GAS AND ELECTRIC NEWS

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Station 15 and Old Dam at Middle Falls

"SERVICE FIRST" turns nickles into dimes, dimes into quarters, quarters into halves, halves into dollars

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Large Sector Gates for Dam at Station 5

EDGAR R. CROFTS

THE movable dam now being built by the Rochester Railway and Light Company in connection with the new hydro-electric development at Station 5 has many novel details. The dam is situated just south of what is known as the Middle Falls which is located about half-way between the R. W. & O. and Driving Park Avenue bridges. Prior to starting construction it was necessary to remove the old masonry dam which existed at this point to serve Station 15. Owing to the erratic flood conditions existing on the Genesee River, it was deemed inadvisable to make the fixed crest of the new movable dam any higher than was that of the old solid one. The pond level of the new dam will raise about 13½ feet above the elevation of the old dam, this difference in level being obtained by means of six structural steel gates which may be lowered or raised to obtain any desired level. Two of these are "Sector" gates each 100 feet long, and the remaining four are "Taintor" gates each 50 feet long. The sector gates are comparatively new in engineering work and this article will describe in detail these gates particularly. The taintor gates are also sector in shape, but are mechanically operated and lift out of the river, whereas the sector gates are

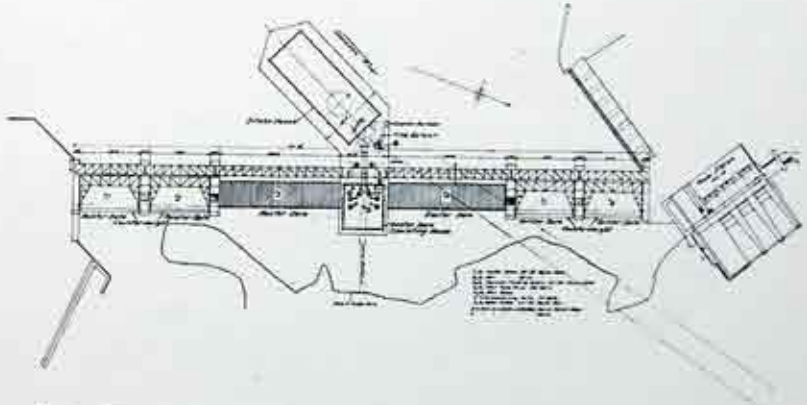

Fig. 1. Plan showing intake house, dam and Station 15. Dotted lines indicate tunnel which goes to Station 5

hydraulically operated and drop into a chamber cut out of the rock forming the river bed.

The sector gate as built at this dam was first designed by Mr. E. L. Cooley on the Chicago Drainage Canal at Lockport, Illinois. In fact, it might be well to call this gate the Cooley Sector Gate inasmuch as Mr. Lyman H. Cooley, a brother of Mr. E. L. Cooley, was the first man to conceive the idea of reversing the hinge on the original Chittenden drum dam, of which a few have been built. In general, these gates which are to be described are similar to the gates installed on the Chicago Drainage Canal, but the details of construction, notable that of the hinge, have been changed.

Sector Gates: These two gates are identically alike, and therefore a description of one will suffice. As shown in figure 1 large concrete piers separate the gates, so that each gate is a complete working unit. The movable portion is in the form of a 44-degree sector of a cylinder 60 feet in diameter and is built up of steel frame work as shown in figures 2 and 5. In all there are thirteen trusses equally spaced. One radius of this sector is covered by what is called a deck plate, and the front or curved portion is covered with a face plate. The whole structure is hinged at what would be the center of the cylinder, thus allowing the gate to move up and down through the required arc. Angle irons have been placed on the deck plate to act as skids for the ice and debris passing over the dam. The front and deck plates are ½-inch thick and are made water-tight by caulking at the joints. The whole structure was designed strong enough to support the weight of a 14-foot depth of water passing over the dam when the gate is in the down position with no water in the chamber underneath to act as a counterbalance or support. Great care has been taken to have the front plate a true cylindrical surface, and to this end the whole structure was assembled in the shop and carefully fitted prior to shipment.

Operation: These gates are raised and lowered by varying the height of the water in the chamber under the dam. Water is admitted to the chamber beneath the gate from an intake located as far up-stream as it was practicable to place it, in order to obtain a maximum head. When the gate is in the down position there is a difference of elevation of 6½ feet between its peak in front and the top of the deck plate at the hinge. This head of water will cause an upward pressure on the deck plate sufficient to lift the gate very slightly off the sills at the bottom of the chamber, and if the water in the pond is held at the same elevation, place the gate in equilibrium. In this position two forces are acting on the gate, namely: the weight of the structure, and the upward pressure of the water. As the gate rises the center of gravity of the gate moves through an arc so that its horizontal distance from the center of the hinge steadily decreases. If, therefore, the water in the pond is allowed to rise with the peak of the sector, the gate will continue to lift to its up-position due to the steadily decreasing moment of the weight of the structure about the hinge, and the increasing pressure of the water on the under side of the deck plate. It would be possible, therefore, to raise the gate with a full flood passing over it if it were necessary to do so. In order to adjust the height of the gate it is necessary to adjust the elevation of the water under the gate; that is, if the gate is to be held in a certain position, it is necessary to keep the elevation of the water inside constant. This is done by means of a special valve called a weir tube, a detailed description of which appears later.

The water used in operating the gate passes first through a coarse screen at the entrance and then through a fine screen placed in a separate chamber. Behind this fine screen are two 30-inch by 30-inch sluice gates, each of which controls the flow to a gate, through which the water passes to a large settling chamber where it is hoped most of the silt will be deposited. Another 30-inch by 30-inch sluice gate controls the flow from this chamber to the chamber of the dam. In order to remove the accumulated silt a 24-inch by 24-inch sluice gate was installed at the lower end of the chamber to allow sluicing of the silt deposits into the tunnel below. In order to catch any silt deposits which may pass through the settling chamber, and also to insure complete drainage of the chamber when necessary, a small ditch was placed in the bottom of each chamber. The water from the gate chamber is drained off through a 24-inch by 24-inch sluice gate out into a small tunnel placed exactly on the center line of the operating pier. The overflow from the weir tube is also carried off through this tunnel.

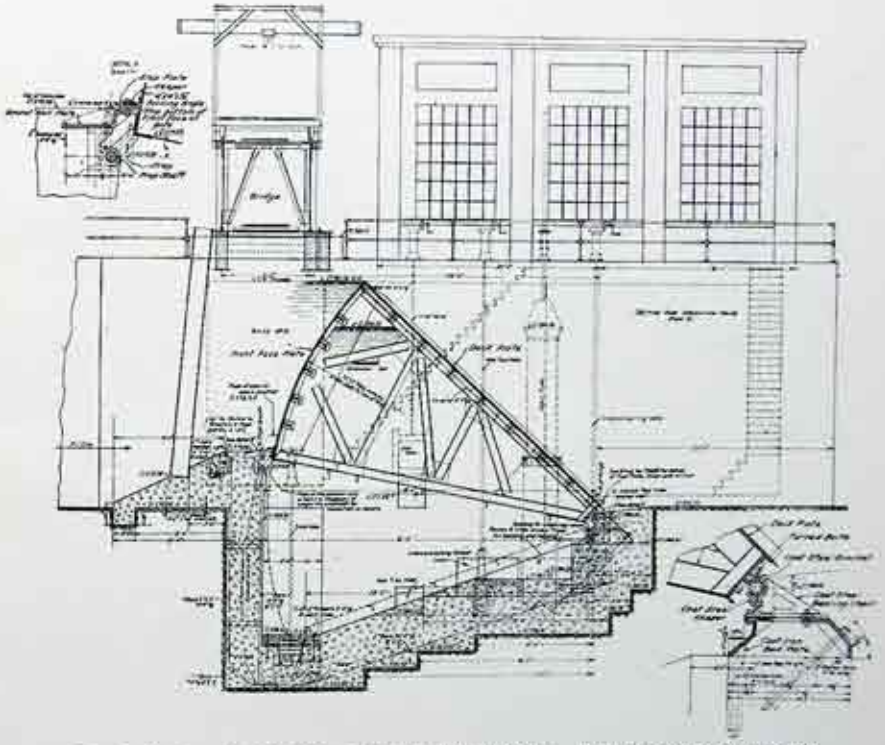

Fig. 2. Diagram of sector gate, operating house and hoist. Insert at right shows details of hinge. Insert at left shows details of breast wall plate, and prop shaft mechanism.

It is absolutely necessary that free air conditions exist in the peak of the dam, and to insure this, twenty-four 2-inch air pipes have been carried into the peak space from the space

behind the hinge. As the water rushes over the gate during flood period it will evidently tend to suck the air out through this pipe from within the dam, thus creating a partial vacuum and putting an excessive load on the structure. In order to prevent this condition large pipes have been installed to connect the space back of the hinge directly with the outside air.

Fig. 3. Picture showing the construction of the large hinge required for one of the gates. Type "A" bearing projects on top, while type "B" bearing projects at the bottom.

Hinge: The hinge is 100 feet long and continuous. Several ideas were developed, but the one shown in figure 3 seemed to adapt itself best to the work required. The shaft is made of cast steel six inches in diameter, and is hollow in order that a steam pipe may be run through the shaft and returned inside the dam, so that the formation of ice near the hinge can be prevented. Should a large amount of ice collect close to the hinge, it is evident that the nut-cracker effect would be fatal to some part of the structure.

It was essential that the shaft should turn with the moving parts in order that an indicating device can be put on the end in the operating house so the operator will know the exact position of the dam at any time during the flood period. The thrust of the gate is carried to a heavy girder of structural steel well braced to the deck plate and to the lower lateral system of the trusses. To this girder, located six inches away from the center line of the sector, cast steel shaft brackets have been fastened as shown in figure 5. The 6-inch cast steel hollow shaft was bolted to these shaft brackets by means of tap bolts, and the brackets were in turn fastened to the structural steel girder by means of $1\frac{1}{4}$-inch turned bolts. Turned bolts were used because it was impossible to place enough rivets of a practicable size to take care of the shear at that particular point. The greatest stress which comes on the hinge is not the thrust from the water in the pond, but the lifting force due to the water under the deck. This will also explain why the castings carrying the shaft were built in the form of a hook. It was impracticable to design shaft brackets which would make the lines continuous, so two types of bearings were designed—one called Type "A" and the other Type "B." The former takes practically all the "uplift" assisted when the dam nears the up

position by Type "B," which has fastened to it the cast steel keeper which takes all the downward re-

Fig. 4. Placing reinforcing steel in the concrete chamber into which the gate descends. Note the size of the drain chute

action when the floods are passing over the gate.

The cast steel bearings are all bolted to heavy cast iron bed plates which in turn are anchored with heavy bolts into the concrete. The anchor bolts do not grip sufficient concrete to withstand the uplift, so a heavy reinforcement was put in the entire floor of the chamber to tie the whole mass of concrete contained in the chamber together. The hinge was designed so that a perfect alignment of all the parts could be obtained in the field as easily as possible. For this purpose the tops of the cast iron bed plates were machined, and the bolt holes were carefully checked after the bed plates were lined up in position. The cast steel bearings were carefully machined to the same jig and all babbitted with a mandrel in exactly the same position, so that the center line of the shaft had to be exactly the same distance above the bottom of the casting at every point. Each keeper was placed on its respective casting and babbitted in that position and shipped to the field bolted to its particular chair. The tendency for these bearings to shift down-stream was taken care of by the lugs on the cast iron bed plates, which proved to be a very handy place for the field men to work from in the erection of the hinge. A high grade babbitt was used in the bearings because the pressures will run fairly high.

A very low unit stress was used both in the cast iron and cast steel castings. This was done not because it was considered impracticable to get good castings, but because of the fact that the gate might be subject to a shock whose amount is undeterminable such as that from a large tree coming down the river or a large field of ice which has been suddenly loosened, and all of the shocks received by the structural steel work must be taken care of by the hinge. A very good grade of steel castings was secured for this work; the steel is very ductile and there appears to be no danger of wrecking the hinge due to a sudden shock.

All of the holes in both the cast iron and cast steel castings were cored, but great care was taken to see that the moulders had the cores set right. A careful check was also

Fig. 5. Framework of sector gate showing deck prior to being covered with steel plate

made of all castings after they were machined to see that the holes were exactly right. There were a few instances, however, where some reaming had to be done. This was prob-

ably due to the fact that one firm built the steel castings, another built the cast iron castings, while still another did all the machine work. It was at first planned to use cold rolled steel shafting, but after it was found impossible to obtain it, a cast steel shaft was substituted. The foundry experienced some difficulty at first in securing good castings, but this difficulty was overcome so that finally they secured a surface which was as good as that of a cold rolled shaft. Of course, it was impossible to get the sections as long, so that the shafting as now installed is in lengths of about six feet, which are fastened together by male and female connections.

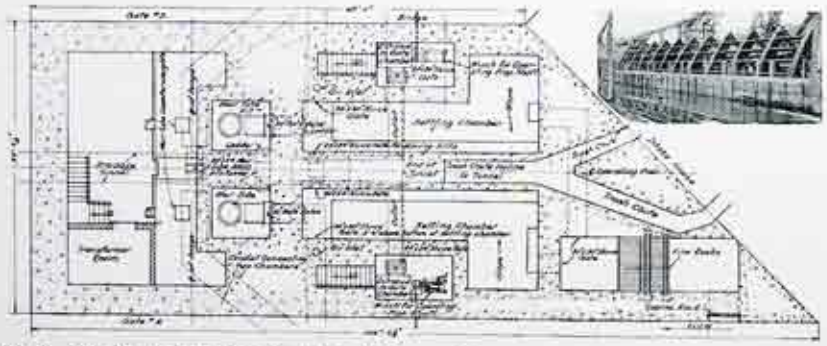

Fig. 6. Plan of operating pier showing trash chutes, sluice gates, setting chambers, weir tubes, and winch for operating prop shaft. Insert shows face of one sector gate prior to covering with steel plate

Breast Wall Plate: The up-stream wall of the chamber has been called the breast wall. This wall is heavily reinforced to take the thrust from the lower end of the needles which may be placed whenever it is desired to unwater the gate. The upper end of these needles will bear against the lower chord of the bridge. The lower lateral system of the bridge, which forms a heavy horizontal truss, has been designed heavy enough to care for this additional load. Heavy grillages had to be placed at the ends of the bridge to carry this load to the piers.

The top of this breast wall is covered with cast iron plates called the breast wall plates. Directly underneath these plates are placed cast iron bearings to carry the four-inch prop shaft. Cast steel props which are normally back out of the way, one at each truss, are keyed to this shaft. When it is desired to inspect the interior of the chamber the gate is raised to its highest position and the props are thrown over into position by means of a winch, ready to receive the gate. A lug was cast on the props so as to make it impossible for the operator to throw them over too far. The winch for moving the props and prop shafting is located in a chamber of the operating pier, the shaft passing through a stuffing box in the concrete wall. On top of the cast iron wall plates were placed the 1½″ x 8″ steel stop plates, which were put on to prevent the gate from going any higher than the desired elevation. On top of this again is the packing angle held in place by means of a cast iron keeper. The stop plates, packing angles and keepers are fastened to the breast wall plate with 1¼-inch bolts, thus making a firm structure against which a 6″ x 1½″ x ½″ angle riveted to the bottom of the front face of the gate strikes when the dam reaches its highest position. The packing angle is a 4″ x 4″ x ½″ angle bent to the shape shown on the detail in figure 2, and is put on to prevent large pebbles and gravel from packing in tightly enough to cause trouble should they get down into the space between the front plate of the gate and the stop plate. The angle will also serve to remove any material which may fasten itself to the face of the gate. This angle is not bolted in place but the horizontal leg is cut as shown, corresponding recesses being cast in the keeper. Clearance enough has been allowed between the keeper and the angle so that the angle may move to conform with any irregularities in the face of the dam.

Weir Tube: The weir tube is a special valve for controlling the level of the water in the chamber under the gate. It consists simply of a cast iron pipe 36 inches in diameter, set in a pit in the operating pier. At the top of this pipe was placed a stuffing box through which a 30-inch pipe, turned on the outside, slides. At the top of this 30-inch pipe was placed a heavy cast iron outfall to which a 4″ shaft for raising or lowering the tube is fastened. Cables which pass over sheaves to a concrete counterweight in a separate chamber, also fasten to this head casting. The 4-inch shaft connected to the head casting passes up through a floor stand placed on the floor of the operating house, and is threaded for a length of ten feet, that being the range of movement of the tube. The floor stand is motor operated so that the tube may be controlled from a distant control if desired. Each gate has its own tube, and should either tube become jammed or damaged it may be segregated by closing a 30-inch gate valve interposed between it and the dam chamber. One conduit in which there is a 24-inch gate valve, connects both chambers, and when one tube is out of commission the valve may be opened and both gates may be controlled by the other tube if it is so desired.

The hinge for one sector dam contains 25 tons of iron castings, 30 tons of steel castings, 2500 pounds of high grade babbitt metal and about 1½ tons of 1¼″ diameter bolts. The hinge was furnished by the Ricker Manufacturing Company of this city, Mr. George Hearn, President. The structural steel of each gate weighs 150 tons and was furnished by the Chicago Bridge & Iron Works, Chicago, Ill., Mr. George T. Horton, President. There are about 18000 field rivets to be driven in each gate. The breast wall plates, prop and prop shaft for one gate weighs 45 tons and was furnished by Jackson & Church Company of Saginaw, Mich. Mr. J. L. Jackson, President. All details for the hinge, breast wall plate and masonry were drafted in the Engineering Dept. by Mr. W. A. Schell.

BACK of the beating hammer by which the steel is wrought, back of the workshop clamor the seeker may find the Thought; the Thought that is ever master of iron and steam and steel, that rises above disaster and tramples it under heel. The drudge may fret and tinker or labor with lusty blows, but back of him stands the Thinker, the clear-eyed man who knows; for into each plow and sabre, each piece and part and whole, must go the brains of labor, which gives the work a soul.—*Selected*

Changes in Dehydrating Apparatus at Gas Works

WILLIAM H. EARLE

FOR over a year the Gas Works has experienced great difficulty in dehydrating its coal tar; that is, in reducing the water content to an acceptably low percentage. Shipments have in some cases run as high as 25% or 30% water. While the source of the trouble was probably largely chemical in the nature of the gas coal from which the tar was derived, and in the heat treatment to which it was subjected in the retorts, it was felt that the remedy lay chiefly in improving the methods of handling the tar.

Figure 1 illustrates the sequence of the general apparatus which comprises the tar handling equipment.

The hydraulic main receives the raw gas from the retorts, and condenses out large quantities of tar which flow to the displacement tank, so called, because the tar entering it displaces or forces out an equal volume of water which flows back into the hydraulic main, thus maintaining a constant water level therein. At twenty-eight hour intervals the displacement tank is drained off into the tar well and refilled with water. The tar well is simply a large brick and concrete receiving or collecting basin. Tar from the condensers and scrubbers, together with large quantities of water or weak ammonia liquor flows to the separator from which the tar runs to the tar-well, and the ammonia to its well.

The separator is a standard type of separating apparatus, designed to so reduce the velocity of the moving tar and liquor, that the difference in specific gravity of the two has a chance to effect a separation. A cross section of the separator is shown in figure 2. Separation in this receptacle is not complete, however, and the tar entering the tar-well carries a high percentage of water. However, further separation occurs in the well. A steam syphon line is arranged to draw off the liquor which accumulates on top and the tar is pumped out into a steel tar storage tank of about 300,000 gallons capacity, formerly part of a small gas holder.

The dehydrating tank is a vertical tank about 30 feet high, and of about 10,000 gallons capacity, and is equipped with a steam heating coil. Its function is to act as a final separating tank from which the tar with water content reduced to a minimum, is dispensed by gallon or by carload lots. The heat assists the separation and also keeps the tar in a fluid condition during the cold weather.

A survey of the tar situation disclosed the following conditions:

Displacement tank, 15.5% water; Inlet section of separator, 18.5% water; Tar section of separator, 17.0% water; