffen, of the Syracuse Office, is the proud father of a daughter, Dorothea Louise Kniffen. Mrs. Kniffen was, before her marriage, Johanna Freytag, of Schenectady, where she was a member of the Power and Mining Engineering Department.

J. A. Shorpy is taking the position formerly held by L. M. Kennard, of the New York Office, who recently resigned.

The General Electric Club of New York baseball team recently completed their season and were the winners of a beautiful silver trophy. The trophy now reposes on the table in the New York Office Library.

Miss Sarah Taylor, who has been associated with G. L. King's Department, at New York, for a number of years, left on November 1st, to make her home in southern New Jersey. The members of the pricing section presented her with a silver basket, on which was engraved a suitable commemoration of the occasion.

The G-E Woman's Club of New York gave a dinner recently at which Miss Taylor, Miss Smith and Miss Malone were the guests of honor.



Jordan Anthony Mason, a member of the Chicago Engineering and Construction Department, died at the Presbyterian Hospital, in Chicago, October 29, 1923. He was born at Richmond, Virginia, January 15, 1888, and entered the employ of the General Electric Company, at the Schenectady Works, in July, 1909, and was transferred to the Chicago District in April, 1913.

Mr. Mason enlisted for combatant service in the World War and was assigned to Company "A," 302nd Battalion Heavy Tanks. He returned to the Chicago Office after the war and specialized in Automatic Station and Substation field engineering.

Mr. Mason is survived by his parents, Mr. and Mrs. Jas. E. Mason, of Harborton, Virginia, and by his sister, Miss Virginia A. Mason, of Easton, Maryland.

J. B. "Jack" Holland, of the Chicago Office Engineering Force, is exhibiting his Quarter Century button with great pride. Jack started with us in April, 1898.

J. F. Shouse, who has been identified with the St. Louis Office sales organization for the past three years, recently tendered his resignation to go into business for himself at Louisville, Ky. Mr. Shouse will establish a manufacturers' agency to handle a number of lines of power plant equipment. He leaves our Company with the most kindly feelings towards its organization and assures us that he plans to continue to sell G-E apparatus and material wherever circumstances will permit.

The Monogram

H. B. Seybt, who formerly was connected with the Lighting Department, Schenectady, and for the past few months with the Chicago Office, has been transferred to St. Louis Office to fill the vacancy made by J. F. Shouse's resignation.



C. S. Hotchkiss, Merchandise Specialist of the Minneapolis Office, recently won a carving set as first prize in the handicap golf tournament of the Superior Golf Club, Minneapolis.

The Minneapolis Office has a large number of golf devotees. R. H. Parker, Manager, won the Dana Bullen cup for approaching at the Jobbers Meeting held at Association Island this summer.

THE FOLLOW THROUGH IS PERFECT "HOTCH"

A daughter, Jane, was born to Mr. and Mrs. Harry E. Scarbrough, November 4th. Mr. Scarbrough is in the Supply Department of the Chicago Office.

Miss Amy Founier of the Chicago Office, died October 9th. Miss Founier was in charge of the P.&M. files since 1912, and will be missed by her associates. She was highly regarded by the Chicago Office force for her pleasing personality, and in addition was one of the most efficient employees.



September 22nd and 23rd were red letter days for the Sales Organization of the San Francisco Office. About 55 men assembled Saturday noon, September 22nd, and were conveyed by automobiles along the scenic Santa Cruz Highway to Redwood Lodge, which is a delightful spot in the Santa Cruz mountains, about 70 miles from San Francisco.

After arrival there, various sports were indulged in, such as barn-yard golf, the exciting game of croquet and pocket billiards. At 6:30 p.m., the big triangle was sounded and the mad scramble for dinner began. A very tasty meal of steak with all the trimmings was served.

