1931

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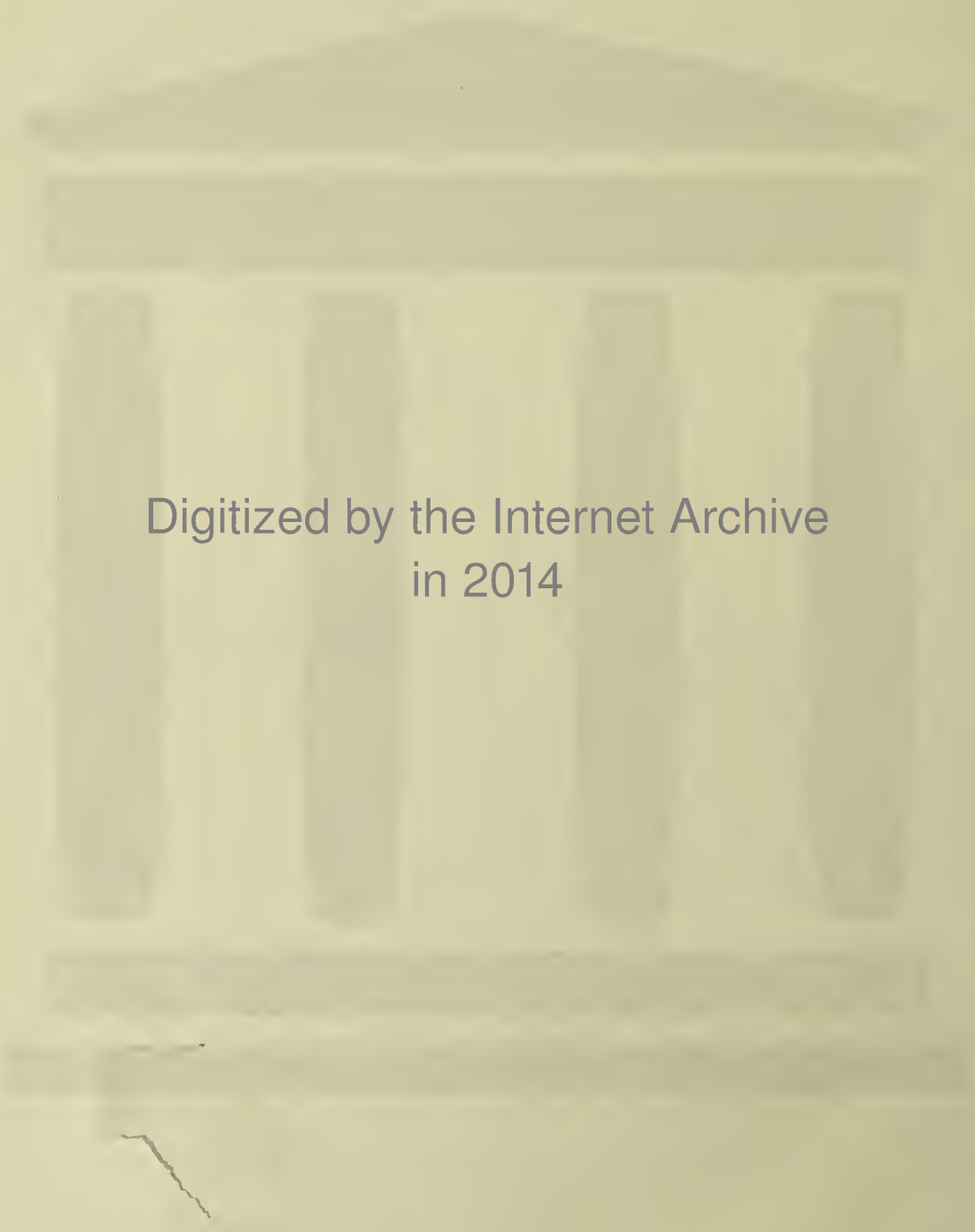

SOME NEW AND INTERESTING DEVELOPMENTS IN THE ELECTRIC LIGHT AND POWER INDUSTRY

Submitted by

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GRADUATE THESIS

Boston University
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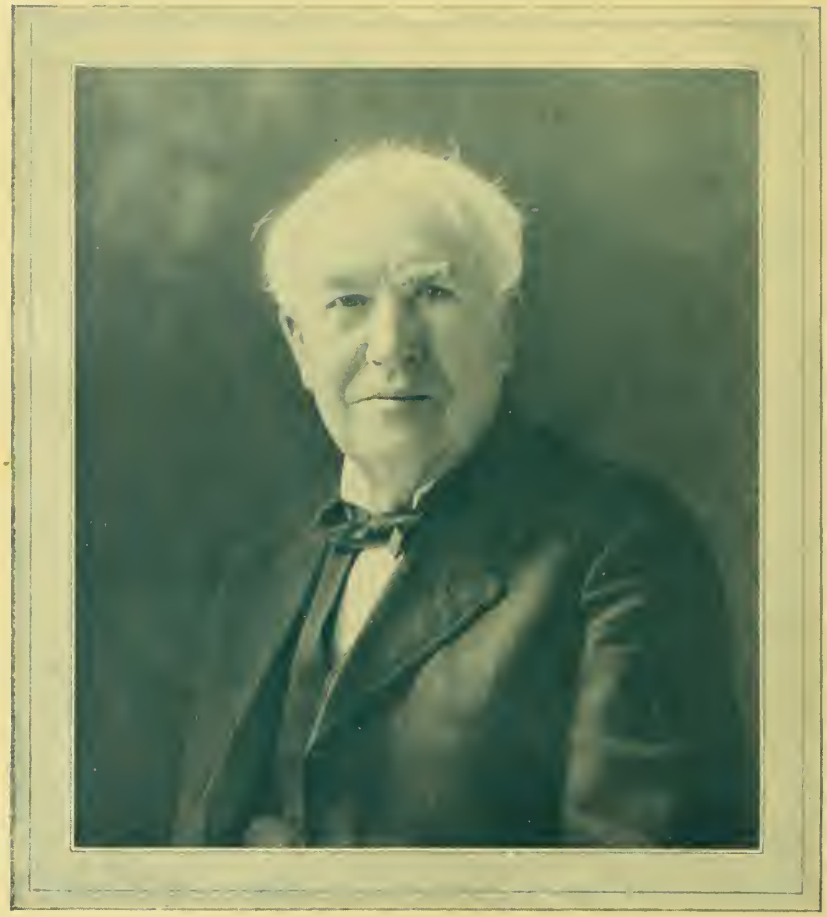

He has led no armies into battle—he has conquered no countries—he has enslaved no peoples—yet he wields a power the magnitude of which no warrior has ever dreamed. He commands a devotion more sweeping in scope, more world-wide than any other living man—a devotion rooted deep in human gratitude, and untinged by bias of race, color, religion or politics.—*Arthur J. Palmer.*

50th Anniversary
of the
Invention of the Edison Lamp

A Living Testimonial
to
America's Greatest Scientist

1879 LIGHT'S GOLDEN JUBILEE 1929

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they weren't of much account; they were too sensitive and couldn't be used over a very great distance, etc.[1] The difficulties caused by the conflict of these two systems and the endeavor to straighten out these difficulties brought about the organization of the present National Electric Light Association which will be discussed more fully later in this paper.

Electrical developments continued to progress with the speed and power and startling creations which we have come to expect of that industry. Thomas Edison's great triumph, the incandescent lamp--a loop of carbonized thread in a vacuum--was perfected in October of 1879. It is this lamp which has turned dark into light and night into day by just the turning of a switch. The history of light has moved slowly from the light of wood logs to the wick in the dish of oil, to the tallow candle, to the kerosene lamp with their dirt, inconvenience, unsatisfactory light and danger, to the present day electric bulb which is clean, convenient and effective, and which may add so much in beauty and grace to the room in which it is used.

The development of the first Central Station on Pearl Street, New York City by Edison, with its method of generation and distribution of electricity for his incandescent lamp, is the system which has survived and been utilized in all subsequent electric development, and is the method used in all central station power transmission today. It is the only method by which electricity may be

1. See N.E.L.A. Proceedings, 1929, p. 63

generated, distributed and used in unlimited amounts over unlimited areas for all purposes,[1] and so it was that the invention of Edison's incandescent lamp introduced a new era of distribution. The need and demand for this new form of illumination appeared at once, and Edison and his co-workers proceeded to fulfill the need the lamp had created. Electric generators grew in size, and transmission lines spread rapidly over the country. The steam turbine was perfected by the demand of the electric industry for a more efficient driving mechanism. With power feeding millions of homes and shops with light, there came a demand for the use of this power in other ways, in turning wheels of machines in shops and factories and in doing the cleaning and cooking in the homes. At first, power was distributed to a limited area in the most congested section of New York City, but it soon spread in leaps and bounds throughout the country until today we find it in rural districts being used by the farmer to milk the cows, churn the butter and increase the egg production in the henery as well as in driving the machinery in the fields. And the farmer's wife uses the same power to wash the clothes, run the sewing machine and do the ironing.

This electrical service has produced ten billion dollars of new wealth to the world,[2] a wealth which economists hardly knew about a hundred years ago; it is added to everything we have, and has come from the exhaustless force of nature. And the ten billions

1. and 2. See N.E.L.A. Proceedings, 1929 p. 71

of dollars is only the material sum of this new wealth; what it means in terms of human comfort, happiness, release from drudgery, increase in productiveness, larger leisure and broader opportunities is beyond estimate. America excels in production and industrial efficiency beyond any other country because it is electrified beyond any other. Electricity has created more millionaires in America than have been created in any other part of the world, and it has enabled the average working man in America to live better than any millionaire could have lived before its development. Leon Trotsky, the Russian genius, has said that the reason for the rapid progress of the United States and the well being of its inhabitants is because each man, woman and child within its boundaries has working for him continuously fifty slaves, these slaves being the equivalent in human effort of the mechanical power in use in this country.[1]

In the United States as a whole, the per capita use of electricity is approximately 600 Kw-hr. In England the per capita consumption is less than 100 Kw-hr., and in Russia it is not even 1 Kw-hr. per capita.[2]

At almost every turn, we see, handle or use electrical appliances; the coffee percolator and toaster at breakfast time, the electric railway which takes us to our office, the elevator which shoots upward in our sky-scraper office building, the telephone on our desk, the electric fan which cools the air in our work

1. and 2. See N.E.L.A. Proceedings, 1929, pp. 184-185

room, the electric calculating machines that think and talk, the mimeograph which turns out numberless copies of typewritten material, the stock market ticker, the telegraph and wireless office just around the corner that sends our messages across the continent or out to sea, and the air mail that hums across the sky. And when, after the day's work, we return home at night, perhaps it is to a home that is electrically heated, and to food that has been cooked on an electric stove or cooled in an electric refrigerator. After supper we may sit under the soft glow of an electric lamp and listen to Mussolini perhaps, who speaks from his palace in Italy thousands of miles away. Or perhaps we would rather go to the moving picture theatre where we may see people act and hear them talk, and then come home again to bask in artificial sunlight provided by the electric sun bowl. These are some of the specific, electric appliances within our offices and homes and the theatre, but in addition to these, we find behind practically everything we eat and wear and touch the master-hand of electricity, for our clothes are woven on electrical machines; our furniture, our newspapers, and almost everything we have are in their present form because of the development of electricity. Where would medicine and dentistry be without their electrical equipment?

Most of the theatres in the larger cities of our country have, during the past few years, been electrically refrigerated so that the "show may go on" with comfort to the actors and to the hundreds of people in the audience sitting together in one building

while the out-of-doors temperature is that of mid-summer heat. With refrigeration in our theatres and on trains crossing the deserts of the United States for the comfort of patrons and passengers, isn't it reasonable to assume that very soon homes and offices will be equipped with small plants of refrigeration to keep them cool on summer days? And when that time comes, won't one of the next steps probably be for scientists to go to the tropics and conquer the heat of those areas and make them livable and commercially profitable for the white man just as engineers and scientists conquered the Panama district? There are vast stretches of land throughout the world, many of them with great natural resources, lying idle because the time hasn't yet come when it is commercially profitable to develop them. But as the years roll on, and the Malthusian theory operates and the developed land becomes over-populated, mountains will probably be moved, river beds reclaimed, intense heat and cold moderated, power taken from the sun's rays and the ocean's tides, and the march of civilization will continue onward.

America has set the pace of general prosperity. All the nations of the world are watching us, sending representatives to study our methods, and to bring back home with them ideas which will help their country to forge ahead. The radio and the airplane are the two latest inventions which are bringing the nations of the world closer together. The distance across the Atlantic has been

changed from days to hours, and in the living room of millions of homes in America has recently been heard the voice of the Pope from Italy, and King George from England, and other dignitaries from Holland, Switzerland, Germany, Japan, France, and Central and South American Countries. This closer relationship and understanding among the peoples of the world should help to break down the walls of hatred, of ignorance, of war and immorality, and bring in their place education, prosperity, co-operation and peace.

The daily radio contact, including music and entertainment, which existed between this country and Admiral Byrd's explorers while on their South Polar expedition in 1929-30; the 25,000,000 automobiles of this country which have made the out-of-doors the road to health and family picnics; the daily news of the world bringing quickened intelligence, wider understanding and a vision of limitless opportunity to the millions of people making up the audience of the motion picture theatres are gifts of electricity. The wage earner of America today may reasonably expect to own an inexpensive automobile and have a savings account. The children in our congested tenement districts are well clothed and nourished, The working girl of America has established silk as the standard fabric of apparel. Poorhouses are gradually slipping into oblivion. Electricity is lighting the way to a still higher standard of living.

