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The Story of the Development of Electric Utilities of Rochester

THOMAS H. YAWGER

THE two most colorful eras in American history are the pioneering and electrical ages. In the pioneering era our forefathers, by dint of toil, hardship, and sacrifice, conquered the wilderness. They opened the pathway to civilization. They made possible the development of this nation into the most progressive and enlightened of all nations. They set the stage for the creation of a system of industrial accomplishment that has been the envy of every other country on the globe.

The electrical age found ready and waiting a land, a people and an opportunity. Electrical genius, like the wand of a mighty magician, touched with its beneficent influence the home, the farm, and the factory. It worked new miracles. It brought light into darkness. It lifted the burdens of millions of people. It gave new and vital impetus to industrial progress. It wrougth amazing accomplishments and marvelous economies in manufacturing fields. It gave to the American home the highest standard of living since the dawn of civilization.

Grew Up with the Electrical Age

Some people may facetiously hint that I personally date back to the days of those early settlers who hewed cities out of forests, I cannot claim any direct association with that stage of America's development. However, I grew up with the electrical age and have been an active participant in it almost from that October day in 1879 when Thoms Alva Edison gave to the world its first incandescent electric lamp. I have lived with it ever since and in this series of articles I propose to sketch something of the background of the development of electric utilities in Rochester. My chronicle will not be an autobiographical story. I shall not relate my own personal experiences. Rather, will it be a detached story of men and events concerned with the foundation and growth of the present electrical system of the Rochester Gas and Electric Corporation.

The electrical age, the local beginning of which Mr. Yawger writes about in this article, found ready and waiting a land, a people and an opportunity. It lifted the burdens of the people and brought a new and better standard of living that was to mark America as the land where even humble homes could generally enjoy blessings heretofore associated only with the fiction of Alladin and his lamp.

ELECTRICITY first became available as a light source to the people of Rochester by the initiative and courage of a few business men willing to invest their money in this new method of furnishing light for general distribution from a central station.

This article deals with the promotion, the corporate, and financial aspects as they relate to the time of the practical and technical work in forming the foundation of present modern and efficient electrical system of the Rochester Gas and Electric Company.

Water Power

As the water power of the Genesee River had a great influence on the development of the electrical industry in Rochester, an outline of the way in which the river flow of the Genesee River was divided will be described.

There were originally five dams across the river,—viz., State Dam at Brooks Ave., Court St., Central Ave., Hasting St., Brink of Lower Falls. These dams diverted the river flow respectively into the Erie Canal feeder at Brooks Ave., into the Johnson and Seymour Race on the east and the Carroll and Fitzhugh Race on the west side of river at Court St., into the Brown's Race on the west side and the East Race on the east side at Central Ave., into the Genesee Paper Mill Race on west side of river at Hastings St., and into the Hydraulic Power Co. Race operating the compressed air plant on the east side at the brink of Lower Falls.

These six races each had a different method of proportioning water between the individual owners, according to the number of rights or as originally designated. "Run of stone," that is the number of mill stones that could be operated from each owner's share of water. This run-of-stone rating led to continuous litigation among the share owners until finally the Supreme Court, being burdened with so many cases, appointed three "officers of the court," or as now designated, "Commissioners of Race" for each race with full authority to apportion, regulate, assess and operate in all matters pertaining to each race. The different set of Commissioners worked out a solution for each race as follows:

The Johnson and Seymour Race was divided into 19 first rights and 32½ second, third and fourth rights, the fourth rights being first deprived of water when the river flow decreased to a certain amount, and then the 3rd and 2nd progressively as flow still further decreased, leaving only the nineteen first rights for division of water when flow reached a low of 150 cubic feet second, this division being accomplished by width of opening to fore-bay allowed from race and by raising the sills by means of mechanism attached to same.

Carroll and Fitzhugh Race

The Carroll and Fitzhugh Race was divided into 76 first rights, each right being 12 inches in width and sills all of the same elevation. The Brown's Race was divided into 80 first rights of 7½ inches in width and sill elevation graduated to the longer hydraulic gradient on this race. The East Race opening on the river and sill elevation was calculated to allow one-half of river flow under all conditions. The Paper Mill Race and the Compressed Air Company Race each had total river flow at all stages of flow.

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Mr. Yawger's article on the history of the development of the electrical utilities of Rochester will run in Gas and Electric News for the next four or five issues. Written by a pioneer in the electric field, who grew up with the industry, it will comprise a welcome and needed addition to the industrial history of this city. Watch for this story each issue, and if you desire extra copies of any issue we shall be glad to send them to you. Make your request to Gas and Electric News, Gas and Electric Building, 89 East Avenue, Rochester, N. Y.

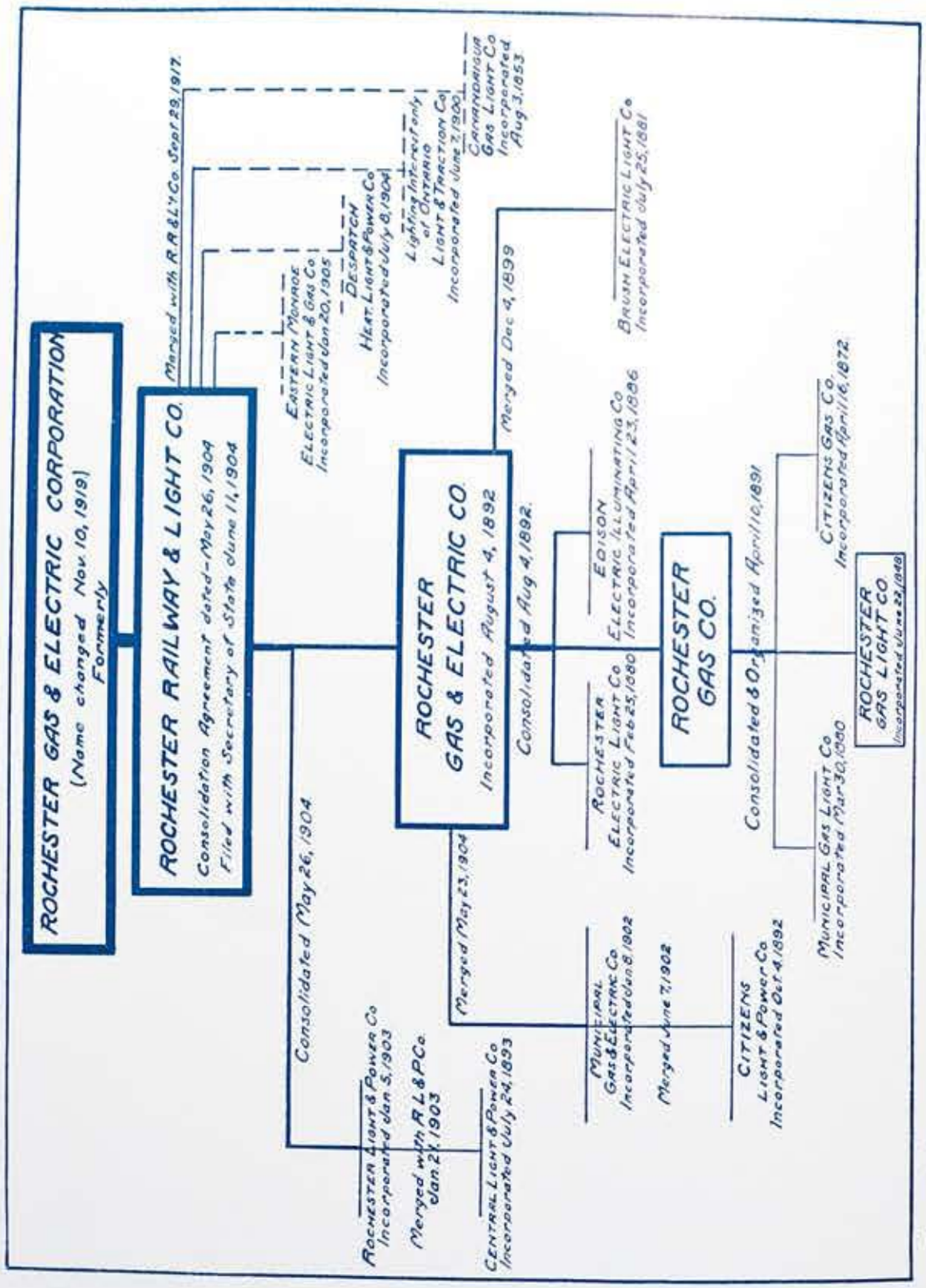


Chart showing the development of the electrical industry in Rochester and vicinity. It delineates the evolution of the electrical industry in this section so far as concerns the many different organizations which had a part in the development of the present Company.

During the early 1880's the Genesee River was furnishing power to numerous flour and saw mills, a paper mill, a cotton mill and several other industries.

These industries used a large amount of power in relation to the number of men employed compared to the present larger employment given by the same river power harnessed for electrical distribution over a wide area.

R. G. and Corporation Develops 96% of Water Rights

The present R. G. and E. Corp'n and predecessors have purchased from time to time mill and other water rights as they came on the market due to the competition of the Western wheat fields and mills nearer to the source of supply, until now they have developed electrically 96% of total rights of Genesee River in the City of Rochester from five (5) hydraulic stations.

Seven (7) other hydraulic stations are now developing power for the R. G. and E. Co.—one each at Mt. Morris, Mills Mills, Wiscoy, Sodus Center, Maxwell, and Newell and the Caneadea reservoir being drawn upon during low water periods, sum total of electrical output under present development of River being 45% of load in K. W. Hours.

First Central Station

In February 1880 the first company was formed by:

H. Austin Brewster — **W. D. McGuire**
Chas. F. Pond — **T. M. McFarlin**
R. E. Sherlock — **A. L. Mabbitt**
Horace McGuire

all of Rochester, N. Y., and incorporated under the name of The Rochester Electric Light Company, with a capital stock of $100,000.

1 ten-light dynamo and 10 arc lamps were purchased from the Weston Electric Company. This machine was installed in rented space in the Beehive Building on Aqueduct Street, the original site of the first water wheel on the Genesee river erected by "Indian Allen," and was driven by belt from power shaft from water wheel supplying mechanical power to other tenants.

The Weston Electric dynamos were designed for furnishing current for a 20 ampere direct constant current arc light circuit to open Maxin 20 ampere arc lamp. These Maxin arc lamps required renewal of electrodes or carbons ever 6 or 7 hours of burning time.

The first arc lights were placed in the old Reynolds Arcade and the circuit supplying them was attached to sides and roof of building along the way.

Notes from the Proceedings of the Common Council May 2, 1882

"Alderman Hart reported: We were shown all of the workings of the light . . . and the danger of fire caused by wires running over buildings . . . that all wires . . . *be placed on poles in the streets.*"

The brilliancy of the new light was favorably received by a number of business places and numerous stores subscribed for service under the following rate schedule:

One arc lamp	**75**	**cents**	**per**	**night**
Two arc lamps	**70**	**"**	**"**	**"**
Three arc lamps	**65**	**"**	**"**	**"**
Four arc lamps	**60**	**"**	**"**	**"**
Five arc lamps	**55**	**"**	**"**	**"**
All over 5 lamps	**50**	**"**	**"**	**"**

These rates were for six nights per week.

As a special inducement rate (promotional) some customers were only charged at the above rate for the nights their stores were opened.

First Annual Report

Amount of capital stock	**$100,000.00**
Proportion paid in	**6,980.00**
Amount of debts	**16,487.00**

Altho this report does not look very favorable, the business increased and additional facilities were soon needed.

Space and additional power one year later was obtained by renting from the Rochester Power Company room with power in building situated on east side of Upper Falls at the north end of

Mill stone from one of Rochester's first grist mills. Early industries used large amounts of power in relation to the number of men employed, as compared to today's efficiency.

Water St.—the present location of Station 4.

This power company was transmitting mechanical power—the only known method at this time—by means of a long wrought iron shaft extending from the plant to near Andrews St. and served a number of buildings with mechanical power for their various industries along this street. This shaft was connected thru pulleys and vertical rope drive to water wheels located 90 feet below the brink of the Upper Falls. These water wheels are still operating (July, 1936) but instead of mechanical power, are driving electric generators.

Later the property was purchased and additional equipment added and at the time of the consolidation in August, 1892, there were in operation 4 Leffel 450 H.P.—2 Poole and Hunt 800 H.P. water wheels, driving, besides the power shaft, 10 Weston 20 K.W. arc dynamos—1-500 volt 500 light (35 KW) Weston D.C. generator for incandescent lighting—2 Western Electric 50 K.W. arc dynamos.

In 1884 this company experimented with a 500 light 500 volts Weston D.C. generator for incandescent lighting, (each lamp being of only 50 volts, it required that 10 lights be run in series in one circuit) and obtained some business with the following flat rates:

For each 16 c.p. carbon incandescent lamp purchased by customer..... $6.00 per month

Same lamp furnished by company.. $10.00 per month

Second Central Station

The following year, in July, 1881, a second electric company was formed by:

Geo. E. Jennings — **G. C. Buell**
Frederick Cook — **J. W. Martin**

all of Rochester, N. Y., and incorporated under the name of the Brush Electric Light Company, with a capital stock of $100,000.00. This company selected the arc lamp and dynamo invented by Charles Brush and manufactured in Cleveland, Ohio. One 40 light dynamo and lamps, wires, etc., were ordered and dynamo installed in building owned by Arthur C. Smith on N. Water St. with a lease of 6 months for room and with power derived from a steam engine receiving steam from boiler in same building.

Station 15 Erected

In the meantime lease with privilege to purchase was made with the Ellwanger and Barry interests for property and water power on west side of River at the Middle Falls. (Later entire property and water rights on this race were purchased and electric station Number 15 was erected). This property consisted, at that time, of an old saw mill receiving water from paper mill race, with a head of 29 feet.

The saw mill building and water wheel were rearranged for driving dynamos, of which six (6) fifty (50) light machines were required to take care of load.

Annual Statement—January 1883

Amount of capital stock	**$100,000.00**
Amount paid in	**100,000.00**
Total indebtedness	**19,084.00**

The need for still *more* and still *more capital* to increase plant capacity was rather discouraging to some of the directors and a resolution to sell the company to other interests was lost by vote of 5 to 3. Another resolution to purchase property and water rights on the east side of River at the Lower Falls, belonging to a compressed air company, was carried and property and water rights—the present Station 5—was purchased.

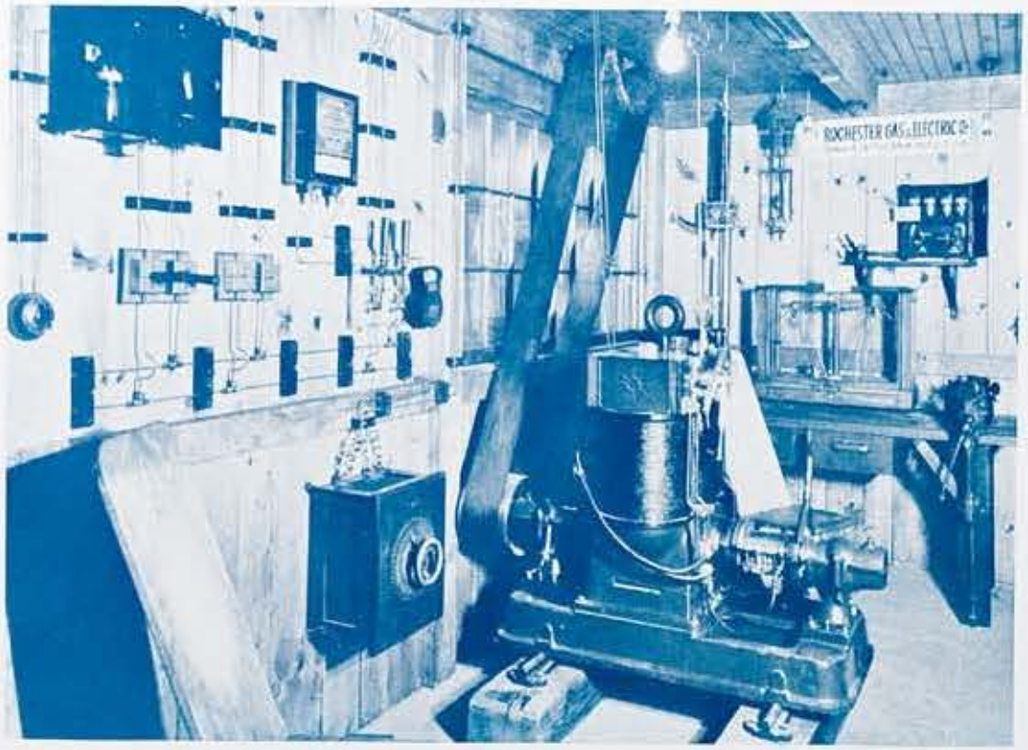
Fantastic Undertaking

This compressed air company was promoted just before the possibilities of electricity were apparent, the idea being to lay pipe up the river bank from the plant to St. Paul St. and supply air to compressed air motors for the propulsion of street cars which also carried a storage tank supposedly large enough for one round trip.

The following method of compressing air at this plant was ingenuous but not very efficient: Two vertical 5-foot penstocks 92 feet high were connected from Race to a long horizontal 5-foot pipe at foot of falls and by alternating the filling and emptying the vertical penstocks with water the horizontal pipe was calculated to accumulate enough compressed air to supply power for a number of street cars.

This undertaking was abandoned shortly after starting due to inefficiency of method and lack of storage capacity on cars. Only enough air to propel car from Driving Park Ave. to the Rome, Watertown and Ogdensburg R. R. crossing on St. Paul St. (approximately ¾ mile) could be stored on the one and only car that reached this point.

(To be continued in our September issue)



The Company's electric Station Number One, formerly located on Edison Street, Rochester, N. Y. This is from a photograph of the reconstructed station as used in the Company exhibit at Rochester's Centennial Exhibit in 1934.

The Story of the Development of Electric Utilities of Rochester

THOMAS H. YAWGER

(Continued from last issue)

Mr. Yawger's article on the history of the development of the electrical utilities of Rochester, begun in the August issue, will run in Gas and Electric News for the next two or three issues. Written by a pioneer in the electric field, who grew up with the industry, it comprises a welcome and needed addition to the industrial history of this city. Watch for this story each issue, and if you desire extra copies of any issue we shall be glad to send them to you. Make your request to Gas and Electric News, Gas and Electric Building, 89 East Avenue, Rochester, N. Y.

Rearrangement of the penstocks and building and the installation of water wheels adapted to drive electric dynamos was sufficient to take care of the increase in load for a number of years. By 1890 the installation consisted of fifteen Victor 150 H.P. and two 450 H.P. Leffel water wheels driving by a line shaft and belts, 31 Brush—2 short dynamos and 2 Thompson Houston 133 cycle alternators. A horizontal 400 H.P. single cylinder non-condensing Corliss engine with fire tube boilers, hand fired was installed for auxiliary power during low water periods. These dynamos were each capable of supplying a series constant 9.6 ampere direct current circuit of 50 lamps, and the T-H alternator was of 50 K.W. capacity.

The switchboard was of wood construction and the various circuits and dynamos were connected respectively by means of long flexible cables and plugs. These cables were extremely well insulated because they were run in a confused heap before the board and the operator had to identify and handle the leads coming from the dynamos before he could plug them in to any selected circuit.

Incandescent Lighting

The invention of the incandescent lamp (hot wire in a bottle, as the gas competition dubbed it), due to its adaptability for applications unsuited to the larger arc lamp, led to the installation, in 1884, of a new type of generator and an additional water wheel at this plant. This was a Thompson-Houston single phase 1100 volt, 133 cycle generator (alternator) of 50 K.W. capacity, designed for furnishing incandescent lighting by means of lowering transformers.

One of Rochester's early horse-drawn street cars. It was on the Rochester City and Brighton Railroad Company, the Lyell and University line. Our imaginations can easily emphasize how the tempo of modern times has "pepped up" since the horse car period, and how helpless we of today would be without the many services which electricity makes possible in our daily business and domestic life.

When this system was started there was available a loop arc circuit which ran up the west side of the River to the Main St. bridge, where it was connected to a transformer and then continued down the east side of the River to the plant. The alternator was started, brought up to proper speed and voltage and when the load was thrown on at Main St. only a very low voltage could be obtained. After several trials and checks the plant was shut down for further study of the trouble. At that time there were no courses in electrical engineering in our schools, and the knowledge of electric alternating current was confined to a few persons who jealously guarded such information as they had acquired. Available literature on this subject also was very limited. However, after finding some articles treating of skin effect, impedence and inductance, which the direct current engineers held at that time as a deterrent for full success of the alternating method, the loop circuit was changed to parallel on one pole line with resultant success in obtaining the proper voltage.

Resuscitation

It was at this plant that the first successful resuscitation from electric shock occurred, the employees using the D'Arsonville method which was under discussion at that time.

This D'Arsonville process of resuscitation was followed and improved upon later by the Prone Pressure Schaffer method.

Long Distance Transmission

The Brush Plant and system can also claim the first long distance transmission of electric power;—that is a small ¼ horse power constant direct current motor had been developed which could be operated by placing it in series with a 9.5 ampere arc circuit. Motors of this size were applicable for driving sewing machines and thus were installed in clothing shops. As the arc circuits were approximately 6 and 8 miles in length, the power was transmitted that distance—a long distance to transmit power in those days. There were several hundred of these motors operating up to the time they were superceded by the Edison system. In the light of later development it is remarkable that these motors, with sparking commutators fed by a circuit voltage of 5,000 volts and installed with ordinary weather-proof wire carried on wood cleats caused no serious electric shocks or fire.

Street Lighting

The brilliancy of the arc lamp in comparison to lights in use (2525 gas and 1660 kerosene lamps) led the Common Council of Rochester to consider the new light for street lighting and a competitive proposal was requested from the Rochester Electric

This is the way Main Street used to look in the vicinity of the Four Corners. The Company's lighting wires extended from pole to pole on cross arms located, as may be seen, on the lower portion of these poles, often forty to ninety feet in height.

This Edison Bi-polar generator was thought to be "big stuff" in 1890 when it was termed a "Jumbo" unit. It weighed about 17 tons and generated about 10-kw. of electricity per ton, approximately. Present day generators, such as shown in illustration on page 263, generate approximately 250 kw. per ton because of the refinements in the electrical art and greater all around efficiencies.

Light Co. and the Brush Electric Light Co. (the latter being the lower), a contract was made for a certain number of lights (52) on November 14th, 1882, for $164.25 per light per year. This price is to be compared with the present price of $52.00 for a light of equal and steadier candle power and the present number of street lamps, 25,244—Fire alarm, 514—Stop and Go Signals, 1,766.

Third Central Station

In April, 1886, a third company was incorporated by:

J. Lee Judson	**G. C. Hollister**
B. F. Smith	**Elbrecht Vogt**
Jas. Buckley, M.D.	**H. L. Brewster**

all of Rochester, N. Y., with a capital of $100,000, as the Edison Electric Illuminating Company, which was licensed to operate under the Edison 3-wire direct current patents. This system, on account of the divisibility of light units and adaptability for motors for power, was able to displace with economy and service a great part of the then existing methods, besides obtaining additional business, especially in the power field.

The first Edison plant, near Exchange St. and the Erie Canal, was strictly a steam plant, two Edison bipolar 125 volt dynamos connected in series and with neutral wire making the 3 wire system being driven by belts from the flywheels of horizontal reciprocating, single cylinder non-condensing engines. The exhaust steam was discharged into the air or as the temperature varied, was used to heat some of the adjacent buildings. This was really the beginning of the Company's present steam heating business.

The engines were of 125 H.P. rating and were manufactured by the Ball, Woodbury, Porter-Allen and Armington and Sims companies.

The 8 boilers manufactured locally by the Woodbury, Booth and Pryor Co. were of 300 H.P. capacity, 75 lb. steam pressure and were of the horizontal fire tube type and fired entirely by hand.

Fourteen 60 K.W. Edison Bipolar 125 volt direct current dynamos—1 Brush arc and 3 Thompson-Houston arc machines were in operation at this plant for a number of years.

Wiring and Voltage Control

The leads from dynamos and ceiling buses and feeders with plug switch and fuses on wall were of bare round copper rod cleated to varnished wood ceiling and walls by wood cleats. Dynamos were connected to buses by single throw knife switch and each feeder had interposed in series an equalizer (large resistance box) placed overhead above ceiling and operated by shaft and hand wheel brought down within reach of operator. These equalizers were used to regulate the voltage at the far end of feeders, voltage at this point being

obtained by means of small pressure wires run from feeder end to differential galvanometer in view of operator.

Voltage regulation was very important at this date as the ordinary 16 candle power carbon lamp cost $1.25 each, as compared to equivalent illumination of 15 cents a lamp today.

Introduction of Electric Meters

Previous to the inception of the Edison system all rates for service were on a "flat rate" basis,—that is, so much a month, or day, for each light or horse power of motors.

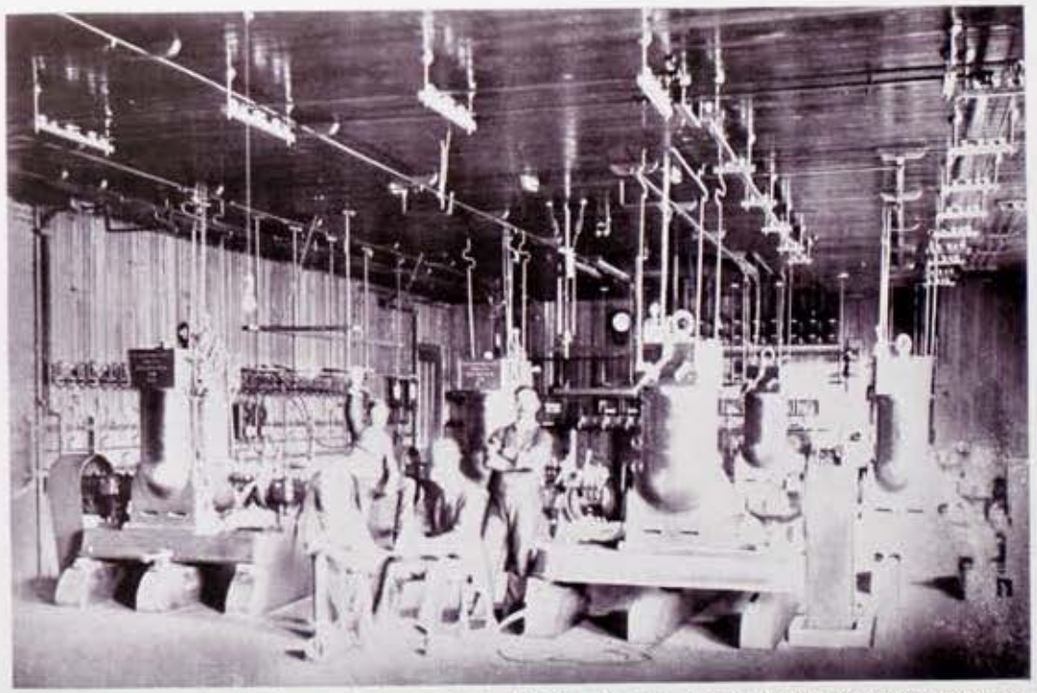
At the start of the Edison service all current used was metered by means of a chemical meter. This meter consisted of small glass containers (cells) holding each two zinc plates in a sulphuric acid solution and a portion of current flowing was shunted thru these cells. The plates were very accurately weighted before and after the installation on customer's premises and the difference in weight caused by the electrolysis of plates by current passing was recorded. The bill was calculated from this data verified by previously proven laboratory tests.

The meter men would start out in the morning with baskets holding 12 of these cells,—a fair size load—and return with cells that were replaced.

This type of meter was very accurate but involved so much time and labor and was only suitable for direct current. That upon the advent of the motor meter for both A.C. and D.C. they were discontinued.

Working Conditions

The working conditions of this period "the good old days" recalls that the writer, besides working with other employees 12 hours a day, 7 days a week, no Sundays or Holidays off, was furnished room with bed and basin in corner of station, so as to be on call in case of station or outside



The Company's first Edison all steam plant, Station Number 1, showing the Edison Bi-polar Generators with copper rods cleated to the ceiling by wooden cleats, and to the side walls for outgoing feeders. Modern safety requirements would surely make this impossible today. The generators on this floor were driven by steam engines located on the floor below, through the medium of belts, and were of 60 kw. capacity as compared to 150 kw. capacity of the "Jumbo" unit shown on opposite page.

Until 1880, Rochester like other cities used gas for street illumination. Persons opposed to electric illumination called the incandescent lamp a "hot wire in a bottle." The Company's first lighting contract with the City of Rochester for street illumination, covering fifty-two lights, was made on November 14, 1882. A total of 27,574 street lamps now illuminate this city, one of the best lighted in this country.

trouble during the night, as telephones could not be afforded at this time for key men. The writer would have to take "horse and buggy" and go to homes and arouse linemen or other men in department concerned to help in correcting trouble.

For "First Aid" in case of accidents one ready remedy consisted of applying quids of tobacco or bovine excrement to cuts and abrasions in contrast to present antiseptic treatment and care and "Safety First" was left to the first law of nature—"Self Preservation,"—in contrast to present intensive training in accident prevention work.

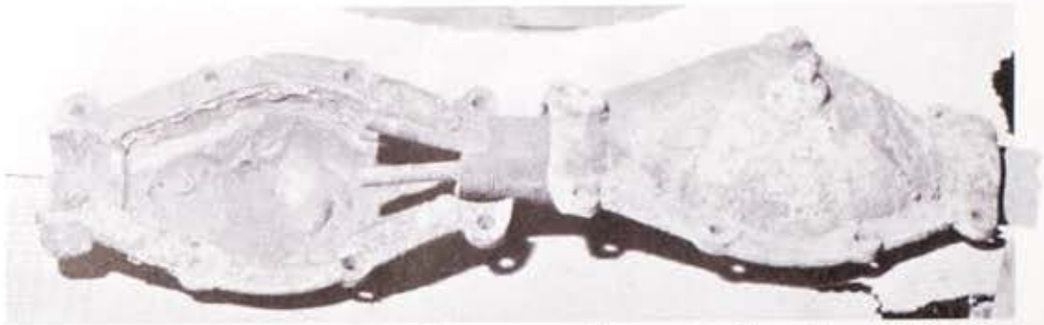
First Underground System

This Edison company was the first company to install the underground method of distribution—known as the Edison Tube system. This consisted of three copper rods each spirally wound with small manila rope, which were placed in iron pipes 20 feet in length, and then the intervening space in the pipe was filled with a plastic insulating compound. These lengths were joined together by junction boxes to form any desired length, the feeders extending to catch (fuse) boxes with the mains radiating for service connections. The feeders and mains were laid in trench excavated in the street, then backfilled and repaved.

This underground method of electric distribution was later displaced on account of the difficulty in making repairs and the cost of installing additional capacity, by the present multiple duct system with manholes and cable, which can be "pulled in" in relatively long lengths.

From the first installation of the underground manhole and multiple duct system in 1892 on State and Main Streets this system has grown thruout the entire city, now consisting of 2037 miles of ducts carrying 3003 miles of cable.

It would be interesting to visualize the appearance of our streets with the necessary structures to carry the large and numerous wires necessary to supply present demands for electric current if the development of underground cables capable of withstanding high voltages and current had not taken place.



Coupling box used in the old distribution system to join together the sections of 20-foot iron pipe which contained three conductors. The conductors may be seen extending through the end of the pipe, in the center of the picture.

The expense of the underground cable construction is many times that of the overhead type, the cost is justified, however, by improved service and appearances.

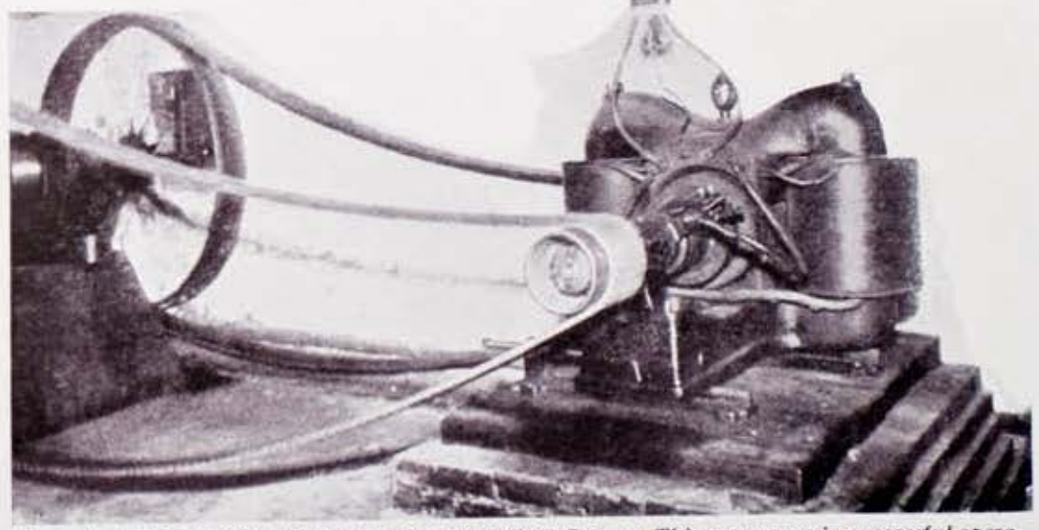
There is today, however, a considerable amount of Edison Tube system still supplying current in the downtown district.

Altho the Edison D.C. system is being gradually obsolesced in favor of the alternating current system for a number of reasons, principally on account of the low voltage of the system limiting the distance (approximately 1 mile) that current could be transmitted economically and by the efficient development of the alternating current motors and appliances.

It is a remarkable statement to make, but, nevertheless, a fact, that in the past 48 years of its existence (Edison system) there has been only 15 minutes that its service has not been available to consumers.

Distribution Methods

The rear lot method of electrical distribution for residential sections was originated in Rochester and in connection with main underground conduits has saved the community the expense of a very large individual investment, and, at the same time, increased the value of property by enabling same to receive electric service, and at the same time not spoil the appearance of streets,



Type of electric motors supplied by the early Edison System. This motor was in successful operation at the Stein Bloch clothing plant for 45 consecutive years. It now reposes in Henry Ford's museum, at Dearborn, Michigan, a relic of pioneering days in electric use.

so that Rochester streets today are practically free of overhead wires, 80% of street lights and other services being supplied from the above described systems.

Additional Capacity

The Edison or direct current load increased rapidly and in 1890 a combined steam and hydraulic plant was built on Brown's Race at the present site of Station 2. Two 45 degree 500 H.P. Couty compound non-condensing reciprocating engines and three 500 H.P. Leffel horizontal water wheels were belted to a double line shaft cross-connected by belts and separatable by a system of jaw and friction clutches. Later additions were made by directly belting Edison dynamos to separate engines and water wheels.

Before this plant was obsolesced it consisted of eleven 500 H.P. 125 pound pressure, hand fired Hazelton porcupine boilers; fifteen non-condensing (later equipped with syphon condensers) steam engines manufactured by companies as follows:

3—Armington and Sims
2—Couty
8—McIntosh and Seymour
1—Harrisburg
1—Ball

also seven Leffel 500 H.P. water wheels driving thrity-five Edison dynamos, twelve Thompson-Houston arc machines, two Wood arc machines, three Brush arc machines and two single phase 1100 volt 125 cycle Thompson-Houston alternators.

Speed and Voltage Regulation

It is interesting to recall the fact that the speed governors for water wheels available at that time were unable to give satisfactory regulation and that the speed control was taken care of by hand manipulation thru mechanical connection to the water wheels from a hand wheel placed at the switchboard. For many years the entire output of hydro power was manually handled with excellent voltage regulation in this manner.

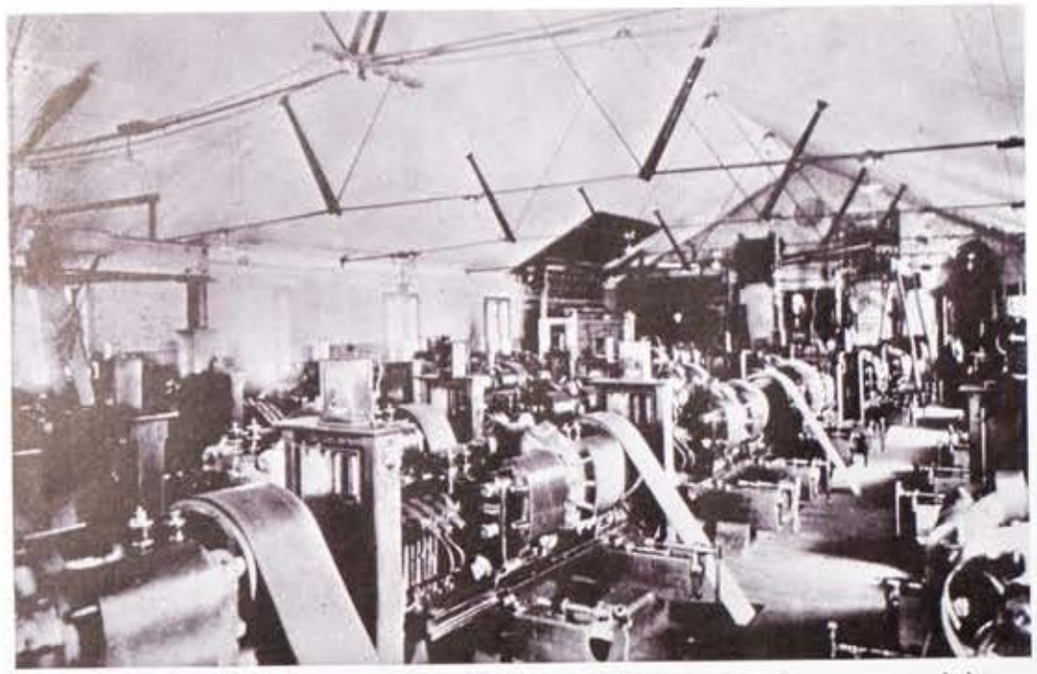
Street Railway Power

It was at this plant (Station 2) that street railway power was first contracted for by traction interests from a lighting company, at this time lighting and traction companies thruout the country having each plants designed only for their own systems. The power was furnished by Edison bipolar 125 volt dynamos which were rewound for 250 volts. Two of these were run in series and thus furnished the 500 volts necessary for trolley service. A total of 1500 K.W. was finally delivered, after the first two machines proved the practicability of this method.

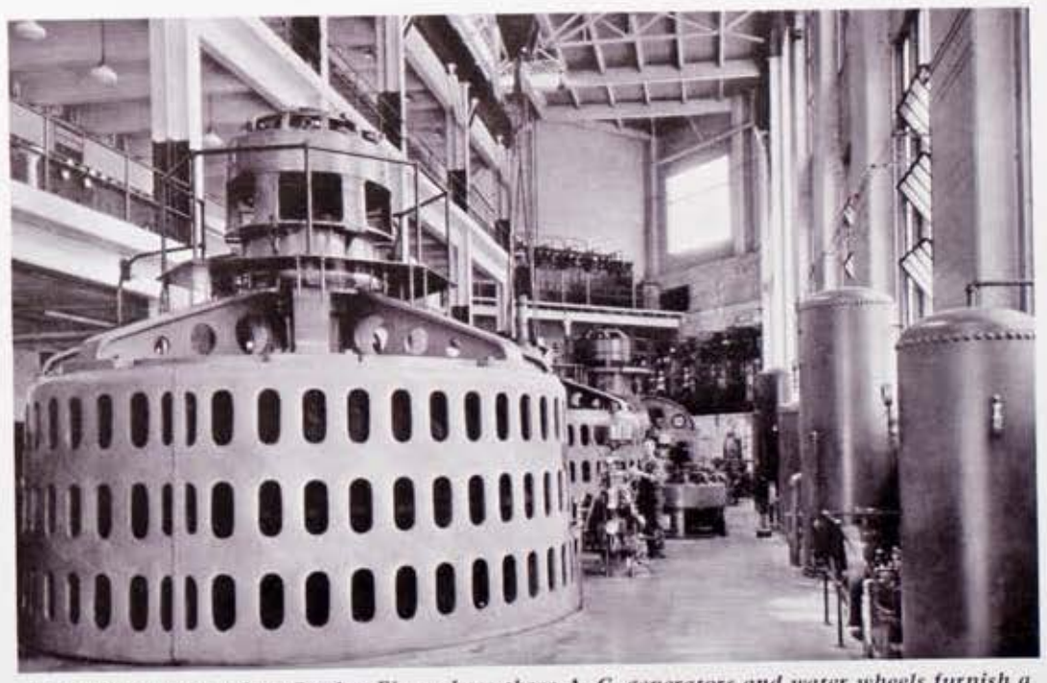
At that time the Railway Company had its own power plants consisting of a steam plant at Hopper Hill, off Lake Ave., for furnishing power to the Charlotte line and steam plant on Commercial Street, consisting of eight Heine hand-fired 125 pound pressure boilers, two Corliss condensing and six non-condensing Ball engines driving 12 Short 500 volt D.C. dynamos and General Electric 1500 K.W. generator, and Siemens and Halske 500 K.W. Generator. These Short Electric Company dynamos were an adaption from the original Brush arc machines. The railway company, with this inefficient equipment gradually increased its purchase of power until finally its entire load was furnished by the Rochester Gas and Electric Co. plants.

Later on the Sodus and Canandaigua Electric Railways were promoted and modern steam plants (modern at this time) installed at Float Bridge and Canandaigua served their requirements for several years. Finally for economical reasons these plants were discontinued in favor of purchasing entire power from the Rochester system.

(To be continued in our October issue)



A view of old Station Five, in 1886. It utilized 45 Brush arc dynamos, 1 A. C. generator, and sixteen water wheels, a total of approximately 3,000 kw. capacity.



A section of the modern Station Five, where three A. C. generators and water wheels furnish a potential capacity of approximately 38,000 kw. This plant is located at the Lower Falls, at the eastern extremity of the Driving Park Avenue Bridge.

The Story of the Development of Electric Utilities of Rochester

THOMAS H. YAWGER

(Continued from last issue)

Mr. Yawger's article on the history of the development of the electrical utilities of Rochester, begun in the August issue, will be concluded in the November issue. Written by a pioneer in the electric field, who grew up with the industry, it comprises a welcome and needed addition to the industrial history of this city. Watch for this story each issue, and if you desire extra copies of any issue we shall be glad to send them to you. Make your request to Gas and Electric News, Gas and Electric Building, 89 East Avenue, Rochester, N. Y.

Fourth Central Station

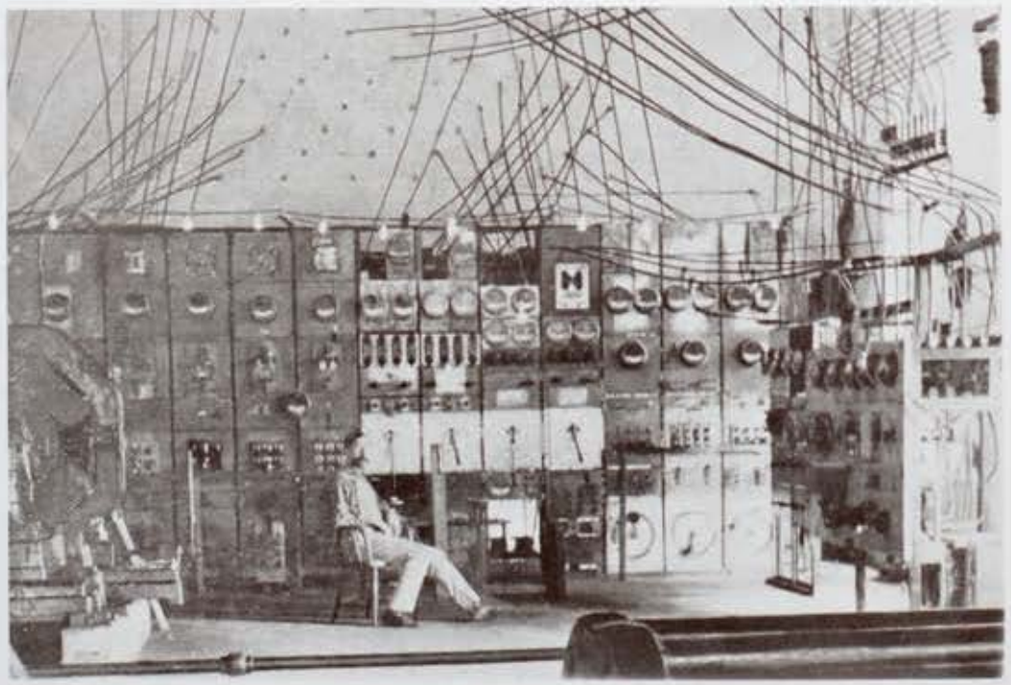
In October, 1892, a fourth company was formed by:

G. W. Gillis — **H. D. Stone**
E. M. Higgins — **Isaac Willis**
R. M. Myers — **H. W. Davis**
M. W. Cooke — **P. V. Crittenden**
S. G. Hollister

all of Rochester, N. Y., with a capital of $100,000 and incorporated as the Citizens Light and Power Co. A combined steam and hydraulic plant, consisting of two 500 H.P. S. Morgan-Smith water wheels and one 500 H.P. horizontal non-condensing Corliss engine, being belted to line shaft connected to dynamos by belts, was constructed on Brown's Race, where the present Station No. 3 is now located. This company adopted the Westinghouse 2-phase 2200 volt, 60 cycle A.C. system for incandescent lighting and 500 volts D.C. for power and Western Electric arc dynamos. The reason for this 500 volts D.C. for power was because the A.C. type of motor for power service had yet not been developed.

Paralleling Alternators

These 2-phase A.C. generators were designed as "double enders." This type of generator supplies 2-phase, 380 volts, 60 cycle, A.C. current from armature leads on one end and 500 volts D.C. from a commutator on the opposite side. **These generators or alternators, as they were then termed, have the honor of proving for the first time in electrical history the practicability of operating polyphase alternating current generators in parallel. This was of great importance to the future development of the electrical industry. This experiment was carried out by Westinghouse engineers and the local station staff, and it was a moment of intense strain when the alternators were finally brought into step and switch thrown in as to whether they would operate in parallel according to theory, or both machines be destroyed.**



Switchboard of the fourth central station, the Citizens' Light and Power Company, with the late Patrick O'Neill at the "board." Time, about 1901. This array of exposed wires carried voltages of from 110-volts to 2,200-volts to an open switchboard. One of the three arc machines is seen at the left. Three others were on the floor beneath. Some of the wires lead to the wall, from where they were conducted to overhead poles outside. There was no underground system in those days.

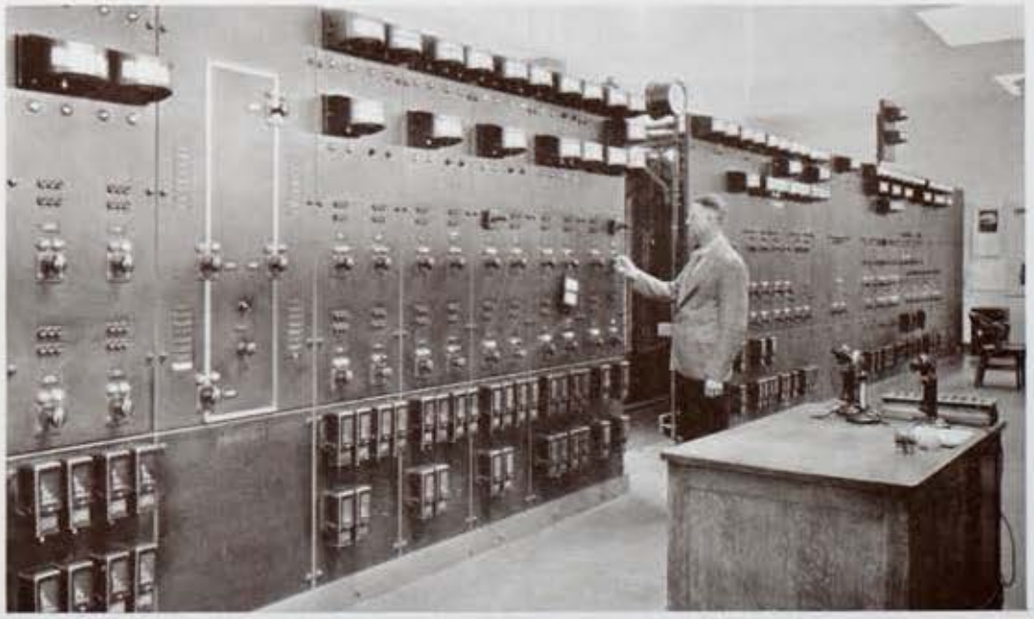
This plant was badly crippled by fire in 1900 and emergency lines and connections were run as an accommodation from the four other plants, Edison Stations 1, 2, and Stations 4 and 5 in the city, which at that time were operating under one control, in order that they could give service to their consumers until the plant could be put into operating condition. This was done in a somewhat temporary manner and continued in this manner for some years.

Fifth Central Station

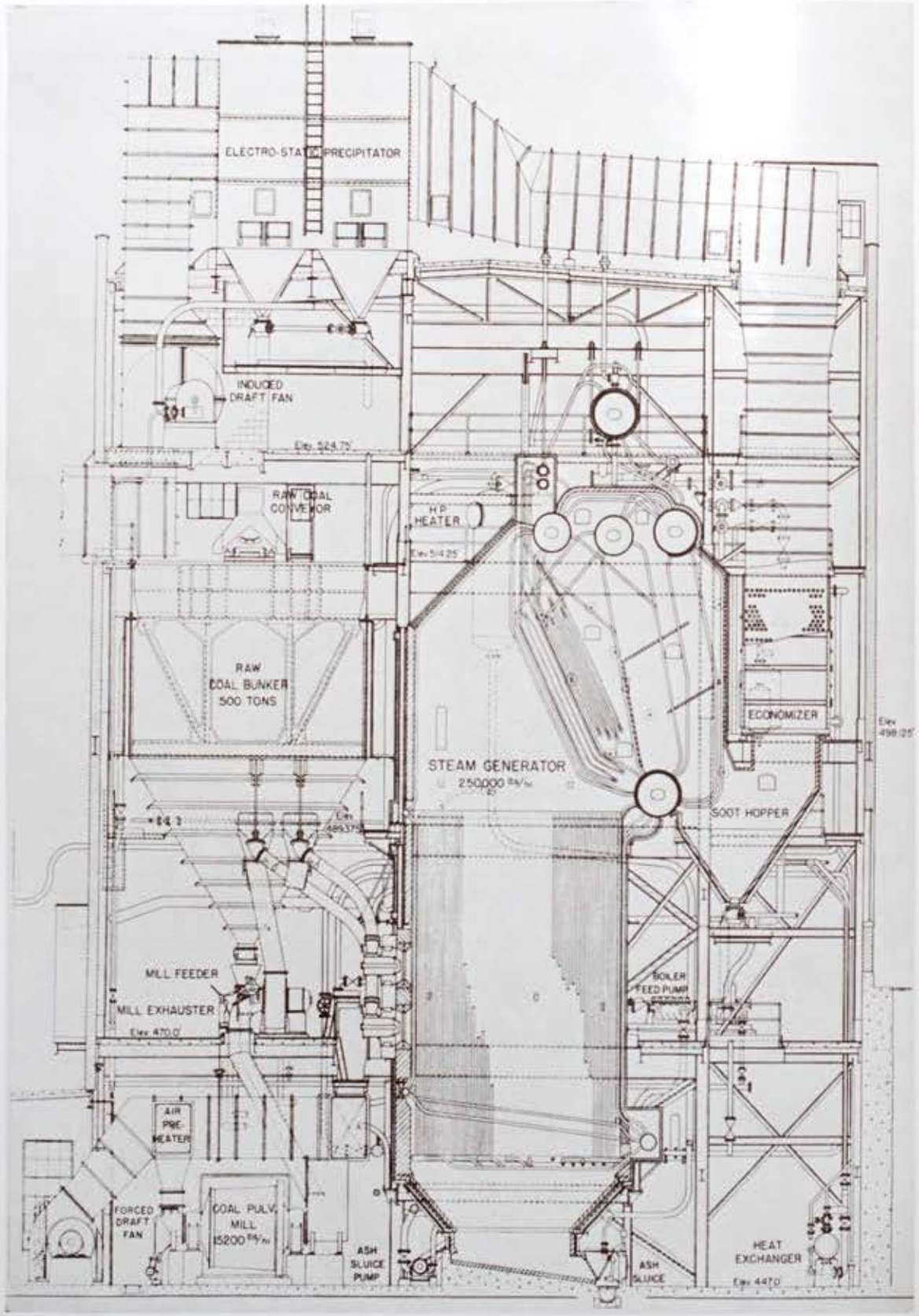
Because of inability to interest the existing company or raise additional capital locally, the property was sold to New York interests and reincorporated by:

Anson R. Flower and C. K. G. Billings of New York City — **Horace C. Brewster of Rochester, N. Y.**

in January, 1902, as the Municipal Gas and Electric Co., with a capital of $500,000. This company, with ample capital, contracted for the erection of a new building to house a modern steam plant and necessary equipment and to build conduits and pole lines. By this time the art had progressed so that 275 pound pressure boilers were fired by mechanical stokers and generators were directly driven, without the use of belts, by large vertical cross compound condensing engines. The engines contracted for were 3 Southwark Vertical cross compound of 2500



This modern Station Three switchboard reflects some of the thirty-five years progress made in electrical transmission and distribution. It has 110-volt control. No higher voltages reach this "board." Switches are isolated on other floors. When the operator presses in a button, the remote switches close automatically. There are approximately one hundred miles of wires neatly arranged and segregated at the back of this switchboard.



This modern steam boiler located at Station Three, affords 750-pound pressure, and 250,000 pounds of steam per hour. It is fired by powdered fuel from mechanical equipment. The feed water is under continuous test and is scientifically treated to remove impurities and scale forming matter.

H.P. rating, directly connected to Stanley 2-phase 1360 K.W. generators and one Dixon horizontal cross compound of 1000 H.P. rating, direct connected to Stanley 700 K.W. 2-phase induction type of generator.

The eight 650 H.P. Altman and Taylor boilers were of the water tube type equipped with Acme mechanical stokers. The vertical and horizontal engines and generators of total 4780 K.W. capacity were later obsolesced and 40,000 K.W. installed in horizontal turbines occupying the same space.

Purchased by R. G. and E.

This company and its contracts were purchased by the Rochester Gas and Electric Co. shortly after excavation was started, and the plant erection was completed by the local staff. The contracts were made for a 2-phase 60 cycle 2200 volt A.C. system, constant current 7½ amperes A.C. for arc lights and 3 motor generators for three wire D.C. distribution. The motor generators were to be placed in substations to be erected in Stone and State Streets and used to supply the down-town section with direct current.

These motor generators were of 500 K.W. capacity each, motors receiving 2-phase 2200 volt, 60 cycles current and driving two generators of 250 K.W. capacity and a voltage of 125 each. These motor generators, instead of being installed as intended, were erected in existing substations No. 6 at S. Water St., No. 4 Sta. at N. Water St.

Engineering Differences

The electrical engineering fraternity at this time were sharply divided in opinion as to the respective merits of the 2-phase versus the 3-phase systems and before this 2-phase plant was promoted a careful study was made of the respective systems and the R. G. and E. Co. selected and installed and was operating a 3-phase 60 cycle 4-wire 4150/2400 volt plant at Station No. 5, which system obsolesced the then existing equipment of arc dynamos, etc.

Station Parallel

In order to economically operate this new steam plant and the hydraulic plant at Station 5 it was necessary to run the two systems in parallel. This was accomplished by means of 2-phase to 3-phase transformers until time and opportunity allowed the redesign and rewinding of the two phase generators to 3-phase, a wise decision, as time has proved.

Until 1902 eleven boilers of this "porcupine" type were functioning at old Station Two. They were of 125-pound pressure and evaporated 10,000 pounds of steam per hour. These boilers were prone to foam, carrying water over with steam to reciprocating engines, sometimes knocking out a cylinder head. The circular furnace was hand fired through three doors. Water tubes were great scale collectors. Potato skins and "quack" boiler compounds were the inefficient antidotes for this trouble.

At the same time that the New York interests started work on their plant, the R. G. and E. Co. was working on an excavation for the erection of a 3-phase, 60 cycle and D.C. direct connected generators and modern steam plant at the foot of the Upper Falls on the west side of River.

As the competing company was tied up by contracts for equipment and the Rochester company had not as yet contracted for all of theirs, it was decided to buy out the competitor and abandon our own project, which was accordingly done.

Three-phase System

The development of the three phase 4-wire 4150/2400 volts, 60 cycle system of generation and distribution was a great improvement over former methods, allowing as it did, a uniform generation and distribution system and power could be transmitted long distances with economy and then be transformed thru transformers and rotary converters at substations into desired type of current.

Type of modern street lighting on East Avenue, fed from underground cable, making for more beautiful and safer streets. A total of 27,628 street lamps serve Rochester, one of the best lighted cities in the country.

Sixth Central Station

In July, 1892, a sixth company was formed by:

K. W. Butts **Frank W. Elwood**
Hiram L. Barker

all of Rochester, N. Y., and incorporated as the Central Light and Power Co., with a capital stock of $500,000. This company took over the small private plant owned and operated by I. W. Butts, which at that time was supplying light and power to the present Beehive Building, between Graves and Aqueduct Streets. The Central company extended the low voltage D.C. system to several adjacent buildings only and operated in this manner for about ten years, when it was merged with the R. G. and E. Co. under the following circumstances.

Seventh Central Station

In January, 1903, a seventh company was formed by:

E. J. Patterson, Plainfield, N. J.
H. L. Snyder, Montclair, N. J.
G. L. Wakefield, New York City
T. H. Ross, New York City
S. G. Perry, New York City

and incorporated as the Rochester Light and Power Co. This company took over the plant and system of the Central Light and Power Co. and 6 months later this corporation was merged with the R. G. and E. Co.

Suburban Territory

Outside of the Rochester city limits, but in territory at present served by the R. G. and E. Corp'n there were started a number of local companies which were formed to give electric service to their towns and surrounding territory. These companies had electric plants installed in existing grist and flour mills, factories, etc., with both steam and water power as prime movers, and as time passed on they

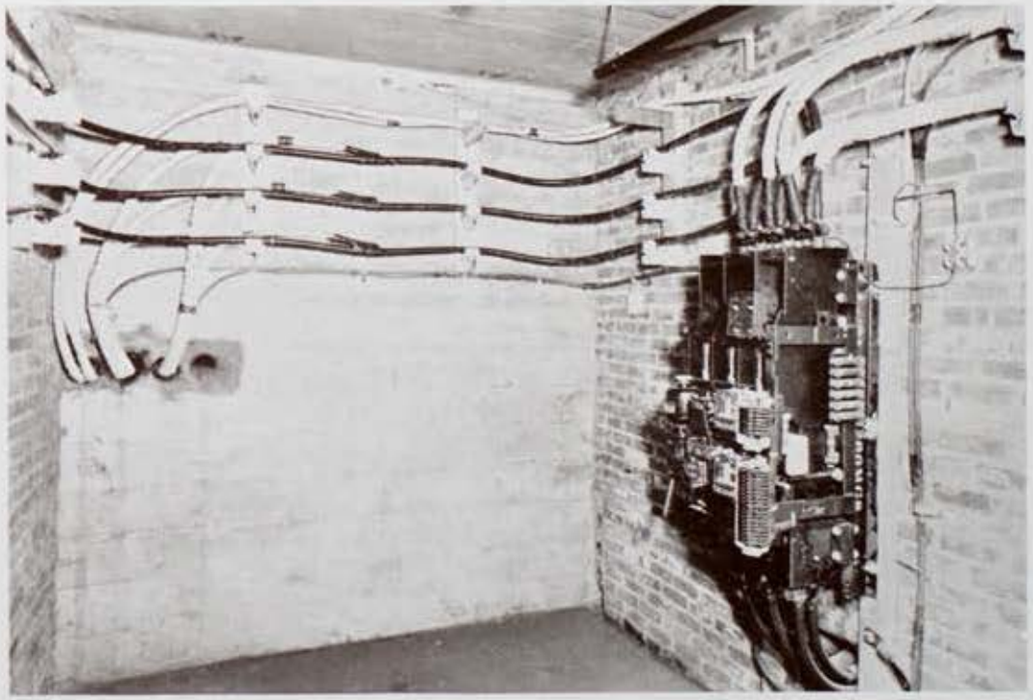
became inefficient and unreliable for continuous service and so were quite willing to be bought out or merged with the Rochester Co. These numerous companies were incorporated and merged or purchased as shown below.

Various Suburban Companies Incorporated

Fortunately all these companies started with the A.C. 60 cycle system with the exception of the Northern Wayne Co., which had 25 cycles, and thus the difficulties and complexities of being connected to and receiving electric service from the Rochester system were of nominal character.

Mr. Yawger's article on the "Development of the Electrical Utilities of Rochester" will be concluded in the next issue of "Gas and Electric News."

May	1902	Mt. Morris Water Power Co.	Purchased	1931
March	1911	Northern Wayne Elec. Lt. and Pr. Co. Wolcott Elec. Lt. and Pr. Co.	Merged	1927
October	1921	Adams Basin Elec. Lt. and Pr. Co.	Purchased	1926
Sept.	1925	Lake Ontario Power Co.	Purchased	1932
Feb.	1904	Sodus Gas and Elec. Co.	Merged	1927
Feb.	1911	Marion Power Co.	Merged	1927
Sept.	1919	Northern Cayuga Lt. and Pr. Co.	Merged	1927
July	1924	Preston Power Co.	Purchased	1931
Dec.	1889	Mt. Morris Illuminating Co.	Merged	1929
Sept.	1909	Hilton Elec. Lt. and Pr. Co.	Merged	1929
April	1922	Cooper Electric Corp.	Merged	1929
Jan.	1920	Genesee Valley Pr. Co., Inc.	Merged	1929
March	1922	Bolivar-Richburg Elec. Co.	Merged	1929
August	1915	Nunda Electric Lt. Co.	Merged	1929



A unit in the Company's vast underground distribution system. Low voltage manhole below the street in front of the new Rundel Memorial Library on South Avenue. Underground construction costs more but justifies itself in better service. freedom from interruption during storms, more beautiful streets and from the standpoint of public safety. Rochester has more underground distribution lines than most cities of its size.

The Story of the Development of Electric Utilities of Rochester

THOMAS H. YAWGER

(Continued from last issue)

Mr. Yawger's article on the history of the development of the electrical utilities of Rochester, begun in the August issue, will be concluded in the December issue. Written by a pioneer in the electric field, who grew up with the industry, it comprises a welcome and needed addition to the industrial history of this city. If you desire extra copies of any issue we shall be glad to send them to you. Make your request to Gas and Electric News, Gas and Electric Building, 89 East Avenue, Rochester, N. Y.

Complexities of Systems

The foregoing more or less chronological recital may give the reader somewhat of an idea of the complexities and confusion arising from the attempt to supply a universal electric service to the people of Rochester and vicinity, by a diversity of interests and systems of generation and distribution.

The first step in clearing the situation was taken in August, 1892, by the consolidation of the three companies then operating,—viz., The Brush, Edison and Rochester companies into the R. G. and E. Co. This consolidation immediately stopped the duplication of effort of these three companies and the simplification of generation and distribution systems was facilitated by enabling the coordination and unification of equipment, pole lines, motors and appliances. This enabled growth in the domestic, commercial and power utilization fields to expand in a uniform manner. The obsolete and inefficient plants were discontinued and new improvements in the generating and distributing system were introduced as the art progressed.

Records and Load Dispatching

These three companies each had their own methods of accounting,

Corner of the line dispatchers office at Andrews Street, with system operator Edward Schleuter (right) and dispatcher Howe Kieffer ready for any emergency. In the background is the large wall map of a part of the distribution system on which a visual record is kept of activities on the system. Orders emanate here for line switching, general check up work and service restoration activities.

Scene in the power load dispatcher's office at Station Three. From left to right are shown chief load dispatcher S. S. Summers, and dispatchers Harold McDonald and George Love. In this office continuous calculations are made for the disposition of the load between stations. The load dispatcher predict's tomorrow's load requirements today and makes necessary plans for procuring the necessary generating capacity, apportioning the load between steam, hydraulic and Niagara power as circumstances of weather and demand indicate.

station and distribution records and this necessitated the origin of uniform methods of operating procedure. The load on generators and feeders were recorded in station log books in amperes. As recording wattmeters had not as yet been developed, it was necessary to obtain the real load to multiply the amperes by the volts to get the kilowatts. As this was a tedious method to be used every half hour, slide rules were furnished and switchboard operators instructed in their use. The first combined station diagrams were calulated and plotted by this method in 1894.

A system of maps and records and station and distribution load despatching was inaugurated, one which has evolved thru the successive changes and growth into the present efficient and alert methods.

Employees' Magazine

By and with the advice and assistance of John Dennis, Editor of the Democrat and Chronicle in 1893 the employees, without other help, started a monthly company magazine named "The Station." A number of interesting articles were contributed by employees. This endeavor was abandoned after six issues were printed, on account of the expense to the employees interested. Several years later the magazine was revived and under the name of "Gas and Electric News." The monthly issues are eagerly awaited and read with interest and instruction by employees and public who are on the mailing list.

This 1892 consolidation, combined with the continuous lowering of the rates which was impossible under the duplication of capital and organizations, soon made the use of electricity general. But, alas for uniformity! The other companies, as before mentioned, which entered the field between 1892 and 1900, each with a different system, and the complexities and confusion of previous years was resumed. But before any great amount of construction was completed these companies were purchased and merged into the present company.

New Complication

After this last consolidation and the task of coordination and unification was completed, it was thought advisable and economical in 1905 to contract for the purchase of a certain amount of 25 cycle Niagara power to be used only for street railway operation and a small amount of power load, because the 25 cycle system was inferior to the 60 cycle for lighting purposes. It is interesting to state that the 25 cycle method of electrical distribution is now being gradually replaced by the standard 60 cycle system.

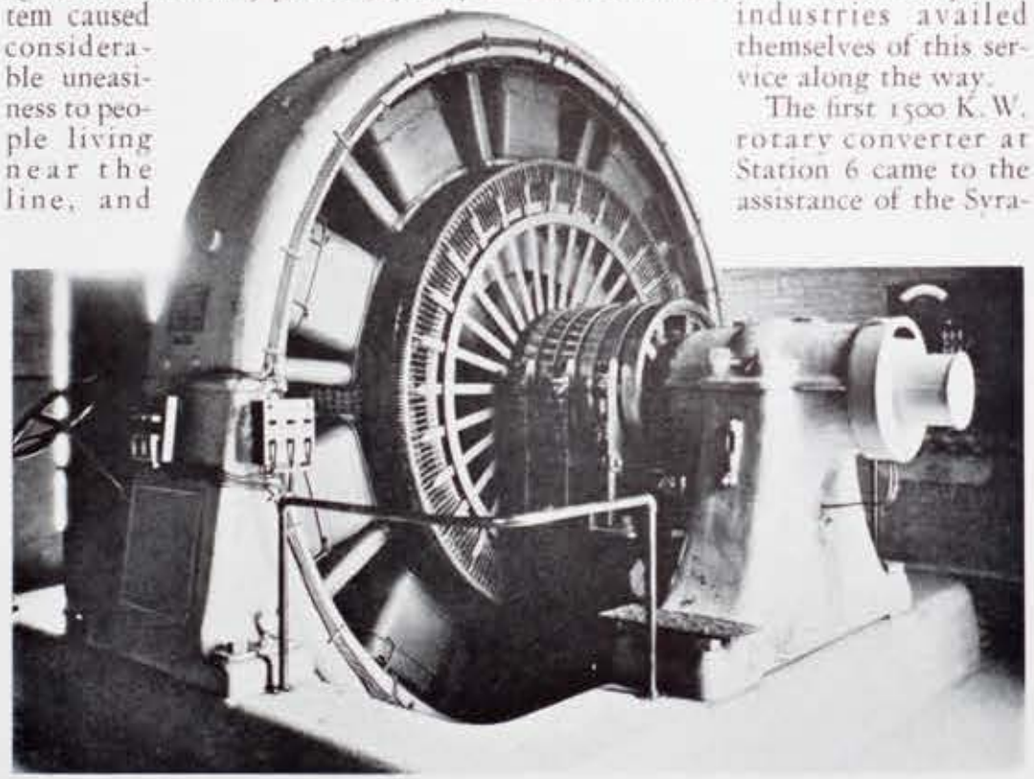
The extension of the Niagara Power system from the Falls to Syracuse, N. Y., was an electrical engineering feat that was closely observed by the entire industry, as well as by residents along the route.

Early Fears

The proposed extremely high voltage of a 60,000 volt 3-phase 25 cycle system caused considerable uneasiness to people living near the line, and the officers of this company had several interviews from neighborhood committees who were in fear that in passing by or under transmission lines they would be swept away by its force. These fears were, of course, groundless.

The Rochester connection to this Niagara system was made at Mortimer, N. Y., one and one-quarter miles south of City line, and two 60,000 volts branches run to Station 33 erected at South Park and Elmwood Avenue. Three 1,000 K.W. transformers with necessary switching equipment were installed and underground cables with reduced voltage carried to Station 6 at S. Water St., where a 1500 K.W. railway rotary converter was used to supply trolley power and 11,000 volts overhead transmission line was run from Station 33 on the western outskirts of the city to the plant of the Lake Ontario Water Co. Several power industries availed themselves of this service along the way.

The first 1500 K.W. rotary converter at Station 6 came to the assistance of the Syracuse Street Railway Co., which depended entirely on the Niagara connection for power supply under the following circumstances:



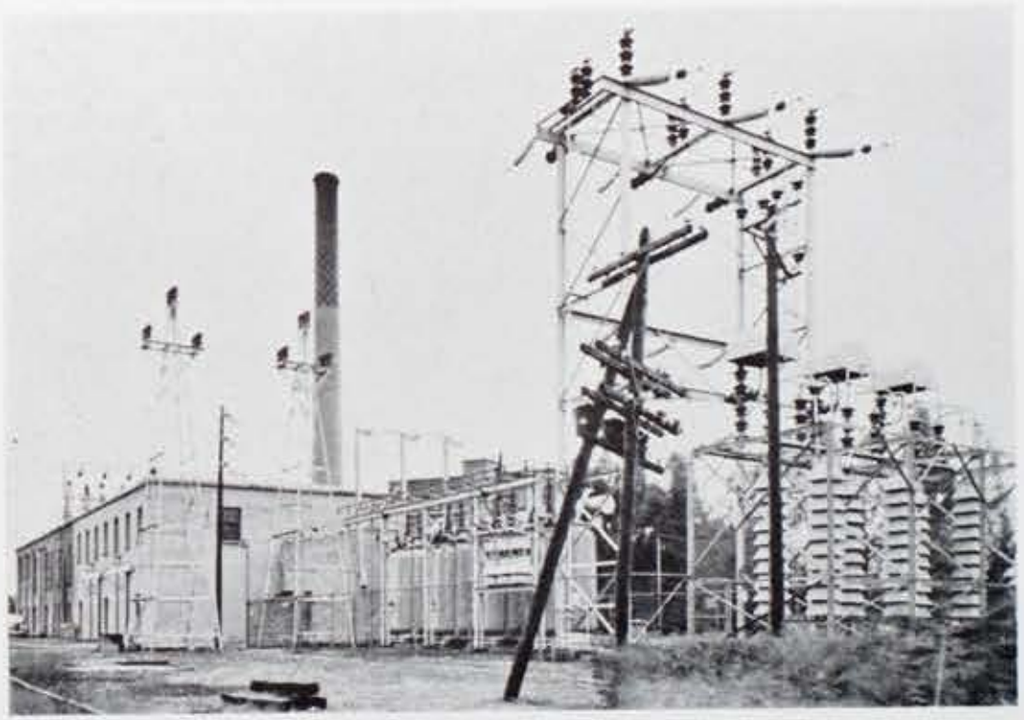
One of the Company's first 1500-Kw rotary converters for transforming 25-cycle Niagara current into 500-volts D.C. current for railway power requirements. It is still in operation at Station 33, near the Strong Memorial Hospital at the western extremity of Elmwood Avenue.

In 1909 an ice jam in lower Niagara River raised the water to such an extent that the Niagara plant was submerged and put entirely out of business. A call for power assistance from Syracuse was accommodated by the only means available, which was to reverse the functions of this rotary converter; that is, by connecting the 500 volt direct current end to D.C. bus supplied by local plants the machine would run and turn out 11,000 volts, 3-phase current. This 3-phase current was delivered to Station 33, there raised by transformers to 60,000 volts and transmitted to Syracuse. Running a rotary converter in this manner is a very difficult and unstable operation. A short circuit or overload on the A.C. side is liable to speed up the machine to destruction. However, by careful watching power was delivered up to the capacity of rotary until the Niagara service was resumed.

Without the consolidation of these numerous companies and unification of system it is easy to imagine the expense, trouble and irritation the citizens of Rochester would have to undergo to adapt the numerous lamps and appliances that are used today and could only be operated from a special type of current.

In the late "nineties" there were the following types of current supply for Rochester:

9.5 and 10 Amperes	**Arc circuits for commercial and street lighting supplied by Brush, Western, Wood, Thompson, Houston and Weston arc dynamos.**
5.5 Amperes	**Multiple A.C. open arc lights**

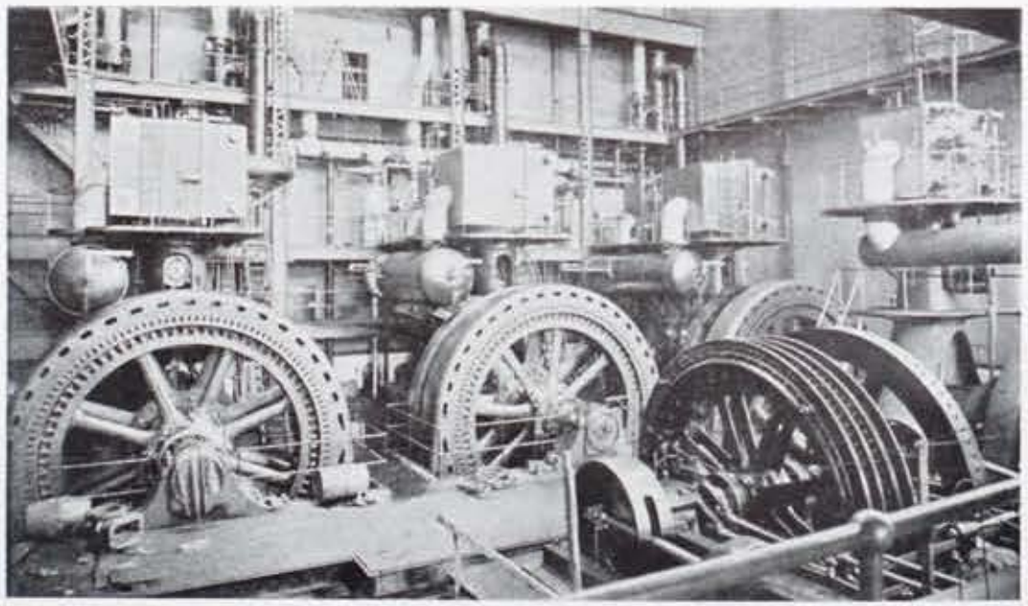


Station Thirty-Three, Elmwood Avenue, showing some of the incoming Niagara Power lines with their lowering transformers and lightning arrestors. At this station two Niagara lines are received; one is a 110,000-volt, 60-cycle line and the other a 60,000-volt, 25-cycle line. This Niagara power is transformed into lower voltage for general use to supplement Company generation in emergencies.

A 500-kw, 2-phase, 2200-volt, 60-cycle motor generator for transforming A.C. to the 3-wire D.C. system. This set was included in the purchase of the Municipal Gas and Electric Company in 1902. Until recently it was in use at Station Four.

5.5 Amperes—Multiple D.C. enclosed arc lights
7.5 Amperes—Series A.C. enclosed arc lights
7.5 Amperes—Series D.C. enclosed arc lights
4 Amperes—Series D.C. Titanium arc lights
4 Amperes—Multiple Series D.C. 1200 Volt Incandescent street lights
9.5 Amperes—Series D.C. Incandescent street lights
7.5 Amperes—Series D.C. and A.C. Incandescent street lights
1,100 Volts, 133 Cycles A.C. Single Phase
2,200 Volts, 120 Cycles A.C. Single Phase
2,200 Volts, 60 Cycles A.C. Two Phase
2,400/4,150 Volts, 60 Cycles A.C. Three Phase
500 Volts, Direct Current Generation for Power Currents
500 Volts, Direct Current Generation for Street Railway
120/240 Volts, Direct Current Generation for Light and Power (Edison System)

Mr. Yawger's article will be completed in our next issue. If you would like the complete series of articles (which may be available soon) please write your request to "Gas and Electric News," 89 East Avenue, Rochester, N. Y.



The last of the reciprocating engines. These Southwark units, until about 1910, in regular operation at Station Three, drove some 1360-Kw Stanley generators. In the space shown a total of 5000-Kw was developed. In the same space, with modern units of advanced design, present turbines make possible a total generating capacity of 60,000-Kw.

GENERAL INFORMATION

Net Increase in Consumer's Meters for Year Ending September 30, 1936

	Sept. 30, 1936	Sept. 30, 1935	Increase
Electric	132,450	129,876	2,574
Gas	110,061	110,159	98*
Steam	315	306	9
Total	242,826	240,341	2,485

Statement of Consumer's Meters by Departments as of September 30, 1936

	Electric	Gas	Steam	Total	Incr.
1926	87,598	97,194	230	185,022	
1927	95,789	101,399	278	197,466	12,444
1928	103,873	105,816	308	209,997	12,531
1929	114,935	109,262	327	224,524	14,527
1930	118,438	109,491	336	228,265	3,741
1931	120,985	109,977	338	231,300	3,035
1932	127,028	109,204	322	236,554	5,254
1933	127,105	108,617	308	236,030	524*
1934	128,532	109,436	305	238,273	2,243
1935	129,876	110,159	306	240,341	2,068
1936	132,450	110,061	315	242,826	2,485
Incr. in 10 Yrs.	44,852	12,867	85	57,804	57,804

Net Increase in Consumer's Meters by Months

	1933	1934	1935	1936
January	258*	54*	16*	329*
February	86*	86*	55*	451*
March	460*	93*	55	182*
April	128	266	206	318
May	134	366	281	540
June	94	332	314	506
July	7*	172	233	562
August	132	281	153	433
September	517	249	324	581
October	318	203	211	
November	281	191	121	
December	211	179	175	

	Month of Sept., 1936	Month of Sept., 1935	Increase
KWH Generated—Steam	21,218,641	7,553,784	13,664,857
KWH Generated—Hydro	7,631,570	10,191,415	2,559,845*
KWH Purchased	7,993,367	16,378,590	8,385,223*
M Lbs. Commercial Steam Produced	50,540	55,498	4,958*
MCF Coal Gas Made	380,657	365,073	15,584
Tons Steam Coal Used	20,997	12,606	8,391
Tons Gas Coal Used	32,614	32,151	463
Tons Coke Made	22,178	21,239	939
	Sept. 30, 1936	Sept. 30, 1935	Increase
Number of Employees	2,488	2,376	112
Amount of Payroll—Mo. Ended	$ 405,096	$ 374,540	$ 30,556
Amount of Payroll—Yr. Ended	$4,594,879	$4,234,913	$359,966
Miles of Underground Duct	2,038	2,032	6
Miles of Underground Line	3,022	3,001	21
Miles of Overhead Line	8,662	8,238	424
Miles of Gas Main	837	823	14
No. of Street Arc Lamps	1,396	1,395	1
No. of Mazda Street and Traffic Lamps	26,362	25,969	393
Total Number of Street Lamps	27,758	27,364	394

*Denotes Decrease

EMPLOYEES' BENEVOLENT ASSOCIATION

Cash Statement for September, 1936

Receipts		Disbursements	
Balance 1st of Month	$5,143.76	Sick Benefits	$1,071.99
Dues and Fees—Members	900.78	Accident Off-Duty Benefits	116.15
Dues and Fees—Company	900.78	Family Sickness	0.00
Rochester Hospital Service Plan—		Medical Examiner	3.00
Members	811.14	Nurse's Expense	100.00
Company	405.76	Payment to Rochester Hospital	
Interest on Bank Balances and		Service Corporation	1,216.90
Investments	402.75	Balance end of month	6,056.93
Total	8,564.97	Total	$8,564.97
E. B. A. Membership September 30, 1936	2,208	E. B. A. Membership September 30, 1935	2,179

Members participating in Rochester Hospital Service Plan Sept. 30, 1936 ... 1,279

The Story of the Development of Electric Utilities of Rochester

THOMAS H. YAWGER

(Concluded in this issue)

The Present R. G. & E. Cor'p

A brief resumé of the major corporate and managerial steps in unifying and simplifying the complication resulting from the attempt of the various companies previously mentioned to supply their particular and competing service may here be made:

The merging and consolidation of the Brush Electric Co., The Rochester Electric Light Co. and the Edison Electric Illuminating Co. in August, 1892, into a single corporation named the Rochester Gas & Electric Co.

This merger and consolidation continued until June, 1904, when a new agreement for the consolidation of the Rochester Gas & Electric Co. and a competing company named the Rochester Light & Power Co. was consummated and incorporated as the Rochester Railway & Light Co., with the following names and addresses of its directors:

Name	Address
Frederick Cook	Rochester, N. Y.
Granger Hollister	Rochester, N. Y.
Alexander Lindsay	Rochester, N. Y.
Edward Bausch	Rochester, N. Y.
Albert O. Finn	Rochester, N. Y.
Thos. W. Finucane	Rochester, N. Y.
George W. Archer	Rochester, N. Y.
Henry A. Strong	Rochester, N. Y.
Eugene H. Satterlee	Rochester, N. Y.
Albert H. Harris	Rochester, N. Y.
Henry D. Walbridge	New York
Edw. W. Clark, Jr.	Philadelphia
Anton G. Hodenpyle	New York
Clarence M. Clark	Philadelphia
James Richardson	Prov., R. I.

This consolidated company acquired control of the stock of the Rochester Railway Company and the two companies operated under one ownership until December, 1905, when the New York Central and Hudson River R. R. Co., to complete their plans for a intrastate electric traction system, purchased control of local companies under the name of the Mohawk Valley Co., and this arrangement continued until 1909, when the Railway properties were transferred to a new company incorporated as the New York State Railways.

This purchase of local electric and gas system by the N. Y. C. & H. R. R. was made simply to supplement and complete their electric traction interest and not to enter into the Gas and Electric business, which did not appear at this date as attractive an investment as transportation.

The name Rochester Railway & Light after this separation of interests remained the same until November, 1919, when to more plainly indicate, the true functions of the company, the name was changed to Rochester Gas & Electric Corporation.

In October, 1928, the New York Central disposed of their interest in the gas and electric business to the Rochester Central Power Company, and in May, 1929, they in turn sold all interest to the Associated Gas & Electric System, one of the large holding companies, with extensive interests throughout the nation. This holding company, due to the depression, had difficulty in refinancing some obligations in 1932 and were aided by local banks under conditions that local control and management was arranged. This was carried out by stock being transferred to voting trustees.

VOTING TRUSTEES

Raymond N. Ball
Fred C. Goodwin
Charles M. Travis
Herbert J. Winn

DIRECTORS

Raymond N. Ball
John P. Boylan
Frederick S. Bourroughs
M. Herbert Eisenhart
Fred C. Goodwin
Frederic H. Hill

This reconstruction of an old kitchen was used in a former Company exhibit at the Rochester Industrial Exposition. The era from which this picture comes is often called "The good old days." For the housewife, however, the present day with its modern kitchen and gas and electrical appliances for almost every "chore" is much to be preferred because it gives her more time for leisure and the pursuit of culture.

Electricity plays a major role in modern home-making. Modern kitchens are examples of what electricity can do to save steps, time and labor and help make life happier for all the family.

Sanford J. Magee
J. Craig Powers
Herman Russell
Charles W. Smith
Daniel Starch
Raymond L. Thompson
Walter L. Todd
Herbert J. Winn
Edward G. Miner, Chairman

EXECUTIVE COMMITTEE

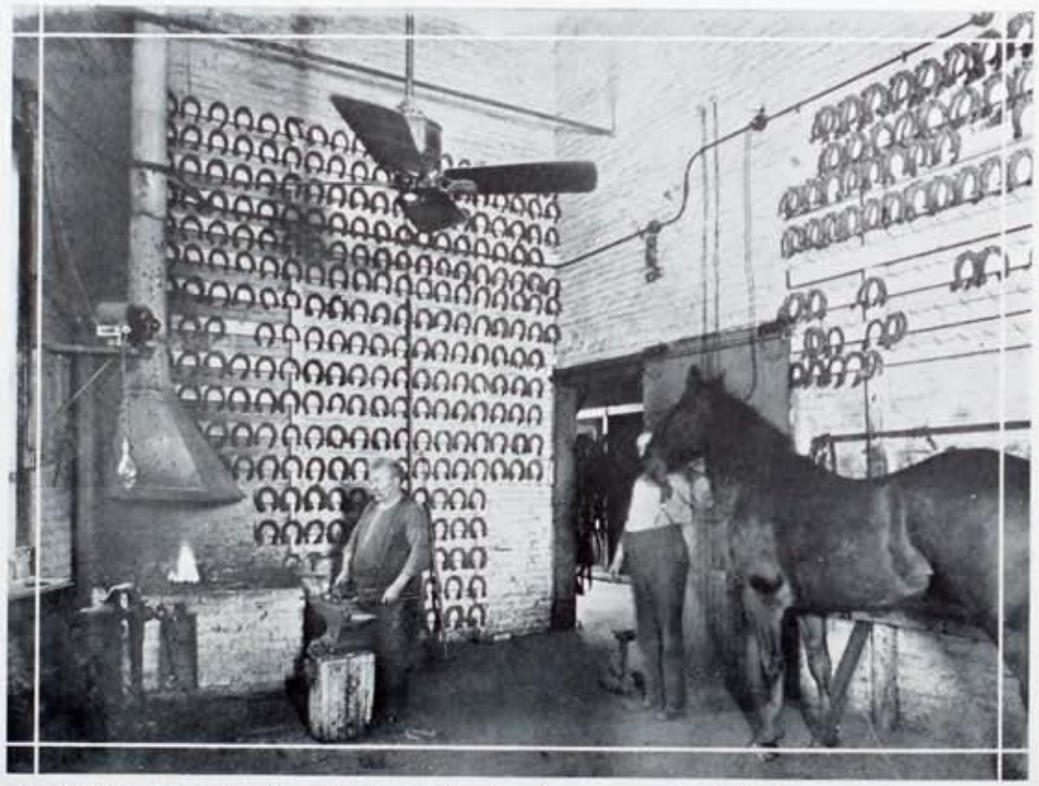
Raymond N. Ball
John P. Boylan
Frederick S. Burroughs
Sanford J. Magee, Alternate
Edward G. Miner
Herman Russell
Fred C. Goodwin, Chairman

OFFICERS

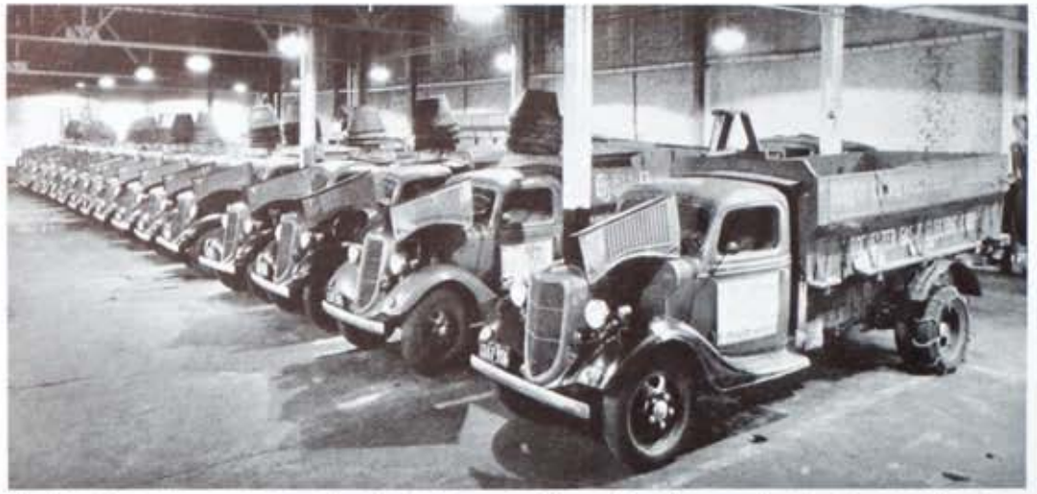
Herman Russell, President
Joseph P. Haftenkamp, Vice-Pres. in charge of Operations
Ernest C. Scobell, Vice-Pres. in charge of Finance and Comptroller
Sanford J. Magee, Vice-President
Frederick H. Patterson, Secretary and Asst. Comptroller
Joseph C. Collins, Treasurer and Asst. Secretary
Joseph F. McKenna, Asst. Secretary
Charles A. Tucker, Asst. Treasurer
E. Weinberger, Asst. Treasurer
Harold W. Nichols, Auditor

The original electric central stations were conceived primarily as a source of light only for general distribution and use. Because of new developments and inventions thruout the years, electricity, due to its convenience and economy has displaced other means and now gives a vital and necessary assistance to our daily requirements in the domestic, business, farm, health and recreation economy.

The rapid and consistent demand on the electric system speaks for itself the way in which its services have been accepted as the following tabulation shows by decades the maximum demand the system is required to supply:



At one time, before the days of automobiles, the Company maintained about 150 horses to take care of its transportation problems. Keeping them shod, especially in slippery winter weather, was an important operation. The Company maintained its own blacksmith shops, and the above illustration is from an old photograph of one of them.



Today, the Company operates hundreds of automobiles and trucks to maintain the type of service which modern times demand. This picture shows one side of the Company coke truck garage, with the cars' hoods opened up for inspection after a day's grind. All cars are maintained in excellent condition in the Company's Front Street garage, and washed and inspected regularly.

Year	Kilowatt Capacity
1880	10
1890	7,500
1900	15,000
1910	25,000
1920	50,000
1936	89,000

A comparison of a few living costs under present rates, due to a unified system and management can be made as follows:

For the average American family

The Food bill is	$50.00	per month
Clothing bill is	20.00	" "
Housing bill is	39.00	" "
Electric bill is	2.82	" "

For this $2.82 per month (in the above table) the average family receives service for superior lighting and the domestic appliances, such as refrigerators, vacuum cleaners, toasters, percolators, radios, washers, ironers and various other devices.

This service reduces to a minimum the time and labor incident to house work and if other means than electricty were used, the cost would be very greatly increased.

Public Relations

The public relations of the company have evolved from a state of political turmoil, due to the conflicting interests in early days of the various companies resulting from their attempt to supply their particular and competing service. Both parties had on their side self-appointed men who claimed to be able to exert political pressure to carry their points to the present mutual interest and understanding.

This good will has been developed and fostered by a unified management in inaugurating a Public Relations Department, news stories to newspapers and radio broadcasting regarding new construction, operating troubles, and better electric service given by men and women employees to the public.

The Electrical industry is inherently a hazardous occupation and were it not for the safeguards and care used in the handling of this unseen force, electricity, it would be a menace instead of a blessing. It has, however, a romance and a fascination that those men who have made it a life career can best appreciate.

And this history would not be complete without paying great respect and tribute to the officers and employees who have passed on—some sacrificing

(Continued on page 354, col. 2)

Industrial Engineers Attend I. E. S. Meeting

The following men from the Industrial Department recently attended a meeting of the Illuminating Engineering Society held in Buffalo, N. Y. They are Messers Floyd Owen, Roy Weston, Bruce Thompson, Charles Rickner and Benjamin A. Thomas. The meeting was held under the auspices of the Buffalo Chapter of the Society, and the principal speaker was Jim Ketch, authority on lighting from Nela Park. Mr. Ketch spoke on the factors connected with the sale of modern lighting, and his talk was illustrated with demonstrations of lighting equipment, through the use of model lighting in various ways to illustrate his points.

The men also made a trip to one of Buffalo's best lighted stores to check up the illumination, which is said to be "tops" in up-to-date lighting efficiency for retail stores.

Women's Section Party and Style Show

by Frances Cameron

"The best we have ever had" one of the girls was overheard telling Helen Smith, the Women's Section Chairman and Pearle Dailey, promoters of the Women's Section Party. Entering the Assembly Hall, one could see a bouquet of yellow chrysanthemums that decorated the piano, across the room on a raised platform. A console-style radio with a bouquet of fall flowers brought a homey atmosphere to the room, in the center of which were twenty card tables arranged with white covers having as center-pieces the gaily decorated prizes topped with miniature dogs designed by Maryland Curran. At the side of the room was a serving table very daintily arranged with a center-piece of flowers and adorned with an urn set.

After a hot supper of ham, escalloped potatoes, rolls, pie and coffee, Helen Smith introduced the new Women's Section Secretary, Eleanor Burger, recently appointed by Personnel Director Frederick W. Fisher. With the rhythmic strains of piano selections furnished by Frances Andersen, the Company models artfully stepped forth in knitted dresses provided by Miss Fairbanks from her shop. Then she described the type of floss used and the style details as each model posed on the platform. Following the demonstration, games of Bingo and Bridge were enthusiastically enjoyed.

The following members of the Company assisted in the party's success:

Party Chairman—Eleanor Burger
Treasurer—Louise Amish—Treasury Dept.
Dinner—Thelma Hoesterey—Personnel, Frances Cameron—Rate and Contract
Table Arrangements—Emma Wage—Auditing; Edith Wilson—Personnel.
Decorations—Margaret Settle—Personnel
Prizes—Esther Shippey—Coke Sales
Games—Bessie Crum—Service
Fashion Show—Evelyn Cross—Stores Record
Hostesses—Helene Thompson—Personnel; Marion Thiem—Consumer's Bookkeeping; Mabel Kramer—Auditing; Marie Fredericks—Auditing; Lois Consul—Stores Record; Rosalie Bridgeman—Auditing; Marion Radell—Mailing; Marion Rossney—Domestic Sales; Hattie Garis—Stores Record; Mildred Magin—Payroll.

The Company Models:

Mildred DeWolf—Industrial Sales
Winnie Sleep Jones—Auditing
Jeanette Macon—Mailing
Muriel Metcalf—Coke Sales
Marion Royle Miller—
Mary Powers—Rate and Contract
Marie Schiro—Coke Sales
Olive Werthman—Tabulating
Ruth Bridgman—Purchasing

Development of Electric Utilities

(Concluded from page 353)

their lives in the line of duty—to those who are now carrying on, with the conviction and hope that the coming generations will be imbued with the same progressiveness and loyalty to the company and public that the present heritage falling to them demands