On September 19th, the Los Angeles, Portland, San Francisco and Seattle Offices of the Edison Lamp Works held an Edison Lamp Conference at the Oakland lamp factory for the purpose of revising stock estimates, facilitating ordering future requirements on the factory and determining ways and means of reducing the amount of stock necessary to properly serve our customers.

Those in attendance were:
E. P. Markee, Los Angeles Office
J. Hampton, Portland Office
J. Reinke, Seattle Office
R. M. Alvord, San Francisco Office
L. E. Voyer, San Francisco Office
J. W. Mahoney, San Francisco Office
A. E. Longmate, San Francisco Office
Miss P. Jones, San Francisco Office
H. H. Barrows, Oakland Lamp Factory.

The conference, with its interchange of ideas, is resulting in improved service and a material reduction of lamp stock investment. Also, it has resulted in bringing the coast offices in closer contact with the factory at Oakland.

"Twenty-five-year" men are an asset to any organization and our San Francisco Office is especially proud of the fact

that the men in that district, who wear Quarter Century buttons, have spent their years of service with the Company on the Pacific Coast.

R. F. Monges, after completing the Test Course at Schenectady, became Assistant Engineer of the San Francisco Office in March, 1899. Ten years later he assumed the duties of Local Engineer at the Portland Office, and in 1921 accepted the position of Engineer for the San Francisco Office. The members of the San Francisco Office were indeed happy to welcome Dick back home.



SAN FRANCISCO OFFICE OUTING AT REDWOOD LODGE

C. A. Loring, the genial Chief Clerk, and E. A. Hunt, General Salesman, handling the auto trade, allied themselves with the Company in San Francisco in 1892, and after more than 30 years of service still believe the San Francisco Office is about the right place, as they continue to perform their important duties with unwaning enthusiasm. Needless to say that Charlie and Ed are among the most popular members of that organization which has an undisputed right to be proud of its personnel.

W. H. Rademacher, of the Lighting Service Department of the Edison Lamp Works, Harrison Office, is in the San Francisco territory for a period of three months, to stimulate interest in better illumination. Meetings at which he is to be the principal speaker are being arranged through the co-operation of the Pacific Gas & Electric Company and the Pacific States Electric Company.



SAN FRANCISCO OFFICE EXECUTIVES

The above picture was taken just before Dr. Addison retired and includes the following: (Standing left to right) J. R. Auguston, H. L. Nagel, M. Rhine, L. E. Voyer, F. E. Boyd, C. A. Loring, A. V. Thompson, J. W. Mahoney, A. G. Jones, G. I. Kinney. (Sitting) R. M. Alvord, E. O. Shreve, Dr. Thos. Addison, J. V. Anthony, R. F. Monges.

L. E. Voyer, Assistant Local Sales Manager, in charge of Edison Lamp Sales at the San Francisco Office, died October 28th, after a brief illness. Mr. Voyer was in his thirty-third year. He was graduated from the University of Wisconsin with the class of 1911.



Philadelphia

vacations and as a result, Bill Hatton reports mail congestion due to picture post cards signed by "Bob."

The General Motors Company have enthusiastic supporters in S. F. Dibble and C. A. Raymond. These gentlemen are great boosters of the "Oakland" and will tell you all about their new cars.

E. D. Ryer, formerly of the Power and Mining Department, Schenectady, is now with the Philadelphia Office, Commercial Service Department, assisting in sales for the steel and cement industry.

H. P. Field, has been transferred from the Power and Mining Department, Schenectady, to the sales force of the Baltimore Office. At the present time, however, he is spending several months in the Commercial Service Department, Philadelphia.

For the information of the curious—it is not a bootlegger's bag that Frank L. Rice, of the Philadelphia Office, carries around with him, but an up-to-date Lighting Research Laboratory. It has been the privilege of Frank to have exhibited this laboratory or suitcase display to many groups of prominent persons in electrical circles. It is our understanding that Frank had the pleasure of addressing the staff of meeting of Local Managers of the Eastern Shore Gas and Electric Company, at Salisbury, Md., recently on the subject of the Incandescent Lamp. Incidentally, they were very much interested in the demonstration of the suitcase with the sprayed lamps of the various colors, and as a result, plan putting on an extensive lamp sales campaign.