Perhaps something should be said here about the business depression which we have been going through for the past year and a

half. We know that there has been a tremendous amount of unemployment with the suffering and poverty which always follow in its wake, but we can't tell yet whether this depression will have a lasting effect, or whether we are already getting back to the old pace. Millions of dollars have come forth from the wealthy and the comfortably situated Americans to take care of those less fortunate, and it would seem that there has been a very equable distribution of surplus to provide for those who are feeling the pinch of unemployment the most. During the past winter, in many towns and cities all public employees have been asked to donate one or two per cent of their salary to be used for the needy of the community. Some factories have divided their week into two parts, using half of their regular force of employees the first three days of the week, and the other half of the employees the last three days. This helps to keep the labor supply in the town until the factory goes back to full time work, and it allows for a fair distribution of wages

THE BIRTH OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION,
And Some of its Functions

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Back in the early days of the arc light systems and the beginning of the telephone industry, about 1879 to 1884, there was a great deal of trouble between these two electrical organizations. They couldn't both seem to operate successfully at the same time because of interference on lines and circuits. Three meetings of executives of these two industries were held during the winter of 1884-85 at the Grand Pacific Hotel in Chicago, to try to work out solutions to the problems.[1] Then a committee of three men was appointed to provide for a meeting of inventors, engineers, manufacturers, and executives to see what plans could be made for the elimination of the conflict in electrical transmission.

Mr. Elmer A. Sperry, President of the American Society of Mechanical Engineers was named chairman of the committee because at that time he had the largest and highest beacon known, on the top of the Board of Trade tower 303 feet from the sidewalk in Chicago. It was about 40,000 candle power and had attracted considerable attention. The second member of the committee was the late Mr. F. S. Terry, founder of Nela Park in Cleveland,

1. See N.E.L.A. Proceedings, 1929, p.61

the principal home of incandescent lamp progressive research. At the time he was appointed to the committee, he operated the largest electrical supply business in the United States, located in Chicago with branches in various other centers. The third member of the committee was a Mr. Bowen, a man in middle life who was trying to make both ends meet by the operation of an electric light system in Elgin, Illinois.[1]

A circular was drawn up by these three men inviting attendance at a conference to be held in Chicago in February, 1885. One hundred and forty people responded, representing arc light stations all over the country, and the National Electric Light Association was born at that time. Mr. Theodore N. Vail, who was then the leader in the telephone business, sent a representative to the meeting with a letter which said that he felt the matter of interference was the telephone companies' problem, and saying that the telephone companies would work with the electric light industry until the solution was found, and asking the help and encouragement of the electric light company operators.[2] The interference on the lines of the two industries was solved by the end of 1885 by Mr. John J. Carty, now Vice President of the American Telephone & Telegraph Company of New York. It is said that, in desperation, after long hours of work on the problem, this young man twisted two wires together and eliminated the

1. See N.E.L.A. Proceedings, 1929, p. 61
2. See N.E.L.A. Proceedings, 1929, p. 61

ground circuit. That solved the problem at once. The telephone interests at that time were making no money; they were just struggling along, and the suggestion of using two wires in place of one did not appeal to them, but it was gradually adopted and from then on the progress was rapid.

The newly organized National Electric Light Association went on at its first convention and achieved a number of standardizations and brought out a great many useful points that were common to all those present. The organization lived, and grew until today when it has a membership representing all branches of the electrical industry including:

682 Electric Light and Power Companies

383 Companies or Firms engaged in the manufacture of apparatus, machinery, equipment supplies, material and appliances for the production, transmission, distribution, translation or use of electrical energy.

410 Companies, Firms or Individuals who are engaged as electrical wholesalers, contractors, dealers, electrical or mechanical engineers, publishers and associations which are interested in advancing the use of electrical energy and are not engaged in its production or distribution.

145 Companies, Firms or Individuals not located or residing in the United States of America or Canada, engaged in the electric light and power industry, or interested in advancing the use of electrical energy.

There are also 19,858 members composed of employees of the above concerns, and officials of Public Service Commissions,

Instructors, Teachers or Practitioners of Engineering and related sciences or of other professions who are interested in the art of applied electricity.[1]

In the Constitution of the National Electric Light Association, Article II--Object, says, "The object of this Association shall be to advance the art and science of the production, distribution, and use of electrical energy for light, heat and power for public service. In the furtherance of this object its activities shall be largely educational and for the fullest development of the electrical engineering arts and sciences in all their branches. It shall not be engaged in business."[2]

The national association holds an annual convention which lasts about four days and to which come all the leaders in the industry, or their representatives, and department heads and pivot men. The convention is divided into six general sessions. The first takes up the general progress of the electrical industry as a whole with such subjects as "Electricity's Contribution to Commerce," and "Science and Progress in the Industries." The National Accounting Section discusses subjects pertaining to accounting in the industry with reports on progress and changes of methods, and talks on "The Account and Modern Business," "The Relation of Accounting to Management," etc. The Commercial National Section gives reports on Merchandising, Refrigeration, Electric Heating and allied subjects, and discusses commercial development

1. See "N.E.L.A. Organization--Personnel," July 1, 1930
2. See N.E.L.A. Proceedings, 1930, p. 1326

in the industry. The National Engineering Section has reports on engineering work, and discusses subjects like, "Practical and Economic Aspects of Standardization." The Public Relations Section and the Public Policy Section meet for reports and exchange of ideas on their work.

SCIENCE AND RESEARCH

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[1] One of the outstanding factors in the success of the electric light and power industry is its encouragement and support of laboratories for research in applied science.

Millions of dollars are spent each year, and thousands of men are employed, including engineers and scientists distinguished for their achievements in their particular field, including physics and chemistry, in the operation of these laboratories. One illustration of the work done in these laboratories, and the resulting advantage to the general public, centres around the incandescent lamp of Mr. Edison. By reason of incessant experimentation, the carbon lamp, in 1907, had reached an efficiency giving an illumination power of 3.4 lumens for each watt of energy employed. Then, in 1907, the best of the carbon lamps was displaced by a metallic filament lamp which held sway until 1928 when the tungsten filament lamp, the one now in general use, was brought forth. This lamp yields more than 14.5 lumens per watt of energy, making it more than four times as efficient as the best carbon lamp of 1907.

Figures show that in the United States alone, during 1928, the total expenditure by the public for lighting by means of the incandescent lamp was approximately $600,000,000. If the best carbon lamp of 1907 had to provide the same amount of illumination, more than four times as much electrical energy would have been required, and the bill for lighting which the public would have to pay would

1. Figures, dates, and statements taken from pages 48-51, N.E.L.A. Proceedings, 1929.

be correspondingly increased. The $600,000,000. would have become $2,400,000,000. This tremendous saving to the public is the result of improved methods of generating and distributing current, and the invention of the modern tungsten filament lamp--all the work of the electric light and power company laboratories. It is quite apparent from the above illustration that if these reductions in cost had not been made, a large proportion of the public now using electric light and power would not be able to afford the service and would be deprived of many of the advantages which they now enjoy, and those who did use it would do so much more sparingly than at present.

It is true that this is the result of applied science, and that before applied science may be used, discoveries must be made by pure scientists. The pure scientists are the advance guard of civilization. By their discoveries they furnish the engineer and the industrial chemist with the raw materials to be used in the finished product. Had it not been for a discovery by Scheele, a Swedish scientist, in 1781 respecting tungstic acid, we might not have had our tungsten lamp. It was the work of Michael Faraday, conducting researches at the Royal Institution in London that the discovery was made that a moving magnet could generate a current of electricity, and that one current could generate another. Joseph Henry, a Princeton professor discovered the

laws of current induction. It is such men as these who are the real discoverers and who are at the base of all progress. They produce the vital force with which the engineer may work.

American scientists at present are attacking the most fundamental of all problems--the ultimate constitution of matter, the structure of the atom, and the nature of the electron. Chemists and physicists are splitting the atom into its parts, and they hope that some day science will learn how to take the elements apart, and put them together again in new and remarkable combinations. They have already found that in the depths of space, hydrogen is being transmuted into helium, oxygen, silicon, and iron. As research and discoveries go on, it is probable that these men of science will give us synthetic materials cheaper and more durable than those we are now using. We may not need to worry about exhausting our natural resources of coal and iron and woodlands, because scientists are at work finding substitutes that may be more efficient.

The mastery of the forces of nature, the elimination of poverty and disease, the prolongation of life, the advancement of learning, the growth of right living and sound thinking and of good understanding among men are all the results of science and research.

ACCIDENT PREVENTION WORK

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The subject of accident prevention is very prominent in the public mind and is receiving greater attention from employers and from the public each year. The members of the National Electric Light Association have worked out the following program of safety to be followed by all member companies.

An organization is developed composed of department heads, foremen, and employees known as "safety guards." These safety guards act as lookouts for possible causes of accident. The duties of the Accident Prevention Committee are somewhat as follows:[1]

a. To investigate accidents, determine their causes and recommend methods of preventing their recurrence.

b. To recommend, through proper channels, disciplinary measures if necessary.

c. To receive and examine all safety or accident prevention suggestions made by employees.

d. To provide a method of receiving suggestions from employees.

e. To suggest or request through proper department heads, the installation of safeguards up to a certain cost.

f. To recommend for approval of the management safeguards costing more than the amount authorized.

g. The supervision and general checking of accident prevention rules. These rules should be issued by the proper departments under the authority of the chief executive of the company, but should carry the full weight of the Accident Prevention Committee so that the employees will know that they have been compiled under their supervision.

1. Data taken from a file of letters on the subject at the office of the Twin State Gas & Electric Co., 131 State Street, Boston.

h. To make, or arrange through the proper channels, periodical inspection of safety appliances, tools and equipment, first aid kits and bulletin boards.

i. To keep the subject of accident prevention interesting to all employees by means of a page or section devoted to accident prevention in the company publication, accident prevention posters on bulletin boards, and accident prevention contests among employees.

Subcommittees are appointed with duties along the following lines: a) The investigation, analysis and determination of causes of automobile accidents; b) electrical accidents; c) miscellaneous accidents. Committees are also appointed on Bulletins and Contests, Publicity and Meetings, and First Aid and Instruction on the Prone Pressure Method of Resuscitation.

A copy of accident reports is forwarded promptly to the subcommittee interested, and an investigation and full report of the subcommittee is made at the following meeting of the accident prevention committee. Particular attention is given to locating and determining the fundamental cause of each accident, and especially of identifying any careless employee as such. The fact that careless employees are likely to become generally known to the pivot men has a great effect on their attitude toward accident prevention work.

The foreman on a job should be one of the most vital forces in accident prevention. He should consider it his duty to:

a. Assume responsibility for all accidents to his men.

b. Make accident prevention a part of his work.

c. Instruct his men in accident prevention and first aid, and

d. Make a written report of each accident involving his men.

A careless employee is reported by the committee to his immediate superior, and in cases where there appears to be deliberate breaking of rules or extreme carelessness, disciplinary measures are recommended such as layoff for first offense, demotion for second offense, and discharge for third offense. It is felt that an indifferent attitude toward a known, careless employee will destroy the best efforts of an otherwise good accident prevention organization. An occasional discharge for a good reason, properly advertised, has a stimulating effect on the indifferent employee. "Discharge for sufficient cause" stamped on company records prevents a careless, incompetent or otherwise unsafe employee from obtaining a recommendation for similar work elsewhere.

Monthly meetings of the Accident Prevention Committee are along the following lines:

Meeting called to order
Roll call
Present
Absent
Reading of minutes of previous meeting
Unfinished business

Speaker of the meeting
  May be chosen from committee
  May be selected from other company employees
  Outside speaker
New business
Adjournment.

In addition to the regular monthly meeting of the Accident Prevention Committee, meetings of all superintendents and foremen, together with the members of the Accident Prevention Committee are held once or twice each year for the purpose of working up interest and enthusiasm in the movement; and, also, a general meeting of all employees should be held once a year, if possible.

Some interesting speaker, singing and some entertainment are generally provided by company employees, glee club, orchestra, band, etc.

First aid instruction is given which covers proper treatment of scratches and bruises in order to reduce the probability of subsequent blood poisoning; the application of the tourniquet to stop or reduce bleeding, and particularly, the proper application of the prone pressure method of artificial respiration to be used in case of electric shock.

Employee safety guards are chosen or elected--one for each fifteen or twenty employees. They are so selected or appointed that the entire company organization will be covered. These men provide close contacts between the employee, crews, departments and the Accident Prevention Committee.

Each employee safety guard is carefully instructed to

keep on the watch for dangerous conditions, unsafe practices and habitually careless employees, and is warned to pay particular attention to the principal causes of "near" accidents and the "narrow escapes."

Guards or foremen see that new employees are properly instructed before going on to any job. The guard does his regular job and the accident prevention work is considered an honorary task. Such a man, in close touch with his everyday work, is likely to be careful himself and is of great help in developing careful workmen in his particular crew. He gives assistance in gathering information regarding serious or "lost time" accidents.

Safety guards are required to report monthly, in writing, through their superior to the Accident Prevention Committee, stating dangerous conditions noted, whether remedied or not, mentioning "near" accidents, with causes, and particularly reporting carelessness cases, or ridicule of accident prevention measures. The annual change of these safety guards provides an exchange of viewpoints and ideas and a means of securing more effective results. The guards are given a suitable button or badge to identify them as such, and they generally wear the badge with pride.

Safety bulletins, posted where they may be seen, and company leaflets have considerable value. The bulletins are sometimes developed through contests under the direction of the subcommittee of the Accident Prevention Committee. They are changed at least once a month, and the old ones are destroyed upon receipt

of new ones. They are of such a nature as to attract attention, convey the message, and impress the thought. Bulletins portraying accidents which have occurred due to carelessness, which are generally known to the employees have a great interest appeal.

Records of all accidents are kept by the Accident Prevention Supervisor, or, in the case of a company which has no Accident Prevention Supervisor, by the Secretary of the Accident Prevention Committee, in such a way that comparison with other companies' records is possible. In a very small company the executive should keep these records.

Of the avoidable accidents which occur each year, it is found that 15 per cent are due to mechanical conditions such as defective tools, poor lighting, etc., and approximately 85 per cent are due to thoughtlessness, undue haste, personal and domestic worries, etc.

Member companies of the N.E.L.A. furnish all the tools to their employees. When a lineman begins work, he is furnished with a complete set of first-class tools which he must use. He is told to turn in tools which are not working right or which seem unsafe, and he is given new ones to replace them. There is no charge for the tools. The workman is expected to return, at the end of his employment, the same number and kind of tools with which he was supplied when he began work. If he is not able to do this, the amount of the missing tools is deducted from his wages. This plan in-

creases the efficiency of the men, and there have been almost no accidents which could be attributed to defective or worn out tools since the inauguration of this policy.

The educational feature of accident prevention work has been the most helpful in reducing accidents. It is not so much a consideration of physical hazards or mechanical conditions, but a question of individual interest, individual responsibility, and personal caution. Successful accident prevention work, industrial or public, is a slow process. Results cannot be obtained until the persons exposed to danger are made to appreciate their personal interest in safety and their personal responsibility in accident prevention work. The man who tries to be extraordinarily brave must be cautioned, and the man who is burdened with family worries must be carefully watched. Having the men talk the work over before they begin, and seeing to it that they know just where the danger lies has been effective. Fixing the attention by every sort of means has reformed some of the most careless men, for when they think safety, they work in safety. Safety is based on habit. We have learned the habit of looking in both directions for approaching automobiles, and to think of the garden rake and turn the teeth down so no one will be hurt on it. It is this simple habit of thinking carefulness which the utilities are trying to cultivate in the minds of work-

men, and children and the public generally.

The large number of fatal and serious accidents which are being reported from year to year by the membership of the N.E.L.A., and the effect of these accidents u on the future welfare of the country as well as the great economic loss due to such accidents, show the necessity for the continuance of systematic and united effort for the elimination of preventable accidents. Aside from the humanitarian viewpoint, the employer is interested in the elimination of accidents because of the damage to expensive equipment, and the time lost, due to accidents, resulting in lessened production, increased cost of production, and poorer quality of product, because when accidents happen, production generally has to go on with less experienced workmen. The employee suffers from accidents, physically, through decreased earning capacity, and increased expense involved during illness.

Some companies have stimulated interest in public safety by putting stickers of different colors, about two inches by three inches, on customers' bills and letters. These stickers contain pithy sentences on subjects like the following: traffic accidents, children stealing rides on cars and trucks, falling into excavations of man holes, children playing about where men are at work, children throwing things over wires, walking under ladders, walking under wires or poles where men are at work overhead, passing under street arc lamps while they are being cleaned, care of fallen wires, and

children keeping away from fires which are built in the street to thaw out the ground. These messages have been well received by customers and have helped to build and strengthen the habit of thinking safety.

THE PUBLIC RELATIONS DEPARTMENT

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In almost every public utility, there is a Public Relations Department, the purpose of which is to establish friendly relations between the company and the customers it serves, and the public in general. Public utilities must get the money with which to finance expansions and improvements from the public. Through the sale of stocks and bonds directly to the customers of the companies, millions of dollars are acquired each year by the utilities, and millions more will be required each succeeding year. It is the work of the Public relations department to disseminate information, regarding the company, which will build and strengthen the faith of the public in the company and make an investment in the company attractive. When a man has invested his money in a company, he is much more interested in the success and expansion of that company than when he is just a patronizer of its service.

In creating friendly relations with the public, the first and prime essential of the electric company is to give good service. Regardless of how perfect all the other functions of the company may be, if the lights go out occasionally, or the electric car is stalled for a half hour during the morning rush hour, or the power is cut off from a factory for even fifteen minutes, hatred and contempt for the inefficient management of the

company are felt by the public, and no amount of advertising, or promises of improvements will bring whole-hearted forgiveness. If the service is good and beyond complaint, but the representatives of the company are discourteous or disinterested, again the public is injured. If the street car is one of the best ever built and runs on the smoothest tracks, but the conductor gives a handful of pennies in change, or doesn't give the signal when a passenger wants to alight, the beauty of design of the car and the smooth tracks are forgotten, and the passenger thinks only of the stupidity of the conductor employed by the company. If a man finds that he must move into a house within a day's notice, and goes to the office of the electric company and asks the clerk to make the electrical connections, as a special request, within twelve hours instead of the usual twenty-four, and the clerk looks vaguely into the distance and tells him he'll have to wait twenty-four hours because it's the rule, with no attempt or pretense of making an exception in this case, that customer is pretty apt to turn a deaf ear to any representative of the company who tries to sell him electricity consuming appliances in the future.

The electric companies know that their employees can be a tremendous asset to them, or a very great handicap, and so they are spending a great deal of thought and time and money in training their personnel to be the kind of representatives they want them to be. It has been found that when an employee enters one of the big

electrical companies of today, he finds the structure so large, the work of the different departments so complicated and detailed, and the tasks of the employees so specialized that he has very little opportunity of expressing his individuality and impressing it upon his fellow workers. It is hard for him to see the relation of his work and that of his department to that of other employees and other departments. He doesn't think in terms of the working scheme of the organization as a whole and the ideas of the officers. If he makes mistakes at first, he is embarrassed; he seems to be alone and lost in the great organization, or he learns his routine duties and performs them almost mechanically, without interest and sometimes without ambition. His attitude is that his is just a small job in a big corporation, and chances for advancement are too slow and doubtful to work for. The company means little to him. When such an employee circulates among the public he has nothing good to say about the company, in fact he would like to leave it if he could find work that was a little more interesting or offered a little more pay. The electrical companies consider such a man a handicap, and they have devised means to turn him into an asset. They have found that if an opportunity is afforded for him to meet his co-workers outside of regular hours at a smoker, on a baseball field, or in games or tasks where he can display superior skill or some talent, natural or acquired, he assumes

a definite standing among his fellows, his individuality asserts itself and he is pleased with himself and those around him. He gains confidence in himself and in his ability to succeed and at the same time unconsciously develops an interest in the organization he represents. The fact that a man is a good baseball player is no guarantee that he will be a good clerk, but if, on Saturday afternoon, he goes out on the field with his team and makes some unusually good play, and is cheered by his fellow workers and is complimented by the boss when he meets him in the office on Monday morning, he is going to feel a lot more like cheering for the company he is working for. He feels that he has made an impression. People like him for his skill on the baseball field. He has an opening wedge; his office work will be noted; his personality is registering. He has gained the attention of his superiors. If his office work is well done too, he will be uppermost in their minds when they are looking around for a man to fill an important position. It is generally believed that the man who has the grit and the fight to be a winner in sports, will apply the same determination and skill and thoroughness to his work, whatever it may be.

There are various educational and recreational groups in the different companies to increase the efficiency of the companies by increasing the efficiency of the employees. Work having to do with the general recreation and entertainment of the members has been developed into a popular and important feature of the educational work. Members are afforded an opportunity to get acquainted with

other members both within and outside the departments in which they are regularly working. They work together in some recreational or avocational group in which they are interested, and in being brought together this way they become interested in each other and in the organization which they represent. Groups are small, and individual importance is magnified so that a man may easily see the advantages of co-operation, of discipline, and, when necessary, of subordination of individual interest.

In the development of recreational features, there are, in most of the large companies, a baseball league and a bowling league, tennis, golf, chess and checker clubs, gymnastic classes and dancing classes, depending upon the size of the company and the facilities at hand for the development and maintainance of such activities. It is becoming a standard practice for companies to supply and maintain a room where employes may come together for meetings of various kinds, or for parties or dances.

Another recreational feature which has become a regular yearly event, is the annual field day or picnic to which all employees of a company are invited, and which affords a splendid opportunity for a democratic gathering of the men of all grades and positions in the company to meet in wholesome out-of-door recreation, and to see what is being done to interest the employees in each other and in the company.

The work of training, instructing, and enlightening employees must be kept up incessantly. A company may never sit back smugly and feel that they have trained a group of men and women into the spirit of service and that they will never lose it, because an organization of five or ten thousand people is undergoing constant change. Turn-over is always present. New boys and girls are joining the companies every day, and if these young people haven't been trained in the ethics of the company they are apt to make some blunder which will greatly offset the good that has been developed in older members.

Situations arise in which the utilities require the helping hand of the public--matters of rates, franchises, contracts, permits, and so on. It sometimes happens that a company is running along smoothly, giving the best possible service, but on a very small return. Then hard luck comes along. There is a series of electric storms which cripple the plant and seriously impair service. Money is required to put the plant in good condition, and the executives of the company find that they will have to raise the rates for the service. Any increase in rates, or increase in commodity prices, is always unpleasant to the consumer, but the public is generally fair about such things. Of course, before a public utility may increase its rates, the increase must be approved and authorized by the Public Service Commission of the state, but it is a whole lot easier

for a utility, if the public is willing to accept the increase rather than offer strong opposition to it. There is a great deal of difference between a Public Service Hearing at which there is a storm of protest and protestants all aiming at different angles of the company's position and trying to confuse the issue with misunderstanding and bitterness, and a hearing to which the public comes with knowledge of just what the situation is, with understanding of the conditions that underlie the request for the increase, with confidence that the company has used good sense and good judgment in its presentation, and with a willingness to do whatever is right to insure a continuance of good service.

It is the work of the Public Relations Department to bring about a situation such as the latter. It is the job of that department to put the public in possession of all the facts through newspaper reports, leaflets, and talks given at various clubs in the community. Here is an opportunity for the employee to help his company. The right sort of an employee is always ready to talk about his business and his company. Sometimes he doesn't do much talking for the reason that he isn't fortified with enough facts to give him confidence, but when he has the facts, he's the best publicity agent possible. Equipped with all the facts pertaining to the past and present history of the company, the past and present requirements of the company, the employees of such a company, through their every day circulation among the public, could and would do more to

bring about an effective understanding of the company's needs than any amount of printed publicity.

Tests made with customers of the electrical companies prove that the impression left by personal contacts with employees is twice as strong as all other factors combined in determining the customer's estimate of the service.[1] The impression left by contacts with meter readers, collectors, telephone clerks, correspondence, counter clerks, cashiers, etc. is more important than promptness, dependability, and general efficiency of service. There are many people who still feel that utility and public service corporations are run for the purpose of bleeding the public. They have not yet reached the point where they can see that the public service corporations are only allowed to earn a fair return upon the money that has been invested in the business. Such people lend willing ears to propaganda which is circulated against the utilities.

In 1929 when the Federal Trade Commission was making an investigation of the electric light and power industries of the country, ninety-six documents were presented to the Commission containing propaganda against the utilities.[2] The Commission did not admit these documents as testimony, but they indicate the extent of opposition to the utilities, and what the public relations departments must do to offset this trend. The documents referred to revealed that there is an organization called the League for Industrial

1. See "Our Public Relations Work," p. 3
2. See N.E.L.A. Bulletin, Dec. 1930, p. 749

Democracy which is the college end of the Socialist party. It has chapters in many American colleges and in recent years speakers furnished by the League addressed over 52,000 college students in 130 different colleges and also many public audiences. Mr. Norman Thomas, the executive director of the League, and the 1928 presidential candidate of the Socialist party, advocates the wiping out of the entire constitution of the United States, and the abolishment of the whole profit system. A clipping taken from one radical paper is as follows:

Our Eminent Statesmen
Department

"RACKET"

> "Water power and public service are the most important issues facing the people. Water power is translated by the people of my city and all over the country in gas and electric bills. The rates are exorbitant to the extent that the power and electric light companies can no longer be designated as an industry but must be classified as a "racket." And when I designate the power trust as a racket, I want to extend my apologies to the rest of the 'racketeers.'"--Representative Fiorello La Guardia, New York.[1]

In the twelfth annual report of the Public Ownership League, there is a paragraph explaining that arrangements have been made with Senator Norris to use his franking privileges for the distribution of his speeches advocating the public ownership of the electric light and power industry, and saying, "This constitutes a new feature of the educational work of the League which is very val-

1. See N.E.L.A. Bulletin, Dec. 1930, p. 749

uable because it enables us at a very small cost to reach every voter in a community."[1] This use of the United States Post Office facilities doesn't seem fair to the utilities. They have to pay for any publicity work they do to offset these attacks.

Politicians seeking office frequently use government ownership as an issue and viciously attack the electrical industry. College professors, in some cases, feel that government ownership is the right thing and present that doctrine to their students. It is a debatable question of course, but the government's own statistics show that the general level of private company rates is below that of municipal ownership rates,[2] even though plants operated under municipal ownership are free from taxes, free from the payment for services rendered by other city departments or agencies, and municipal companies create higher taxes because of the loss of taxes that would be paid by a private plant. The electrical industry must defend its position. Millions of dollars are invested yearly in public utility securities by life insurance companies, savings banks and trust estates. The utilities must maintain the good will of their investors and fight the attacks of their enemies, and they are doing it through the education of their employees.

Today, industry is generally recognizing the fact that they are losing much of value because their personnel are not developed to the point where they can express their thoughts and ideas intelligently and effectively. Mr. A. W. Robertson, Chairman of

1. and 2. See N.E.L.A. Bulletin, Dec. 1930, P. 750

the Board of the Westinghouse Electric and Manufacturing Company has said, "Every business as an economic structure must be successful before all else. But every business is the product of the human beings that compose it and it cannot be greater than they. Few business institutions succeed in making a full use of the brains that lie latent within the organization and it seems to me that this is the test of executive leadership."[1] Member companies of the N.E.L.A. bring their employes together periodically during the year for participation in an educational program. Heads of departments take turns speaking at the meetings, explaining the work of their department and telling the employees how they can improve their work. The employees are being trained in public speaking. Different methods have been used. Some companies have engaged a man familiar with the electrical industry, and also an authority on public speaking, to train the employees who are interested and show particular aptitude for the work. Other companies request that the employees give a three minute talk on current events at roll call; others that members give a five or ten minute talk at different meetings on "My Job." As the employees become proficient in speaking, they are given subjects to master such as "The History of Our Company," "Economics of Utilities," "Regulation," "Rates," "Government Ownership," "Superpower," and "Rural Electrification." The material for the talk is assembled and put in form for the employee and he

1. See page 351, "Conferences, Middle West Utilities Co."

simply has to be able to present it with ease and enthusiasm. The employee first gives the talk before the Director of Public Relations who corrects and encourages him. Then he gives it at a company meeting, and when he and the Director of Public Relations are satisfied that the subject can be given effectively before the public, a record is made of that fact. Then local organizations are advised of the availability of speakers. A letter is sent out just in advance of the time clubs make up their programs for the year, which is usually in July. When replies come in asking who the speakers are and their subjects, the Director of Public Relations indicates the speakers, subjects and treatment, and the club members, in turn, indicate whom they want. Sometimes they advise that anyone will be acceptable. Frequently the clubs ask that the utility provide the entire program for a meeting. In January of this year, the president of the Berlin, New Hampshire Woman's Club called the manager of the Berlin division of the Twin State Gas & Electric Company. and said that the speaker for the next meeting of the woman's club was ill, and asked if the electric company could provide a program. Arrangements were made by the woman's committee of the electric company to present "The Pageant of Light," a pantomine in six parts. The stage was arranged, and appropriate costumes acquired. The first scene was that of an Indian camp fire representing primitive light. A wigwam was set up with a squaw sitting by

the fire. A member of the woman's committee sang the "Indian Love Call." Then came the Puritan Period. A girl dressed in a puritan costume sat before a Betty Lamp. The solo was "Drink to Me Only With Thine Eyes." The Colonial Period of candle light was portrayed next, and a quartet sang, "Love's Old Sweet Song." The Tin Type Age and the oil lamp were presented next. "Smiling Through" was the solo. The carbon lamp of twenty-five years ago was shown, with the quartet singing "In the Gloaming." The pageant ended with the representation of a bridge party in a living room electrified the modern way. "Love Sends a Little Gift of Roses" was sung.

At the close of the program women of the company served waffles and coffee which they prepared on company appliances. The following day a review of the program appeared in the local paper saying it was one of the most delightful meetings the club ever had.[1]

In the territory of another electric company there has been a great deal of public concern because of the rapid expansion of the company and its acquisition of private and municipal plants in that territory until there remain only three municipal plants and six privately owned ones out of a total of fifteen. Some of the public have felt disturbed over the monopolistic trend of the company and were expressing mistrust. Members of the company secured opportunities to speak before clubs of men and women in the territory. They gave reasons for the expansion, and displayed colored charts showing economies effected by the consolidation of the companies.

1. See "Berlin Reporter" January 15, 1930

A chart showing the benefits of rate reductions which have been passed on to the customer, because of more efficient management, served as a clincher to the talk. The talks and charts helped to win the approval of the customers, and the opposition and unrest was greatly reduced.[1]

In 1928, a bill for the export of surplus power beyond the borders of the State of Maine was passed by the legislature and it received almost a unanimous vote in the House of Representatives. It was passed by the Senate and signed by the Governor with a referendum attached referring it to the people for a decision. There has been a law in the State of Maine for over twenty years forbidding the export of hydro-electric power out of the state. The bill was defeated by approximately 8000 votes out of a total of 118,000 cast. In the territory of the Central Maine Power Company, which has carried on an aggressive public relations program and had members speak at various clubs, the bill was approved by a fair majority. In other parts of the state where little work of this nature has been done, the bill was defeated.[2]

The Southern Wisconsin Electric Company is stressing, particularly, rural electrification. Each member of the woman's committee is well informed regarding the matter of rural rates, rules for the extension of service, and appliances which are practical for use on the farm. The company has a model electric dairy farm where every task that can be done so practically is accomplished by

1. See page 161, "Conferences, Public Relations Directors"
2. See page 329, "Papers & Discussion, Mid. West Utilities"

electricity in the house, barn and other farm buildings. The equipment is complete in every detail, and the woman's committee holds "At Homes" to members of clubs and women residing in rural communities in that territory. Moving pictures of the equipment in use have been taken, and a member of the company is prepared to give a lecture, "Electricity on the Farm," and to show the moving pictures to groups too far away from the farm for a visit.[1]

The electric light company of Salt Lake City, Utah, uses one of its windows for the display of Utah products. These exhibits bring hundreds of people into the company offices oftentimes only to inquire about the product on display, but they leave with a friendly feeling toward the utility for having the interest of the community at heart. The company also has a well appointed auditorium which is at the disposal of civic, business, and social women's groups for the purpose of holding their different meetings and bazaars. As the auditorium is offered free to these groups, thousands of people have been guests of the company in this respect. Friendly comment and letters of appreciation have been received from these groups, as well as very favorable, free newspaper publicity.[2]

Frequently an electric company sets aside one day when it invites the civic clubs of the community to visit its substation and plant. The members of the woman's committee of the company escort

1. See page 176, "Conferences, Public Relations Directors," Mid West
2. " " 210, " " " " " "

the women guests through the station, and the operators at the plant explain in how the machinery and turbines work. This helps to promote understanding and good will.

Another practice of some companies is to conduct cooking schools. A letter is sent to the customers of a company in a given community inviting them to attend a cooking class and electric stove demonstration, and to have luncheon which will be prepared on the range. A woman, versed in Home Economics and thoroughly acquainted with the range, talks on the operation of the stove, at the same time preparing a meal and giving recipes of novel ways of preparing food. A talk is also given on the correct method of table arrangement and service. During the luncheon the company orchestra may entertain, and a social half hour with guests and employees may follow.

The women of many companies have made an active study of Home Lighting with the idea of helping customers to know the correct arrangement of lights, the amount necessary for comfort, and the most artistic types of fixtures, and to help the company by increasing its load. The Edison Lamp Works of New Jersey has prepared a correspondence course in Home Lighting consisting of fifteen illustrated lessons for the use of electric company employees who desire to qualify as Home Lighting Specialists, and also as a basis for a survey of Home Lighting by students in colleges and universities. The subjects covered in the course are

as follows:

Lesson one is an outline of the history of light and treats the development of artificial lighting through 5000 years of progress. The purpose of the lesson is to familiarize the student with the various types of lighting equipment which have been used, beginning with the saucer lamp of 3000 B. C. and following through with the virgin lamp used in the old Roman days, the bronze Florentine lamp of 400 A.D., the Egyptian lamp of coiled silver, lamps of the Middle Ages, the Venetian lamp, Renaissance and English designs, 18th century iron and brass candlesticks, early American Betty lamps, early camphine lamps of glass and pewter, oil lamps of the 19th century, gas lights, and various types of lamps illustrating the important developments in incandescent lamps from the first one invented by Edison to the lamp of today.

Lesson two deals with the fundamentals of electricity and is designed to give the student an understanding of the meaning of the more commonly used electrical units such as volt, ampere, and watt. The lesson also explains how electric energy is measured, methods of generating electric current, the meaning of direct current and alternating current, transforming and transmission of current, how to calculate the cost of operating lamps and appliances, how to read the electric meter, and the function

and purpose of the fuse.

Lesson three is on the fundamentals of light and illumination. It covers lighting terms, explanation of candlepower, lumen, glare, diffusion of light, reflection and distribution from different types of fixtures--direct, indirect, and semi-indirect.

Lesson four covers the characteristics of Mazda Lamps used in residence lighting. It describes different types of incandescent lamps, shapes and sizes of bulbs, types of bases, advantages of inside-frosted lamps, the difference between life and efficiency of lamps, the importance of using lamps of correct voltage.

Lesson five is on better home lighting for eyesight conservation. It explains the importance of the correct use of light from the standpoint of health and eyesight conservation. The characteristics of proper illumination are interpreted in terms of amount of illumination, diffusion, directive qualities and color qualities.

Lesson six is on residence lighting fixtures, their design and characteristics. This lesson covers the importance of selecting fixtures not only for their artistic appearance, but from the standpoint of their ability to produce useful light. It explains the purpose of lighting fixtures, what constitutes a

good lighting fixture, illumination qualities, different types of fixtures, the importance of selecting fixtures with a view to obtaining a urity of design, descriptions of direct lighting, residential fixtures and semi-indirect lighting fixtures.

The seventh lesson is on the selection and use of table and floor lamps. It describes the different types and the particular use to which each type is adapted, various styles of lamp shades in use, advantages and disadvantages of some of the more popular shades, the importance of selecting the right type of table or floor lamp for special uses, such as for reading, sewing, writing, dressing, etc., and how lamps should be used in various lighting applications.

The eighth lesson covers general principles of good lighting and their application in each room in the home--the entrances and porches, hallways, living room, dining room, kitchen, etc.

Lesson nine gives hints on utilizing old equipment for better lighting. It discusses the conversion of combination gas and electric fixtures, preventing glare, inverting shades, converting fixtures to give a different type of illumination, and rearrangement of fixtures. The suggestions given apply to specific, inadequate fixtures. The suggested alteration in most cases is illustrated.

The tenth lesson discusses the use of color in the home,

how colored light is produced, the primary colors of light and pigment, combinations of these, why objects appear colored, and the effect of colored light on the appearance of colored objects.

How to Make Lamp Shades is the title of the eleventh lesson. Many companies hold classes in lamp shade making as part of their Public Relations program, and this lesson tells how to make a few of the more popular types of lamp shades, how to conduct a class in shade-making, what materials are required, and where they may be secured.

The twelfth lesson shows two phases of light for decoration. The first part discusses light ornaments and their use, illustrates many of them, tells where they may be obtained, and points out their value to the central station. The second portion of the lesson is devoted to garden lighting. It describes floodlighting, outdoor convenience-outlets, the flexibility of the garden installation, and specific applications of light in the garden, illustrating each.

The use of light as a means of adding novelty and as an attractive setting of beauty for a party is covered in the thirteenth lesson. It describes the applications of Christmas tree lamps, new decorative lamps, candle lamps, and modernistic and Gothic lamps. It also includes uses of light in connection with bowls of flowers, balloons, dolls, miniature candles, etc.

The essentials of adequate wiring in the home, with many illustrations, is covered in the fourteenth lesson. From the viewpoint of the owner, it presents a discussion of approved material, the annoyances of inadequate wiring, carrying the current into the house, meter, and fuses, etc. With actual wiring diagrams of a complete house, it discusses the installation of light outlets, convenience-outlets, and switch controls, room by room.

The fifteenth lesson tells the student how to prepare a detailed outline and explanation of a recommended lighting layout. It points out the basis for estimating the cost of a proposed installation, and shows both why and how a lighting recommendation should be written.[1]

In companies where several members are taking the course outlined in the foregoing paragraphs, a responsible person is appointed to conduct the course. Such a person arranges for meetings, special demonstrations, film presentations, supplementary talks by officials of the company and by members of other organizations, such as lamp and lighting fixture manufacturers. The instructor requires each student to submit, in writing, answers to questions pertinent to the subject covered in each lesson. A suggested list of questions is appended to each lesson. Meetings are held once a week for discussion and demonstration of material covered in the lesson for that week.

Other courses including English, Accounting, Salesmanship,

[1] See "A Course of Study in Fifteen Lessons," Edison Lamp Works of General Electric Company, NELA Park, Cleveland, Ohio.

Economics, and Engineering are available to electric company employees either at cost or free. Some companies have the student pay for the cost of the course in monthly installments, and upon the successful completion of the course the money is refunded to him. When this happens, the student frequently receives the refunded money and a certificate at an employee meeting where a congratulatory talk on his work is made by an executive.

The experience of correspondence schools has enabled them to arrange courses so that an employee may start with the most elementary subject, and by progressive steps, train himself to the ability to digest even the more technical courses which are offered. Beginners and experienced employees take the courses. Most of this work is brought about through department heads. When an employee wants to enroll in a course of study, the head of his department determines whether the employee really wants and needs the course, and if he has the educational background that will enable him to complete the course. The department head also arranges with educational institutions so that progress reports will be received regularly. He also keeps a complete record showing what employees in his department are taking courses of study, the particular courses being taken, and the actual progress made. In this way every effort is made to see that the employees obtain the maximum of value from the courses.

Magazines and periodicals of electrical interest to which a company subscribes are circulated freely throughout the company. When one reader finds an article which he thinks will be of interest to another member who might not see the article under ordinary conditions, he marks the article and puts the magazine containing it on the desk of the one he wishes to see it.

The "Better Business Ticket System" has been established in many companies for the purpose of encouraging employees to freely make suggestions for the improvement of their company's business. These suggestions are generally nothing more than the passing on of observations to the proper departments. They require no work on the part of the employee other than the writing of a ticket. Each ticket containing a better business suggestion is recorded by a clerk in charge of the work. The ticket is then referred to the proper person for attention, a record being made of that fact also. When the matter has received the attention of the party to whom it was referred, a statement is made on the back of the ticket of exactly what was done. The ticket is then sent back to the Record Clerk who closes his record and either mails or delivers the ticket to the employee from whom it originated. The object of the record is primarily to keep a check on the progress of the tickets

and to insure, first, prompt attention to them, and second, due notification to the originator as to exactly what he has accomplished by making the suggestion. In some companies, competition is encouraged between individuals and between departments on the number of tickets turned in. If the competition is carried to extremes, it results in a considerable number of tickets being used that are of no great value, but even under such circumstances a number of valuable tickets are received which might not otherwise have been used. In one year the General Electric Company paid something like $40,000.00 in compensation for suggestions for better business made by employees, and estimated that the saving to the company by the use of the suggestions amounted to over $420,000. for the same year. Most of these suggestions entailed a considerable amount of study on the part of the employees.[1]

1. See page 279, "Conferences, Public Relations Directors," Mid West U.

CUSTOMER OWNERSHIP

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[1]The necessity of raising money for additional facilities brought about the original customer ownership campaigns in the electrical industry. When the experiment was first tried, financial conditions were very unsettled. Utility companies, large and small, were finding it very difficult to finance their construction and other requirements. Investment bankers were practically unable to place their bonds, and even short term, high yield notes with generous collateral behind them had little investment appeal. Industrial concerns everywhere were ready to pay abnormally high rates for money, and such investment funds as were available went to the highest responsible bidders.

The first systematic effort of any public utility to distribute its preferred stock to customers and others in the territory served was made by the California Telephone and Light Company in 1913, to secure new capital for extensions to their plant. The decision to attempt a preferred stock campaign was the outgrowth of a practice of that company of making service extensions, provided the people seeking the service would furnish the required money by investing in the preferred stock of the company. Although the company had, at that time, only 4,000 customers, a total of $40,000. in par amount was sold during a campaign extending over several months and requiring the united selling efforts

1. Figures and statements taken from "Papers & Discussion, Middle West Utilities System Convention, Biloxi, Miss." pp. 76-85

of the company's employees.

The success of the California Telephone and Light Company in selling stock among its customers impressed the officers and directors of the Pacific Gas and Electric Company. They reasoned that if a company with 4,000 customers could sell them $40,000. of preferred stock in one campaign, a company with 400,000 customers should be able to sell $4,000,000. The company hesitated about undertaking such a campaign at first because it had previously done its financing through recognized banking channels and they felt that the public might conclude that they were being asked to buy a security that could not be sold otherwise, but the necessity for additional money became so great that a canvas was undertaken, with the result that, from June 1914, to the end of February 1917, the company secured subscriptions among its employees, consumers and others for approximately $6,000,000. of its preferred stock and sold through other channels, as the result of its customer ownership campaign, additional preferred stock in excess of $8,500,000.

The customer ownership sales of the Pacific Gas and Electric Company attracted the attention of public utility executives throughout the country. In June 1915, the Consolidated Gas, Electric Light and Power Company of Baltimore, Maryland, sold--mostly on the partial payment plan--to 2,100 consumers approx-

imately 14,000 shares of preferred stock. The Northern States Power Company, an investment company, became convinced that, if in some parts of the country the public were being persuaded to invest in the securities of electric and gas companies of their own communities, it might be possible to sell the holding company's preferred stock in the respective territories in which its subsidiary companies operated. These subsidiary companies were in need of money for expansion purposes and had few securities of their own to offer. The Northern States Power Company spent months on educational work, and then was successful in selling its own stock to customers of its subsidiaries.

In 1919 the subsidiary companies of the Middle West Utilities Company were finding it increasingly difficult to raise new money for facilities required to keep pace with their rapidly growing loads. A program was arranged for selling preferred stock, through company employees, to customers and others in the territories served. Because of the lack of training of the employees in such an undertaking, and the unacquaintance of the customers with preferred stocks for investment purposes as against stocks for speculation, the work was difficult, and unsuccessful. The company found that one of the principal prerequisites to successful selling was proper education of the employees with respect to their company and all phases of its business. They attempted to show

that their electric and gas companies stood out prominently among the industries noted for their stability of business and earnings; that their proper development over increasingly greater geographical areas at constantly decreasing charges for the services rendered required vast sums of money, inventive genius, engineering and mechanical ability and skill, financial alertness and business initiative; that the growth and prosperity of public utility companies is bound up with the continuous development of the cities, towns and surrounding territory that they serve; that the properties owned and operated by the companies are fixed and cannot be moved away or dissipated, and that the utility companies, through legislation, earn a fair return on the money invested in their plant and equipment.

The utility companies realized that in selling preferred stocks to employes and customers, such sales would bring important benefits to the companies beyond the raising of additional money. They recognized that the distribution of stock in small quantities to investors would develop on the part of those investors an interest in the success of the company selling the stock, and an unwillingness to accept as true, without thought or investigation, attacks made against the company. They realized, also, that company employees accurately informed about company business are the best safeguard against unfounded criticism of the

company. They also realized that customer ownership adds to their responsibilities; that they are charged with seeing to it that every share of stock sold under the customer ownership plan is safeguarded against the failure of paying regular dividends. If dividends were not paid regularly, it would result in serious damage to the customer ownership movement and affect the entire electrical industry.

Customer ownership has been helpful to the employees because the employee with ambition enough to sell stock finds it quite necessary to learn more about his company before attempting to inform others respecting its securities. He becomes a better employee, increases his earnings through commissions received from the sale of stock, acquires stock in his company, and having become a stockholder, he works for the greater success of the company.

The customers, through contact with better employees, take a different attitude toward the company's problem of giving satisfactory service at reasonable rates, and when the customer becomes a stockholder, his financial interest in the company makes him a staunch ally. The better understanding of company problems, gained through contact with company employees and study of company advertisements, annual reports, year books and news letters received with dividend checks, often changes a complainer to a promoter and leads him to feel the company is doing everything possible for all concerned.

Statistics show that the majority of stock sold to utility customers, both for cash and on the monthly payment plan, is held for a satisfactory period. Many of the first purchasers have their original holdings and continue to increase them. The fact that such stock has always been offered as a permanent investment with no speculative features has placed it in the hands of investors satisfied with just that type of security. The known speculator is neither desirable nor solicited to become a utility stockholder. During 1928 when stocks soared, many customer owned stocks were sold to acquire more promising securities, but generally, stockholders are lost through natural causes such as for the purchase of homes, sickness, or the settlement of estates. Most of the electrical companies have established resale markets within their own organizations where the small stockholder may dispose of his stock without undue loss when he finds it necessary or wishes to do so.

Frequently, efforts are made by salesmen of some brokerage houses to induce people to trade their public utility securities for those of some other company. When such a situation arises, the stockholders in that community are visited by a utility company employee and advised of the soundness of the security they already hold. The employee emphasizes the safety of the stock, the marketability in case of necessity, and the rate of return.

Data collected under the direction of the Customer Ownership Committee of the National Electric Light Association show that in the year 1928, 251 companies sold under the customer ownership plan 2,081,071 shares of stock to 202,380 new shareholders. A similar report for 1927 shows that 246 companies sold 3,581,206 shares to 249,491 new shareholders.[1] In other words, five more companies obtained 47,111 fewer new shareholders in 1928 than in 1927, and sold 1,500,135 less shares to customer owners in 1928 than in 1927. The report says that the decrease in this form of financing in 1928, as compared with 1927, does not indicate any real loss of interest in customer ownership on the part of electric light and power companies, but that a majority of the companies reporting their customer ownership activities found it more expedient to finance themselves to a less degree during 1928 with preferred stock and in increasing proportions with bonds and common stock.

The Customer Ownership Committee of the National Electric Light Association, relying on the experiences and records of the companies reporting their customer ownership activities, adopted ten cardinal rules of procedure for customer ownership. For several years these rules have been constantly before the electric light and power companies operating under customer ownership and continue to be regarded as providing safe standards for electric light and power companies to follow. They are as follows:

1. The sale of the securities must be direct from com-

1. See N.E.L.A. Proceedings, 1929, p. 1506

pany to customer or through an agency expressly created for the purpose and controlled by the company.

2. The safety of the securities offered must be amply protected by property and earnings.

3. A minimum rate of dividends must be provided for insofar as honest judgment based on experience can foresee.

4. A reliable resale market must be maintained in some manner so that shareholders who wish to dispose of their holdings can do so promptly at nominal expense.

5. A partial payment purchase plan must be operative in order to give every customer who can save a small amount monthly full opportunity to become a shareholder, and to encourage thrift.

6. Loss of capital by shareholders in hazardous and fraudulent offerings from various sources must be guarded against by the rendering of authentic information and advice to shareholders.

7. The number of shareholders must be increased steadily and efforts should be made to avoid large individual accumulations of stock.

8. Employees must be carefully instructed in order that all representations made to customers or others are in line with the facts.

9. Managements must realize that customer ownership multiplies their obligations to the public and intensifies the trust reposed in them. It does not replace the constant striving for

higher efficiency, good service, reasonable rates, courtesy and progressive public relations policies.

10. The proprietary interest and responsibility of shareholders must be emphasized, and the shareholders supplied regularly with information regarding their company and its affairs.[1]

1. Rules taken from page 1510, N.E.L.A. Proceedings, 1929.

MERCHANDISING BUREAU

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Many different methods are being used to increase the revenue of the various electrical companies. During and immediately after the World War, the problem of the electrical industry was how to finance additions to their properties to take care of the business brought to them without solicitation, but their problem now is how they can most intelligently bring about greater diversification in the distribution of their product--electricity--to more surely safeguard the heavy investments already made and to be made for generating capacity and distributing facilities. The large investments made in transmission lines for interconnecting small communities and extending into rural districts, where there is little industrial activity, require more volume of electric service in small town homes and farms. The Commercial Section of the National Electric Light Association, with merchandising departments in all member companies, is organized to promote the sale of electricity consuming appliances.

After the organization and equipment of the department, the next step is the selection and training of salesmen. And here is the advice and schooling which is given to electric light company salesmen:

RULES OF CONDUCT FOR A SUCCESSFUL SALESMAN

1. Make a good impression. Dress as carefully each day as though you planned to meet the president. A face that bears the mark of optimism, good nature, enthusiasm and a healthy personal confidence does the rest.

2. Interest the people you talk to. Know enough about your company and what it does, the industry and how it serves humanity, to sow good seeds of public interest and appreciation, and to establish your own reputation as a man of ability.

3. Meet and know as many people of all classes as you can. Lend a hand in civic enterprise; belong to social clubs and be a recognized co-operator.

4. Be resourceful. Be prepared to offer more than just an argument. Have the evidence and proof of each vital statement that you make, in one well chosen data book. This book should prove by photographs what each appliance looks like and how it is used; it should prove, by the names and testimonials of local men and women, that each device is practical and satisfactory; and show by photographs those other houses "just like yours" that have been wired, what it cost, how the work was done, and what the monthly current bills amount to. Present your evidence in figures and in pictures to support each argument that is needed

day by day. There is no excuse for lack of such preparedness.

5. Win the order now. Second calls cost just as much in time as first calls, and a salesman's time is all he has. Except in cases where it would be obviously inexpedient to force a decision, win the order on the spot. Poor salesmen call again, but men of ingenuity and courage clean up their business as they go.

6. No business enterprise is safe that doesn't constantly create more market. You must steadily develop more new prospects for yourself, for if you spend your time in following inquiries from the office, you have given up your independence. You are not creating opportunities unless you find new markets for yourself.

7. Every salesman must remember that his customers are his most precious asset; his probable prospects for more business. Educate them; steadily maintain friendly contact, and continually sell them those further applications of the service that you know they need and can be made to buy from time to time.

8. The salesman should make every contractor and dealer in the town his friend. Co-operate with the electric fraternity who recognize their functions in the field you work in. Make your place among them as a man of business and take full advantage of the many benefits that popularity among the trade

will bring.

9. Co-operate. Find heart in competition with your friends and with the records of your own achievements in past months and years.[1]

After the salesman is instructed on how he is to act, he proceeds to convince the housewife that for the good of her health, or for the good of her husband's disposition or digestion, or for the beauty of her home, she needs every appliance he has for sale that she does not already own. He tries to create a great public appreciation of, and greater indulgence in the comforts which complete electric service provides. He tries to make the magic of electricity spectacular in order that it will catch and hold public interest. He tries to make the electrical home a fad among housekeepers and home builders. He sets up electrical methods as a style of housekeeping and would create a craze for them just as a craze was created for color in the kitchen and bathroom and as the demand for electric refrigeration is now being created. It is believed that the speed with which the style of electrical housekeeping will be established will depend upon the degree of sales promotion given to the appliances that perform the house work that is hard to do. Other appliances will follow the trend of the style.

The electric iron, the appliance which has had the

1. "The Way to Make a Salesman," Earl E. Whitehorne N.E.L.A. Proceedings, 1916, p. 104

largest over-the-counter sale has reached its position of importance because of the extensive advertising and sales promotion work stressing the elimination of hard, hot, tiresome work. The vacuum cleaner and the washing machine, the appliances having the second and third largest sales, eliminated the hardest, most disagreeable and unhealthiest work of all the household duties.

A recent survey developed the information that 55 per cent of the owners of electric refrigeration purchased them to eliminate the inconvenience and labor of using ice. Less than 10 per cent purchased for reasons of health.[1] The electric refrigeration business is using sales methods which catch and hold the public interest, overcome the fixed ideas and habits of housekeepers, and set a style or craze for the machine that is swaying the whole nation and is accomplishing in a few years what less intensive and skilfull methods would take decades to accomplish.

Through the standardization of electrical equipment on the part of manufacturers, costs to the consumers have been reduced thousands of dollars, taken as a whole, and much has been added to their convenience. Almost any electric bulb will fit into almost any socket, and the cord and plug which come with the electric iron will also fit the coffee percolator or the

1. See N.E.L.A. Proceedings 1929, p. 123

waffle iron. One socket may be used at different times during the day or night for the toaster, the vacuum cleaner, and the radio.

A step which has already been taken by some companies and which will be followed more closely and effectively by more and more companies as time goes on, is the servicing of appliances by the company supplying the power, whether that company sold the appliance or not. The purpose of this movement is to avoid the loss of power sales because of idle appliances. If the electric iron works perfectly, the housewife uses it frequently and buys another as soon as it wears out. If the vacuum cleaner is reliable, it is constantly in service and is replaced by a new one as soon as it is worn out--and so on, but if the iron is unsatisfactory, due to some fault in the iron, or the circuit, it is put on the shelf and the housekeeper uses the old-fashioned things she was brought up with. So it is the part of wisdom for the utilities to send representatives into the homes of their customers to go over their equipment, put it in good working order, and instruct the housewife on any points that she may need help. To promote the sales of appliances, and through them power, their reliability must be unquestioned; they must be serviceable so that they may be used frequently without any danger whatever.

Home Service Work is a part of the program of the Woman's Committee of every electric company connected with the N.E.L.A. The utilities feel that the women of the companies, through the Home Service Departments, can be of great help in building a homemaker's understanding of utility services and equipment, and help to build good will and revenue by helping women in the selection, use, and care of appliances. A high priced appliance which is not thoroughly understood, and therefore not fully used by a customer, is a possibility of dissatisfaction. A woman representative, of the company selling the appliance, who knows something about housekeeping and can speak the language of the housewife is trained to thoroughly explain and demonstrate all electrical household appliances.

When a woman is first taken into the Home Service Department of any company she is given a thorough training in company policies, organization, properties and rates. Then she is trained in the use of equipment and services. After this preliminary training course, she goes about calling on customers, learning service conditions, customers' attitudes, helping customers in uses of appliances, and suggesting proper equipment. In this way she gets an excellent opportunity of understanding customers and the requirements for good service. It also gives her a personal acquaintance with the company's customers and while she may not

be able to visit all of them, she will have a knowledge of all the common complaints. It has been found that when salesmen try to demonstrate waffle irons, they frequently overheat the iron with the result that the waffle isn't very palatable, and the iron is blackened. Many women using electric ranges don't know that a half cup of water is sufficient for cooking any vegetable, and that when that half cup of water has reached the boiling point, the amount of heat may be decreased. Complaints of the high cost of operating electric ranges have been due, largely, to the housewife's using a kettle full of water for her vegetables and having the electricity on at full force to boil away the water. The proper use of refrigerators isn't understood by many housewives. A member of the Home Service Department may overcome these misunderstandings in her visits to the homes. The utilities are recognizing the woman's domination in the home and her position as the buyer and operator of everything in the home. After selling an appliance, if a customer is to be satisfied with her purchase permanently and consume electricity through its use, it must perform, regularly, a useful service.

The need to create more market for motors, industrial heat, electric trucks, better lighting of streets and buildings and for the many applications of electric service in the store and office is being realized. The industry must grow in the future not by just accumulating customers, but by enlarging customer

installations. The past years have been an era of preparation, and the present era should be one of market development. The electrical merchant will have to give much more attention and support to selling, in the years to come. American industry has been absorbed in the perfection of the processes of production and now it is confronted with great inefficiencies in the distribution of its products.

There is a growing competition between industries which is bringing about a new philosophy of selection in buying. The public is learning to discriminate not so much as to what is best, but what is most desirable. It is learning that it must plan its purchasing more carefully because selection is becoming more difficult and because of the more deliberate process of modern easy payment buying. The public today is trying to decide whether to apply available money to something electrical or to an automobile, a radio, furniture, clothing, shrubbery, or a more extended vacation. This mental attitude is the result of clever and highly organized sales activity, and the electrical industry must work harder than ever for its share of the consumers' dollar.

The work of the Women's Committees in demonstrating appliances and serving refreshments prepared on the appliances has been valuable in promoting their sale, although the women do not try to do any selling during the demonstration. If an electric refrigerator is being demonstrated, frozen desserts are served

from it; if an electric range is being demonstrated, a luncheon is prepared on it and served.

In 1930, one thing that saved the electrical industry from heavy reductions in payrolls was the domestic or residential consumption of electricity. The amount of energy served for industrial purposes fell off in proportion to the general let down in factories and industries. This meant tremendous losses in earnings and to some companies it might have meant complete loss, but the progressive policies which the electric companies established several years ago in the development of the sale of all kinds of household appliances, and in teaching women how to make advantageous use of them so as to save labor and improve their standards of living, compensated at this time, in part, for the loss of the industrial load.

ELECTRIFICATION OF RAILROADS

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Steam railroad electrification commenced in 1895 when two short sections were electrified in the United States.[1] The first was that of the Nantasket Beach line of the New Haven Railroad, and the second was the electrification of the Baltimore & Ohio Railroad tunnel in the city of Baltimore which was commenced in August of 1895. From then until 1900, there was the electrification of three short sections of the New Haven Railroad in the United States, a small portion of the Burgdorf-Thun Railway in Switzerland, and some of the suburban routes of the Western Railway in Paris.

Italy, England, Austria, Switzerland, Holland, France and Japan adopted electrification quite extensively from 1900 to 1910. During this period several important projects were completed in the United States, the more important of them being the suburban routes of the Long Island Railroad in and near New York City, the New York terminals of the Pennsylvania, New York Central and New Haven railroads; the St. Clair tunnel of the Grand Trunk between Port Huron, Michigan and Sarnia, Ontario; the Cascade tunnel of the Great Northern in crossing the Cascade Mountains; and the Detroit River tunnel of the Michigan Central between Detroit and Windsor, Ontario.

1. History, figures and dates have been taken from N.E.L.A. Proceedings, 1927, pp. 64-73, and 1929, pp. 31-34

More than thirty separate installations were completed from 1911 to 1920. They took place in each of the seven foreign countries mentioned in the preceding paragraph, and also in Prussia, Norway, Sweden, Chile, Spain, Hungary, and Australia. The most important projects completed in the United States were the Hoosac Tunnel of the Boston & Maine; suburban lines of the Southern Pacific between Oakland, Alameda and Berkeley, California; the New York, Westchester & Boston; the Fort Dodge, Des Moines & Southern; Butte, Anaconda and Pacific; New York, New Haven and Hartford between New York City and New Haven; a mountain division of the Norfolk & Western in West Virginia; the Mount Royal tunnel of the Canadian National in Montreal; the Broad Street terminal of the Pennsylvania in Philadelphia, and more than 640 route miles of the Chicago, Milwaukee & St. Paul in Montana, Idaho and Washington, which includes the longest continuous section of electrified steam railroad in the world. It extends about 440 miles.

Since 1921, Chile, Germany, Sweden, Brazil, Mexico, Java, New Zealand, Switzerland, Japan, Austria, Uruguay, France, India, England, Norway, Italy, and Russia have had electrification projects completed. In the United States, the following electrifications took place: the Long Island road between Jamaica and Babylon; short sections of the New Haven and the Baltimore & Ohio near New York City; the mountain section of the Virginian between Mullens, West Virginia, and Roanoke, Virginia; the Norfolk & Western from

Vivian to Laeger, West Virginia; part of the Putnam division of the New York Central; the mountain section of the Great Northern between Cascade tunnel and Skykomish, Washington; the suburban passenger service of the Illinois Central in Chicago; the Detroit, Toledo & Ironton from Fordson to Flat Rock, Michigan.

The most important recent electrifications in the United States are the Great Northern's from Appleyard to Skykomish, including the Cascade tunnel which gives this line a total electrification of 74.6 miles; the section of the Pennsylvania between Philadelphia and Wilmington; the electrification of the New York Connecting Railroad and Long Island Railroad between Port Morris and Bay Ridge, New York. Electrification has also taken place on all trunk line railroads in Sweden, Italy and Switzerland, and a number of complete installations have been made in England, Australia, Japan, France, Russia and the South American countries.

The necessity of relieving some local or general operating condition has been the most compelling influence in bringing about electrification. In most cases there has been more than one reason for the change, the most common in the order of their importance are as follows: To increase capacity, improve service, and promote economy; to facilitate operation on heavy grades; for operation in tunnels; to conserve fuel and use water power; and for general and legislative reasons.

The necessity of increasing the capacity of tracks is important chiefly at terminals in large cities and wherever construction of sections of railroad is determined by natural restrictions such as mountain grades and tunnels. In such places, the reduction of grades or the construction of more tracks would entail much more expense than electrification would cost.

The chief reason for the electrification of the terminal of the Pennsylvania Railroad in New York and Philadelphia was to relieve congestion. It was also the chief reason for the electrification of the Grand Central terminal of the New York Central and the New Haven roads in New York; the Victorian Railways in Melbourne, Australia; the several English roads in London, and the French lines in Paris. These terminals had about reached their capacity, and traffic was steadily increasing. The problem couldn't be solved by laying additional tracks because these terminals were located in the busy sections of large cities; therefore it became necessary to operate more trains over the existing tracks. By increasing speeds, eliminating turning movements and reducing switching, electrification provided greater capacity.

Suburban passenger train service makes the greatest demand on the large city railroad terminal during the morning and evening rush-hours, and this is in addition to the long distance freight and passenger movement. The use of electric trains in sub-

urban passenger service makes possible more rapid movement of cars and a longer train, as the length of the train is limited only by the length of the station platform. Up to the present time, the growth of suburban population has been larger than that of the cities, and this means a similar growth of suburban train passengers. Rates on suburban passenger service have been so low of late years, that the railroad companies have been operating at a loss on this service. If the increased load is going to require electrification, the public must expect to pay more in rates in order that the railroads may receive a revenue large enough to provide an adequate return on the increased investment.

Electrification has made operation on heavy grades possible at lower cost and with more speed because one electric locomotive is now capable of handling trains which formerly required the use of two steam locomotives. Speed has been almost doubled. The electrification of trains operating over heavy grades has been particularly effective in Switzerland, Austria, France, Italy, Japan, and South America, and with the Norfolk & Western Railroad, the St. Paul, and the Virginian Railroads in the United States.

The rapid growth of tunnels of considerable length has been followed by electrification of the trains running through the tunnels in order to eliminate the smoke and gas of the steam locomotive, and to increase the capacity of the line. These are the

main reasons for electrifying the Great Northern in the Cascade Mountains, and the Baltimore & Ohio tunnel in Baltimore, which extends under the heart of the city and is the entrance for all the trains of that railroad. The Park Avenue tunnel which provides an entrance to New York City for the New York Central and the New Haven railroads had steam locomotives running through it for many years, but increased traffic and legislative measures brought about electrification. To eliminate smoke, the Grand Trunk Railway began electrical operation through its St. Clair tunnel in 1908. The Cascade tunnel of the Great Northern was electrified in July 1909, and the Hoosac Tunnel of the Boston & Maine, in northwestern Massachusetts, was changed from steam to electrical operation on May 27, 1911. An electrified tunnel under the Detroit River was put in operation in October, 1910 for trains of the Michigan Central Railroad. The Canadian National Railroad has an underground entrance to Montreal through the tunnel under Mount Royal. This tunnel was put in electrical operation in 1915.

In a number of foreign countries, the lack of fuel, or the excessive cost of fuel has brought about the electrification of steam railroads. Because of the lack of coal and the abundant water power for the generation of electrical energy, Norway, Switzerland, Sweden and Italy are electrifying all their railroads, and it is thought that Austria, Brazil, and Japan will follow a similar

program. The desire to make the operation of railroads independent of imported coal, the receipt of which might be interrupted by outside disturbances, has hastened electrification in some European countries.

Legislation has brought about the electrification of some lines. The State Legislature of New York enacted a law dated May 7, 1903, forbidding steam operation in the Park Avenue tunnel because of an accident which occurred there.

There have been occasional public movements for the elimination of the smoke and noise of the steam locomotives in some of the larger cities, and it is interesting to know that the Chicago Association of Commerce, in 1911, employed a staff of experts to study the question of smoke abatement and the electrification of all railroad tracks in Chicago. The result of the investigation, which lasted over four years, was that steam locomotives produced only 10 per cent of the total smoke in the city. It was evident from this investigation, which made exhaustive tests of air pollution by steam locomotives and all other agencies, that the tremendous cost of complete electrification of all the tracks in Chicago was not warranted and so the idea was abandoned.[1]

On March 22, 1923, the New York Legislature passed a law prohibiting the operation of steam locomotives in all cities of the state having more than one million population. New York City is

1. See N.E.L.A. Proceedings 1927, p. 70

the only one affected by this statute so far, and its principal railroad passenger terminals have already been electrified.

Some of the advantages of electrification to the railroad companies are the reduction in the number of engine crews, the release of steam locomotives for use elsewhere, greater horse power per pound of coal consumed, increased revenue through ability to handle greater traffic, reduction in maintenance costs, reduction in locomotive terminal facilities, reduction in switching costs, greater revenue through increased comfort to passengers, increased revenue through development of air rights. In connection with the latter item, it is claimed that the revenue from the developed air rights of the Grand Central Terminal in New York City is equivalent to the fixed charges on the cost of the electrification. Property adjoining railroad rights-of-way in the early days of our present large cities was used, chiefly, for industrial purposes. As population increased, more general use of the property crowded the larger industries toward the outer districts of the city, and with the electrification of railroads and the consequent abatement of smoke and noise, the space over the right-of-way as well as the adjoining property may be used for hotels, office buildings and apartments.

Apart from the special conditions of operation where electrification has been used to overcome grades, increase capacity, or give general relief, there is the question of more general applica-

tion of electricity to main lines. The undertaking of the Pennsylvania Railroad, in traffic magnitude, is the largest ever turned over to electric motive power. It consists of complete electrification of freight and passenger traffic on 325 miles of line and 1300 miles of track. It will extend from New York and Philadelphia to the Susquehanna Valley and involve the capital investment of $100,000,000.

Some reasons why the Pennsylvania Railroad adopted the electrification of its lines, in part, are the following: In 1902 it determined to build a large passenger terminal in the heart of New York City with an underground station and yard to be reached by sixteen miles of tunnels passing underneath two rivers. It was necessary to have some form of motive power for the trains other than steam, and so electricity was adopted. About the same time, the company electrified seventy-five miles of its line running from Camden to Atlantic City, New Jersey. This was regarded as an attempt to determine the traffic-fostering possibilities, economy and reliability of handling long distance passenger service by electric trains. A little later, a subsidiary of the Pennsylvania Railroad, the Long Island Railroad, was forced to remove its tracks from the surface of Atlantic Avenue, Brooklyn. This was done by using electric trains in tunnels and elevated lines. It was also desired to use the new Pennsylvania tunnels and terminal in New York City for

suburban service. This service was necessary in order to bring suburban passengers into the heart of the city as it couldn't be done with steam locomotives.

The next movement was the electrification of suburban services to use motor car trains into the Broad Street Terminal of the Company in Philadelphia. This was done to relieve congestion and increase traveling speed. Then came the electrification of the New York Connecting Railroad which was finished in 1927. The purpose of this electrification was to bring about economies in operation and to save time in the dispatch of freight from New England points to the South and West by avoiding a change from steam to electric engines within the city and to increase train weights handled over heavy bridge grades, and to deliver local freight electrically to industrial plants within the city.

The latest plan of the company is the full electrification of all services on the four-track main line from New York to the South and West. It is the most costly and extensive project of its kind undertaken anywhere. It is expected that this new arrangement will result in relief of congestion, increased revenue through increased business, especially in perishable commodities, and the handling of through passenger service into the two underground terminal stations--New York and Philadelphia--without change of power en route. The railway world will watch the results of this great

undertaking with keen interest.

In addition to the electrification of railroad tracks, electricity has played an important part in improving railroad transportation performance through its application to railroad machinery and equipment used for maintenance of way, and through its use in automatic block signals, colored light signals, automatic interlocking, and remote switch control, the printing telegraph, telephone and telegraph apparatus for special uses on railroads permitting the rapid transmission of information as to the time of trains, track assignments, and special instructions around yards and terminals simultaneously to a number of widely separated points; and the use of loud speakers for announcing purposes in passenger stations. Radio application to railroads is being developed, particularly for emergency communications when wire service is interrupted, and for communication between the head and rear end of trains.

The use of electrically driven machines for repair work has meant much for the improvement of railroad transportation in the United States. This improvement has been seen, since the World War, chiefly through physical improvements. About $5,000,000,000. has been spent on improvements since 1920 when the government turned the railroads back to private operators. In 1926, the railroads handled forty per cent more traffic than in 1921, the first year of

private operation after the war. This increased volume was made possible not so much by an increase in the number of physical units as through the enlargement of terminals with increased miles of tracks, greater tractive power of locomotives, and increased capacity of box cars.

Railroad track has been improved, and maintenance of way costs reduced, by increasing the weight of rail on main tracks, putting more ballast under the ties, and adding many hundreds of thousands of rail anchors.

The replacement of steam locomotives by electrically driven motors in railway traction depends upon the comparative economy of steam and electricity as a motive power in a given instance. A large proportion of the railroad mileage of the United States requires only one or two passenger trains a day in each direction, a light local freight train, and one or two heavy tonnage freight trains, with no tunnels or heavy grades. On such roads there is no justification for electrification. But there are, also, a number of railroads covering districts with continuous, heavy traffic during the twenty-four hours, and on these heavily traveled sections between large cities, electrification may be advisable. Studies have been made with a view to electrifying the New York Central from New York to Albany, and the New Haven from New York to Boston.

The tremendous first cost of electrifying a railway, in-

volving an extensive rearrangement of track, the acquisition of additional real estate, changes in or removal of many structures, and changes in signal and communication systems, as well as the cost of power generation, transmission and conversion, may be reduced in part by the purchase of electrical energy by the railroads from large central stations, rather than generating current in their own stations which they would have to construct and maintain. Reserve power is extremely important in railroad operation because interruptions to the normal supply are very costly. The large central power stations provide the reserve and can assure the railroad of a continuous supply. The Illinois Central Railroad in Chicago purchases power from the Commonwealth Edison Company, and has at its disposal not only the facilities of the Edison company but also those of the other central station companies with which the Edison is interconnected. In this case the railroad's maximum demand will probably not exceed 32,000 kw., and it has at its disposal 1,200,000 kw. This business of course is very valuable to the electrical companies, affording them increased revenue.[1]

1. See U.E.L.A. Proceedings, 1927, p. 72

RADIO

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Ten years ago, radio was presented to an interested public. It was pretty hoarse and nervous and tiresome at that time, but it has grown in beauty and refinement, has cultivated a pleasant tone, and speaks daily with the wisdom of the ages. The greatest artists, orchestras, men and women of public affairs, and of the Church and educational institutions have entered the homes of millions of radio owners throughout the world. The radio is the key to millions of homes. It takes part in the family life and enjoys the intimacy of the family circle. These features of entering the family life make its employment one of great delicacy and fraught with danger if not handled with the best judgment and tact; for radio comes into the home as a guest and will be welcome or unwelcome exactly under the same rules of behavior as any other guest. Radio programs are censored by the stations over which the program is transmitted, and this has reduced to a minimum any transmission which might seem offensive. A few years ago there seemed to be considerable criticism of the poor quality of orchestra music, and of orations and entertainment. The quality of entertainment has been improving steadily, and there are so many different programs available at one time now, that if an auditor doesn't find what interests him on one station he is pretty sure to find it on another.

And all the programs are free. That is they are free to the listener, but of course some one has to pay the artists, and

it costs money to operate radio broadcasting stations.

The National Broadcasting Company, the largest in the world and, as its name implies, one through which a single broadcast may reach every radio receiver in the nation and with proper connections the world, was organized and sponsored by three important members of the electrical family, The Radio Corporation of America, The General Electric Company, and the Westinghouse Electric & Manufacturing Company. The programs broadcast by this company are paid for by the owners of the company in the development of radio science and entertainment. The three companies sponsoring the National Broadcasting Company are interested in promoting the sales of radios, and expect to derive their profit therefrom. They know that the sale of radios depends upon the programs to be received through them, and so they have been securing the services of famous men and women and orchestras for the entertainment of radio owners. American industry is also contributing to the support of the National Broadcasting Company. They have quickly grasped this medium of advertising, and in return for the programs which they offer, the radio public is expressing its appreciation in good will and through the purchase of the products represented on the various radio programs. It is said that the Pepsodent Company has added millions to its profit through the nightly presentation of Amos 'N Andy.

It is expected that as time goes on, more and more industries will use the facilities of the National Broadcasting Company so that this institution will be self-supporting. At the present time it is quite a heavy expense to the companies sponsoring it.

Radio broadcasting stations other than the National Broadcasting Company receive their revenue from the companies who advertise over them. Direct advertising and descriptive advertising have no place in radio. These must be left to the newspapers and magazines. The American people appreciate fine music, entertainment and information by radio, but resent the absorption of their time by direct selling of products or by drawn out speeches, whether by public officials, preachers or educators.

National church services, programs of elementary and higher education, the most important messages of municipal, state, and federal government officers have been presented over the radio, and recently, Walter Damrosch, the best known of our musical leaders, announced that the remainder of his life would be given over to the development of radio broadcasting of fine music in the homes and educational institutions of the land.

More than a million and a half farm homes have the benefit of radio and the farmer has realized that the purchase of a radio instrument is a worthwhile investment in farm equipment. Weather reports, market reports, the latest information on farm machinery,

crops and farm equipment have been immediately available to the American farmer without cost to him.

The Federal Radio Commission, with the power to re-adjust and allocate the wave lengths of the numerous radio stations in the country, is clearing the air of interference, so that American families may be entertained and informed each night and day without interference.

Executives of electrical companies are making various predictions of what we may expect in the future from radio and other developments. Mr. Merlin Hall Aylesworth, President of the National Broadcasting Company, Inc. predicts that in the homes of the future every room will be equipped and wired for the distribution of radio programs from the parlor and the bedrooms to the kitchen.[1] Mr. H. P. Davis, Chairman of the Board, National Broadcasting Company, says that talking movies in the home are just around the corner. He says that at first this device will be through the use of individual film records, but later it will be a service of the broadcasting companies. Apparatus is now developed in practical form whereby a message or a picture can be transmitted in facsimile form--that is, as a typewritten page or picture. This is a new system of telegraphic communication. Mr. Davis says, "This agency opens up other avenues whose development can be most far-reaching. I conceive it possible, when combined with the principles of the

1. See N.E.L.A. Proceedings, 1927, p. 16

Televox, to arrange a device for use as a broadcast receiver which can be started or stopped at will. This device will automatically take the message from the broadcasting station in facsimile form, At one's leisure, he can go to his receiver and get the market reports, weather reports, important news items--in fact, through selective controls, any service would be available for which he may indicate a desire. Items of interest will be made available in the home or office immediately they occur, and thus furnish the means by which this information may be quickly and easily obtained. Progress in this direction is inevitable; its future is assured."[1]

It is also forecast that we may look for the transmission of power without lines in the future.

The radio companies are interested in promoting radio, as all other electrical appliances, because they derive profit from the sale of electrical energy. And if, as Mr. Ayelesworth suggests, the homes of the future are going to have radios in every room with electricity feeding the tubes of each instrument, this is a big field for the electrical companies.

Quoting again from Mr. Davis, "Unquestionably many appliances will be developed, as the result of radio studies, which will create more demand for current--for instance, the employment of high frequency furnaces which will take power from the lighting circuits to operate tubes, the tubes in turn converting that fre-

1. See N.E.L.A. Proceedings, 1928 p. 22

quency to one suitable for furnace use. Such high frequency furnaces will undoubtedly be used by jewelers, dentists and others in the refining and working of precious metals and alloys. These same high frequency applications will also be used in connection with therapeutic treatments.

"The developments of various special radio appliances that have originated in the continued study of this art, and which are now being used, will probably be increased in number for purposes of automatic supervision, automatic control, automatic inspection and sorting, automatic counting, automatic fire protection, automatic synchronization of machines and many other automatic operations. All these things will reduce man power and increase the application of electric power."[1]

1. See N.E.L.A. Proceedings, 1928, p. 23

ELECTRIC REFRIGERATION

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Refrigeration has been a problem that has interested mankind since very early in history. We have been told that the ancient Egyptians filled shallow porous trays with water and placed them on beds of straw. They were then exposed to the cool, night breeze, and due to the coolness and evaporation, a thin film of ice was formed which was removed at dawn by slaves and stored away. And this practice is being followed today in India. We are also told that Alexander the Great and Nero had their serfs carry down packed snow from the mountains and place it in deep trenches with hundreds of kegs of wine so that guests at their feasts might have cool vintages.

It is only a few years ago that the harvesting of natural ice was a big American industry. Today it is almost a thing of the past; artificial ice is supplanting it. Labor was the largest factor in the cost of natural ice; it is only one fourth the cost of artificial ice.

In the last few years, the trend has been and still is toward automatic refrigeration and because of the research and educational activities of the many manufacturers of automatic refrigerators, the influence is felt in homes where formerly little or no thought was given to the preservation of food. Scientists are agreed that the only way to prevent the multiplication of bacteria

is constant cold. If food is kept all the time at a temperature below 50° F., foodstuffs will remain fresh. Electric refrigeration is capable of maintaining a constant, even temperature averaging 42° F. automatically. [1]

In 1929, the Electric Refrigeration Committee of the National Electric Light Association took for its work a closer co-ordination of efforts in the refrigeration industry. They found that each manufacturer of refrigeration equipment was carrying on his sales and promotion work without any regard to the work being accomplished by his competitors. The committee undertook to bring the industry closer together to work out a co-operative, national, educational program that would tend to sell the American public on the possibilities of electric refrigeration from the standpoint of health and food preservation. After several meetings of the committee, a plan was formulated which incorporated every manufacturer, jobber and dealer interested in refrigeration. It also called for the endorsement of every national and local group interested in health and food preservation, such as the National Dairy Association, the Federation of Women's Clubs, the Medical Association, and others. The National Electric Light Association agreed to actively sponsor the plan. All finances connected with the national committee which would direct the activity were to be raised through subscription by the manufacturers of electric refrigeration and ice boxes, and all local promotional expense was to

1. See N.E.L.A. Proceedings, 1929, p. 126

be borne by the local utility and all interested groups. An avalanche of publicity material descended on the public. National advertisements and all types of local material on the food temperature were distributed by the millions. The specific aims of the program were to establish the cause of food decay and bacteria growth, to establish the relationship between food spoilage and health, and to establish in the public mind a perishable food temperature of 50 degrees or less. They endeavored to make the customer feel that a food temperature of 50 degrees for health is just as important to them as a heat temperature of 70 degrees for their comfort.

Twenty-five thousand dollars was appropriated for a model home, a Cadillac car, and other prizes for the best essays submitted by the public on automatic electric refrigeration.[1]

The campaign was successful. The public responded generously, and thousands of refrigerators were sold.

1. See "National Food Preservation Program", N.E.L.A. Proceedings, 1929 p.122

COMMERCIAL AERONAUTICS

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[1] Development in aviation has meant a development in the electrical business because the commercial flying which must be done at night requires lighted airways and lighted landing fields. At the present time, lighted airways extend across the eastern states from Boston, Mass. to Atlanta, Ga.; through the Mississippi Valley from LaCrosse, Wis., to Chicago; from Chicago to St. Louis, and from Chicago to Dallas, Tex.; along the eastern slope of the Rocky Mountains from Cheyenne, Wyo. to Pueblo, Colo.; and on the Pacific Coast they extend from Los Angeles to San Francisco; Los Angeles to Las Vegas, Nev., and Pasco, Wash. to Boise, Idaho. Lighted routes also extend between Atlanta and New Orleans, Cleveland and Louisville, Cleveland and Albany, Salt Lake City and San Francisco and Seattle.

The standard lighted airway has a 2,000,000 candle power revolving beacon every ten miles. "In addition to the beacon there are two course lights facing in opposite directions along the course, with the flashing mechanism synchronized with the beacon mechanism, so that as the beam of the beacon revolves off the course, the course light flashes out the number of the beacon in code." An intermediate landing field varying from forty acres to 100 acres is provided every thirty miles. The outline of the runways is indicated by boundary lights placed 300 feet apart. Any obstructions on or near the fields are marked with red lights.

1. Figures and statements taken from pages 161-163 N.E.L.A. Proceedings 1923

These airways and landing fields are constructed by the government for the use of air mail planes, but anyone who wishes to use them may do so. They are lighted from sunset until dawn, and electric power companies supply the current in almost all cases. Electrical companies esti ate an income of $1,000,000. a year from aeronautical sources.

Air mail routes in the United States have grown from one, between New York and San Francisco to nineteen (1928) now serving all the important business centers of the country. These routes have been brought about without any government subsidy. They have been supported entirely by private enterprise in payment of postage for air mail. Because the post office audit in 1927 showed a profit for that year, Congress authorized the Postmaster General to reduce the air mail rates to five cents an ounce, the existing rate being ten cents a half ounce. Mail rates were fixed at five cents for the first ounce and ten cents for each additional ounce, beginning August 1, 1928. One reason that the rate was not cut lower was because if it had been, there would be very little difference between the air mail rate between New York and San Francisco and the rate charged for carrying ordinary express by rail. If this condition existed, it was feared that the demands for service would be too great for the aviation equipment available.

The American Railway Express has a service which makes it possible to send a package partly by rail and partly by air ir-

respective of where the shipment originates or to what point it is consigned. Some of the best and oldest railroads have established a system of combined air and passenger service, and it is now possible for passengers to travel over most of the air mail routes at an average fare of ten cents a mile.

There are countless organizations operating planes for instruction, sight seeing, aerial photography, advertising, crop dusting, forest patrol, and emergency airplane trips. The business is expanding rapidly not only to supply the Army and Navy and Post Office, but also commercial air service operators, private owners and business concerns.

INDUSTRIAL DEVELOPMENT IN THE UNITED STATES AND CANADA

The Metropolitan Life Insurance Company of New York in conjunction with the National Electric Light Association made a survey of the fundamental industrial development in the United States and Canada during the years 1926 and 1927 which showed the following situation:[1]

Two thousand eighty four cities, representing three-fourths of the urban population of the United States and about two-thirds of the corresponding Canadian population, and covering sixteen thousand industrial firms, contributed their experience with the migration of industry and other factors entering into industrial development. During the years under review, 1926 and 1927, the cities covered reported gains of over 10,000 plants which employed more than 371,000 employees. It was found that this industrial development came from new industries which were started within the communities themselves and that only nine per cent of the total plants gained by the various communities came from the relocation or shifting of industry. Branch plants were responsible for about eight per cent of the total plants and 25 per cent of the total employees gained.

The size of the plants gained, measured in terms of employees, shows that the average branch plant had 102, the average

1. Figures and statements taken from N.E.L.A. Proceedings, 1929, pages 80-84.

relocated, or migrated industry, 71, and the average new local plant 35. These figures are for the United States as a whole, and the average size of plants gained when measured in terms of employees in geographical areas. In the South Atlantic States, the average size of plants gained was 75, or more than twice the size of the national average. New England's average number of new employees was 47, and The Middle Atlantic States was 26.

The Middle Atlantic States showed the greatest gain due to the migration or relocation of industry. The New England states ranked second, and the East North Central States which consist of Ohio, Indiana, Illinois, Michigan and Wisconsin ranked third. The Middle Atlantic States received a bigger gain from the establishment of branches than the other territories; the East North Central Territory stood second, and the South Atlantic States, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia and Florida were third. The Middle Atlantic States ran ahead of the other territories in the establishment of local plants, New England came second, and the East North Central States third.

Using the nine geographical areas into which the Federal Census Bureau has divided the United States, the following chart shows to what extent the three sources of industrial growth have been responsible for the gain in each of the areas:

		Relocations Per cent.	Branches Per cent	New Industries Per cent.
NEW ENGLAND	Plants	18.0	6.5	75.5
	Employees	28.3	16.0	55.7
MIDDLE ATLANTIC	Plants	5.6	4.3	90.0
	Employees	15.9	16.0	68.1
EAST NORTH CENTRAL	Plants	18.8	11.1	70.1
	Employees	28.7	26.9	44.4
WEST NORTH CENTRAL	Plants	9.6	17.6	72.8
	Employees	12.9	42.1	45.0
SOUTH ATLANTIC	Plants	13.4	19.2	67.4
	Employees	17.2	36.8	46.0
EAST SOUTH CENTRAL	Plants	6.2	20.1	73.7
	Employees	10.6	30.7	58.7
WEST SOUTH CENTRAL	Plants	8.1	16.0	75.9
	Employees	12.2	33.7	54.1
MOUNTAIN	Plants	4.0	28.3	67.7
	Employees	2.0	77.2	20.8
PACIFIC	Plants	6.4	16.9	76.7
	Employees	4.8	50.4	44.8

Markets were most frequently advanced as the reason for the location of plants. It is as important as ever to manufacture as cheaply and as well as possible, but the primary problem confronting the manufacturers of today is to sell their product. The closer the manufacturer's plant is to his markets, the lower his transportation costs will be and his service to consumers will be quicker and better. The availability of a steady, dependable supply of labor at reasonably low wages was the deciding factor in

Chart taken from N.E.L.A. Proceedings, 1929, p. 81

the location of some industries. Transportation facilities were third in importance in the selection of plant locations. Railroads have greatly increased their efficiency in the past few years. They have expended large sums of money in eliminating grades, installing automatic grade and crossing signals, using engines with greater traction power, changing over from wood to steel freight cars and developing the container car so that trains are giving faster service, holding more steadfastly to schedule time and increasing the convenience of shipping in less than car load lots. Because of the improvements in the time schedules of the railroads, and the prompt delivery of goods according to promise, inventories have been reduced to almost nothing. When a dealer knows that by ordering goods on one Saturday they will be delivered the following Saturday, there is no need to carry a heavy stock which may depreciate in a falling market. The millions of dollars which have been released for industrial purposes through the elimination or reduction of inventories have added to the economic prosperity which the country as a whole has enjoyed.

Bonuses, free taxes, free land, and free factory buildings which in the past may have been inducements for the location of plants are no longer considered of any importance.

The food, machinery, and chemical industries locate their

plants with a view to nearness to markets, while the textile and leather plants are interested in the supply and quality of labor available.

During the period of this investigation, about six thousand industries were lost to American cities. About 18 per cent of these moved away, and 82 per cent went out of business. About 60 per cent of the plants gained were lost, and the causes underlying the losses are not available because the communities did not keep a record of the reasons or were not willing to disclose them. It has been revealed that many communities make considerable effort to attract industries within their boundaries, but they make almost no effort to keep them there once they are in, nor to protect small industries naturally growing up there.

In considering the industrial development of the large versus the small cities, and arbitrarily taking a population of 50,000 as a dividing line between the larger and smaller cities, the survey shows that the branches and relocations were divided nearly equally between these two types of cities, but that approximately three-fourths of the new local plants were established in the larger cities. Some of the reasons for the continued industrial growth of the larger cities are the large number of satelite industries which are established around existing industries located therein, and the development of style industries such as clothing and allied lines which are usually located in

metropolitan areas.

It is important that about one-fourth of the branches gained by the smaller cities are located in cities of under 10,000 population and about one-sixth of the relocations went to these cities. Cities of 50,000 and over received about 65 per cent of all plant gains, and the remaining 35 per cent went to cities of under 50,000 population. The larger cities experienced a greater per centage of plant losses than did the smaller ones. Cities of over 50,000 population lost 83 per cent of the total plants and 70 per cent of the total number of employees. In deducting the losses from the gains, the cities of 50,000 or over showed a net increase in plants gained of about 60 per cent, and the smaller cities showed a net gain of about 40 per cent.

It is interesting to note that there is more migration of industries in the textiles and allied products than in any other industry. Machinery ranks second; lumber and allied lines third, and leather and associated products fourth. In terms of branches, food and kindred products established more of them than any other line of business, with textiles second, chemicals third, and machinery fourth. The greatest number of new local plants was made by the textile industry; the paper and printing industry coming second; food and kindred products, third, and lumber and allied lines fourth.

Summing up the whole situation, the textile industry and allied products were responsible for a little more than 22 per cent of the total plants established in the United States during 1926 and 1927; food and kindred products came second with over 10 per cent; paper and printing third, with over 9 per cent, and lumber and allied products ranked fourth with over 7 per cent, the machinery group slightly below this.

The National Electric Light Association was interested in making this survey in order that it might have a statistical record upon which to base its plans for expansion. If the trend is toward more and larger factories in the big cities, electrical service must be available in those cities, and if manufacturing is moving outward to the smaller cities and towns, electrical equipment must be put in readiness to serve in the smaller communities.

The Metropolitan Life Insurance Company was interested in helping with this survey because approximately one out of every five men, women and children in the United States and Canada is insured with it, and the insurance company wants these policy holders to keep well, and to maintain stability of employment.

THE DOLLAR VALUE

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It is maintained by authorities on the subject that during the period of rising prices from 1914 to the present, the value of the dollar has decreased in connection with the purchase of almost everything except electricity, and in the purchase of this commodity, the value of the dollar has increased. In spite of having the same rising costs of material, labor and taxes as exist in other industries, there has been such a tremendous increase in the efficiency of production and in the extent of use of electricity that the industry has been able year after year to reduce the charges to its customers. The average charge to the domestic consumer for household electricity has been brought from 8.3 cents per kilowatt hour in 1914 to 6.9 cents today, a saving of 26⅔ per cent.[1]

The present dollar will now buy 67 cents worth of food compared with 1914. A dollar paid for milk today brings in what was worth sixty-four cents on the old standard; a dollar paid for sirloin steak brings in only fifty-two cents worth, and we get only forty-four cents worth of potatoes, and so on. The electric dollar is worth $1.36 compared with its buying power in 1914.

The clothing bill is generally regarded as 13 per cent of the family budget, and it is interesting to learn that the value of the dollar for clothing was at its lowest level in 1920 when it was worth only thirty-six cents. Today it is worth sixty-two cents.

1. See N.E.L.A. Proceedings, 1930, p. 44

The following is a chart of purchasing power compiled in 1930:[1]

	Index of Prices	Purchasing Power
Electricity, Residential	73.5	$1.36
Cost of living	171.4	.58
House rentals	151.9	.66
Household furnishings	197.7	.51
Clothing	160.5	.62
Food--all articles	150.1	.67
Milk	157.3	.64
Sirloin steak	190.6	.52
Potatoes	229.4	.44
Coffee	140.9	.71
Eggs	102.6	.97
Bread	157.1	.64
Butter	121.9	.82
Doctor's care	200.0	.50
Drugs	156.7	.64
Movies	208.2	.48
Candy	170.0	.59
Tobacco	119.6	.84
Reading matter	177.7	.56
Newspaper advertising	188.0	.53
Farm products	126.0	.79
Grains	107.0	.94
Meat animals	151.0	.66
Dairy and poultry	123.0	,81
Fruits and vegetables	169.0	.59
Building and Construction	203.0	.49
Automobiles	88.4	1.13

1. See N.E.L.A. Proceedings, 1930, p. 47

THE TREND OF THE TIMES

After the stock market crash in the fall of 1929, President Hoover called the National Electric Light Association, together with other large business organizations, into conference to see what could be done to uphold business. The electrical industry was able to assure the President that one billion forty-six million dollars would be spent during the year 1929-30 in furthering new projects, one billion dollars to buy equipment and material and pay wages to workers all over the land, thereby making business for others, and sustaining the purchasing power of the customers of every variety of trade. This figure was not forced nor brought about by extraordinary circumstances; it was simply representative of the annual progress in supplying this country with electric energy.

As part of the association's general effort toward the recovery of business health, it has compiled weekly a record of the output of electricity, and has made the information public in order that any benefits that might be derived from knowing what the demand for electric power at a given time has been would be available. The electrical business, in output, reflected the general business trend. During the year ending April 1, 1930, there were only 775,000 new domestic customers served. This is the smallest increase in new customers since the pre-War days. It is to be compared with 1,160,000 taken on during the year of

1928, and 1,340,000 during the calendar year of 1927.[1] This decrease in new customers is thought to be due to the decline in residence construction, and to the closing of factories which mean unoccupied homes. It may be brought about in part, too, by the fact that the number of new customers added each year must become smaller because the electric companies are gradually catching up with the number of unwired buildings in the country.

Leaders in the electrical industry feel that they have gone a very long way in rate reduction. Annually they are spending huge sums for new construction and for the extension and improvement of service, and they cannot continue to reduce rates and make these great expenditures if the output of electricity remains at its present levels and the number of new customers continues to decline.

1. Figures from "Progress in the Industry." 1931, p. 2

C O N C L U S I O N

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The electric light and power companies of the country have made the following report for the year 1930:[1]

550,000 new customers were served. A new construction program amounting to $850,000,000. and covering the entire country was carried out. Electric service to farms has been increased by 18 per cent which is the largest gain in the history of the industry for any one year. Domestic consumption of electrical energy showed a gain of 14 per cent. Gross earnings for the year are approximately 3 per cent above those for 1929, while the average rate for household service was decreased by 5 per cent. Several thousand miles of additional transmission and distribution lines have been placed in operation. Generating capacity was increased by 7 per cent, the new equipment showing further gains in efficiency. Laboratory, research and field experiments have been carried on as usual. There have been some general political attacks on the industry, but these have not been serious, and customer relations with the electric companies in their local territories have been very good.

Of the 550,000 new customers added during 1930, 472,000 are domestic users. In view of the reduced residential construction throughout the country and the fact that the electric companies are rapidly approaching the saturation point in wired homes,

1. Figures, dates, and statements taken from pages 5 & 6 N.E.L.A. Bulletin, Jan. 1931

this figure is very satisfactory. Numerical increases are largest in Pennsylvania, New York, California, New Jersey, and Massachusetts. The southern states had the largest percentage increases. Unwired homes are chiefly in the rural districts.

Consumption of electricity by the average household customer increased from 502 kilowatt-hours to 550 kilowatt-hours during the year. The use of electricity for cooking and water heating was important in bringing about the increased consumption. The utilities are alert to the commercial possibilities of more sales of household appliances and they are doing aggressive sales promotion work to secure more business. They are also actively working for the new business which comes from electrifying farms, although sparseness of population in some territories presents difficult economic problems. Adaptations of electricity to farm work are constantly improving, and new adaptations are being developed. Increases in the average consumption of electricity on the farms already connected will take place as extensions of lines are made to additional farms.

The Cleveland Union Railroad Terminal, and the Lackawanna suburban zone in New Jersey were electrified and placed in service in 1930.

The new construction work which was carried out during the year involved the expenditure of large sums of money for both labor and materials. The work was spread generally throughout the country so that almost every locality benefitted.

Of the 2-3/4 million horsepower of additional generating capacity which was placed in operation in 1930, 73 per cent was in fuel burning plants, and 750,000 hp. was in hydroplants. Fifteen Miles Falls in New Hampshire, and a plant at Waterville, Western North Carolina provided half of the increase in hydroelectric plants. The electrical properties throughout the country have been well maintained, and the expansions made during the year place the companies in a better position than ever before to supply any increased demand for service.

Gross revenue from all classes of customers for 1930 was approximately 3 per cent above 1929, or about two billion dollars. The loss of revenue from the falling off of demand from industrial power users has been offset by the large increase in electricity used by household consumers and small light and power customers. Use of electrical appliances in homes appears to be but slightly affected by general business conditions.

Electrical power costs to the public, including industrial, commercial and domestic uses, are below pre-war levels.

Based on the changed purchasing power of the dollar, household rates are only 42 per cent of those in 1913. Advances in efficiencies of steam turbines and high-pressure boilers, following concentration of generation in large plants, have reduced the average consumption of coal from 3.2 pounds per kilowatt-hour in 1919 to 1.64 pounds in 1929. This lower cost of electricity, generated by fuel, puts it in a position of sharp competition with water power. During 1929, four great turbines were installed at State Line, Indiana; East River, New York; Philo, Ohio; and Hell Gate, New York, each of which has a greater capacity than the entire Muscle Shoals power house, and which are second in size only to the hydro-electric plant at Niagara Falls.[1]

1. See N.E.L.A. Bulletin, January 1930, p. 7.

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