After a leave of absence D. C. Spooner, Jr., has returned to his duties in the Philadelphia Office. Dave, while away from the Company devoted his time to putting on house wiring campaigns and the experience he gained will undoubtedly be of benefit to him. All who know Dave Spooner are glad to welcome him back again into the fold.



General Office

C. E. Stewart, of the Automatic Station Division, spoke before the Philadelphia Section of the A.I.E.E. on Power Supervisory Control and Indicating Systems, Monday evening, December 10, 1923.

Robert F. Cahill, a graduate of the Schenectady Test Course, and now enrolled in the Supply Sales Training Course, is spending three months in the Philadelphia Office as a part of his sales training. We all hope that he will be located permanently in the Philadelphia District.

C. H. Cochran, of the Industrial Sales Department, Philadelphia Office, has a habit of motoring West for his

H. E. Lockett, of the Automatic Station Division, is now at the San Francisco Office on temporary duty in connection with the exploitation of Automatic Switching Equipments of all kinds.

A. E. Anderson is in Baltimore in connection with the application of Automatic Reclosing Feeder equipments with high speed circuit breakers to the railway circuits of the United Electric & Railway Company.

W. L. Melarkey is enroute to the San Francisco Office, where he will assume his new duties as Switchboard Device Specialist. Mr. Melarkey was formerly in the Switchboard Supply Sales Section at Schenectady.

W. H. Wild, of Marine Sales, recently returned from an extended business trip to England. Mr. Wild visited the Cammell-Laird Shipbuilding Company, Ltd., at Birkenhead, in connection with the Diesel Electric drive for three new ships now under construction for the United Fruit Company. He also visited shipyards in Scotland for the purpose of studying the latest developments in that country on Diesel engines.

W. C. Watson, Assistant Engineer of the Marine Department, sailed November 17th on the S. S. *America* for Cherbourg, France. Mr. Watson will confer with our associated companies and with shipbuilders in France and Italy in connection with our program for the installation of turbine electric and Diesel electric machinery in large vessels.

L. L. Hughes and E. M. Murphy of the University of Pittsburg, Class of '23, are engaged in the Students' Training Course at Schenectady.

W. D. Manson left Schenectady, November 6th, on a business trip to Philadelphia, Harrison, Newark, and New York, in the interests of the Warehouse Supervision Department.

H. L. Unland, for the past eleven years a member of the Power and Mining Engineering Department resigned on December 1st to accept the position of electrical engineer with the Victor Talking Machine Company, at Camden, N. J. Mr. Unland was graduated from the University of Nebraska in 1910, and in the same year entered Test at Schenectady. He completed the Test Course in 1912. During the World War Mr. Unland was an engineer in the Ordnance Department of the United States Army. Mr. Unland leaves with the best wishes of his associates for success in his new field.

C. F. Pitman, of the Industrial Control Sales Department, recently returned from a business trip through the Philadelphia District. Mr. Pitman visited the Philadelphia, Baltimore, Pittsburg and Youngstown Offices, where he advised with the Control Specialists concerning the latest control developments. He also called upon several customers in the coal mining regions and in the steel industry to study control problems. Mr. Pitman will leave this month for a similar trip through the Atlanta and Cincinnati Districts.

President Swope was recently made a life member of the Corporation of the Massachusetts Institute of Technology. Mr. Swope was graduated from M.I.T. in 1895.

John Abrahams, formerly of the General Accounting Department, assumed the duties of the Cost Record Section of the Publication Department, November 1st. Mr. Abrahams succeeds Allen Beer.

The following men have recently joined the Central Station Commercial organization.

H. F. Buchanan, transferred from the International Company; C. L. Conrad, a graduate of the University of Illinois, who has just completed the Test Course; H. V. Erben, transferred from the Central Station Engineering Department, and Richard W. Gaskins, formerly of the Industrial Control Department.

B. K. Swarts, a graduate of the University of Michigan, has just completed the business training course in the Accounting Department and has recently become a member of the Central Station Commercial Department.

C. B. Broschart and A. R. Honig, Jr., have been transferred from the Central Station Commercial Department to the District Office organization. Mr. Broschart goes to the Philadelphia Office and Mr. Honig to Chicago.

W. C. Schroeder, Rose Polytechnic, 1921, recently transferred from the Industrial Control Engineering Department to Industrial Control Sales. Mr. Schroeder took the Test Course at Schenectady before entering the Engineering Department.

Ralph Randall, of the Railway Department, has been transferred to the Oklahoma City Office. Mr. Randall will look after certain public utility companies in his new territory.



C. B. Shipp has been appointed Assistant Engineer of Salt Lake City Office, succeeding R. F. Penman, who has been given leave of absence for post graduate work at Cornell University.

R. M. Spurck, Switchboard Department, Schenectady, gave an interesting talk, preceded by an informal dinner, before the Colorado Section of A.I.E.E., on November 2nd. His subject was the new development in oil circuit breakers and subsidiary material.

Miss McClain, of the Chicago Office, recently passed through Denver and stopped off with us for a few hours. The train on which she left was wrecked a few miles east of Denver. We were relieved to learn that she was uninjured.



SOME DENVER SNAPSOTS—(LEFT) STENOGRAPHERS GO MOUNTAIN CLIMBING. (CENTER) B. C. J. WHEATLAKE TAKES HIS CUSTOMERS FISHING. (LEFT TO RIGHT) H. L. VAUGHAN, MOUNTAIN STATES MACH. CO.; B. C. J. WHEATLAKE, MR. MCCANNON AND MR. MCCLURE, DENVER GAS AND ELEC. LT. CO. (RIGHT) WAS IT DIPLOMATIC OF WHEATLAKE TO CATCH ALL THE FISH?

New York Office Adopts Labor Saving Devices

THE New York Office Mailing Department has recently purchased two new devices which have greatly simplified the work of the department and have saved considerable time and labor.

One of these devices is the Universal Folding Machine. This machine makes all of the parallel or angular folds required for letters, booklets, circulars and folders in about a tenth of the time, a tenth of the space and at a tenth of the cost of hand folding. It handles sheets as small as 5½ by 6 inches and as large as 12 by 16 inches, and counts and delivers the finished pieces at

the rate of 5000 or more an hour. It is electrically driven and automatically fed.

The other machine is known as a Postage Meter. This is a printing and recording mechanism which prints the user's license number and cancellation mark on letters. The machine is rented from its manufacturer, and is registered and set by the Post Office. It handles 250 pieces of mail per minute and has an envelope sealing attachment. The machine thus seals the letter, stamps it, counts it, and stacks it for tying into bundles. It has proven a great labor and time saver.



WHAT WE FIND IN THE PRESS

WM. F. JACOB, *Librarian*

THE ELECTRIFICATION OF NORTH AMERICA

By GUY E. TRIPP

Chairman, Westinghouse Electric & Manufacturing Co.,
(*World's Work*, September, 1923; pages 498-504.)

The water power of North America consists of sixty-five million horse power of which only ten million is utilized, while fifty million is generated by means of steam. Less steam generation and more water power will conserve our dwindling coal and oil resources. Water power conserves human labor as a hydro plant uses one-twentieth of the operating staff of a steam plant. A hydro plant is, moreover, a more permanent asset, as rapid improvements are not so prevalent as in the steam generator field, thus making expensive replacements unnecessary.

Water power, however, is unlike steam power in that it is not under human control. A stream which in certain seasons may generate five hundred million horse power will in other seasons produce barely twenty thousand horse power. Thus for water power to be an efficient venture, interconnection must be resorted to, leading to a national so-called "super-power" system."

The advantages of such a system are:

That it will cheapen electric power, and make it available to the rural districts.

That it has no limitations, other than topographic.

That it will bring about a new era of progress in America through greater replacement of human labor by electric power.

That it will permit electrification of railroads.

That it will help the farmer by cheapening fertilizer.

That it will aid in our national defense, by a better distribution of war work.

A super-power system can only come into being through individual state legislation. Any attempt on the part of the Federal Government to bring this about might be resented by the states and by public opinion.

Again, if such a system is favored, it must not suffer by political control if it is to gain the confidence of the large manufacturing interests. It must not be over-regulated by Federal commissions.

A SALES MANAGER'S RULES FOR LETTERS TO SALESMEN

By ROGER DAVIS

(*Printer's Ink*, September 13, pages 41-42, 44.)

A vice president and general manager of a well known specialty house owes his advancement, it is said, to the fact that he could write sincere and friendly letters to the men on

the road. His letters as a sales manager were not the "do-it-now-and-do-it-quick" kind, but they kept a friendly relation between the house and the man in the field.

Below are some of the rules given by this executive, each of which is explained or illustrated in the article:

Never write a letter when you are mad or in a hurry.

Never try to be clever or sarcastic in a letter.

Don't over-congratulate.

Don't write periodically.

Classify your men.

Can the cant.

Make a call down specific.

AN EXPERIENCE IN SCHOOLING DEALERS

By GEORGE R. PURVIS, of the Hurley Machine Co.

(*Electrical World*, September 9, pages 511-12.)

This company found it an obstacle to their business if the dealer was not kept posted as to the operating and technical facts of their line of merchandise, and it was decided to make trained salesmen out of their dealers.

A number of dealers were invited to visit the manufacturing plant and were given a course in the history and development of the company, and were taken on a detailed investigation of the factory activities. They were sent out on selling trips with the company's trained salesmen, and a careful record kept of the ability of the embryo salesmen. Every effort was made to enthuse and develop the raw material as a qualified salesman for the Hurley Company—and also a sincere friend. Results soon showed through sales in the territory represented by the "graduates" of this course.

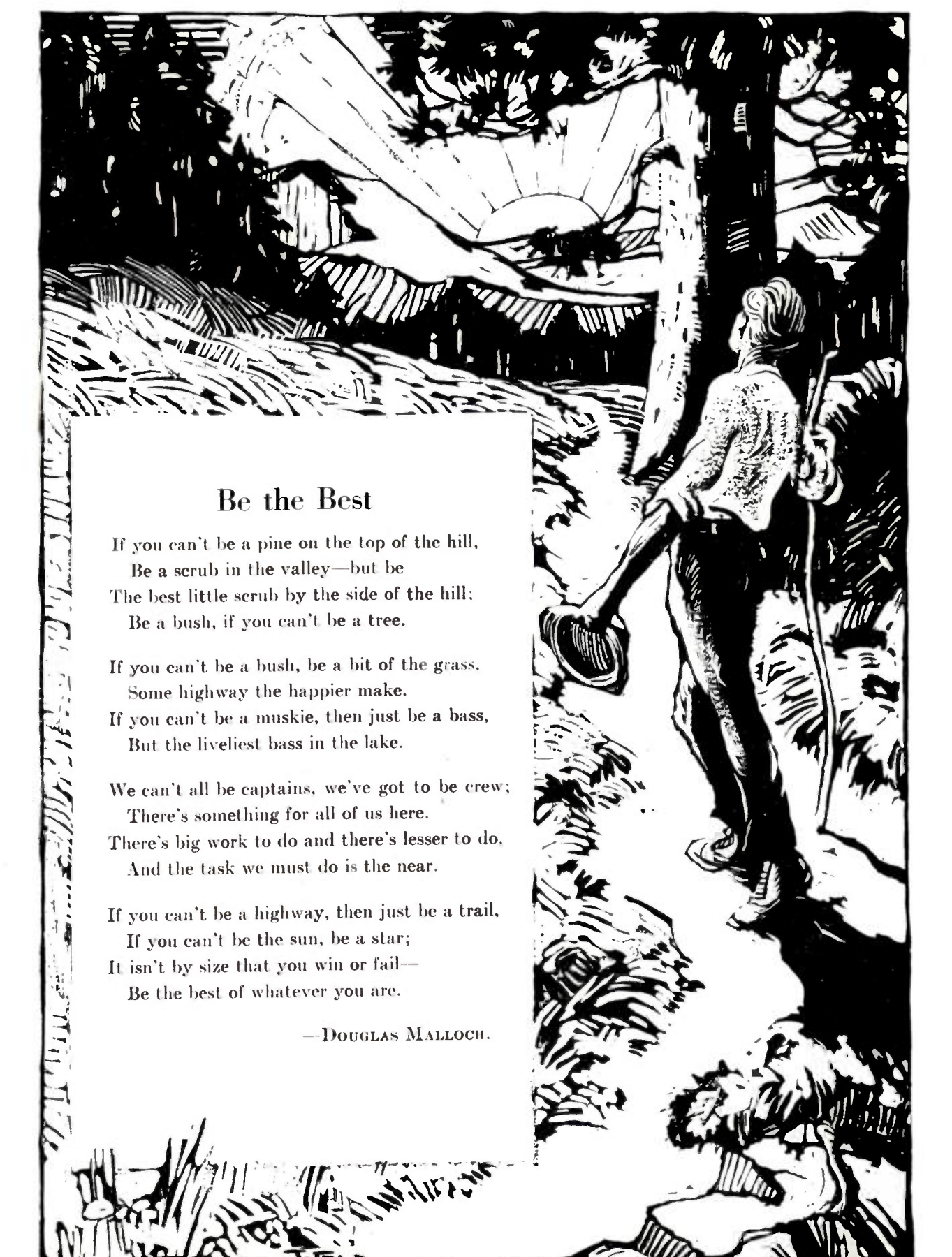
This activity has been found so valuable that a Hurley School of Salesmanship has been started the object of which is to put two thousand trained salesmen in the electrical merchandise field.

A PACEMAKER FOR SALESMEN

By W. L. BARNHART

(*Printer's Ink*, September 6, pages 165-166, 168.)

"All horsemen understand the advantage of having a pacemaker in order to bring out the best from any promising colt in their training camp." The author applies the same system by recommending that a sales manager keep the sales staff posted as to the activities of the star salesman. He mentions one instance of having a hard-hitting salesman make a flying trip through the various territories of his firm, and having telegrams posted at the main office and field offices showing how this salesman progressed, and the new customers gained.



Be the Best

If you can't be a pine on the top of the hill,
Be a scrub in the valley—but be
The best little scrub by the side of the hill;
Be a bush, if you can't be a tree.

If you can't be a bush, be a bit of the grass,
Some highway the happier make.
If you can't be a muskie, then just be a bass,
But the liveliest bass in the lake.

We can't all be captains, we've got to be crew;
There's something for all of us here.
There's big work to do and there's lesser to do,
And the task we must do is the near.

If you can't be a highway, then just be a trail,
If you can't be the sun, be a star;
It isn't by size that you win or fail—
Be the best of whatever you are.

—DOUGLAS MALLOCH.



Millions of American women voted for President in 1920
and are finding time to take active interest in civic affairs

The suffrage and the switch



The General Electric Company is working side by side with your local electric light and power company to help lift drudgery from the shoulders of women as well as of men.

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No woman should be required to perform by hand domestic tasks which can be done by small electric motors which operate household devices.

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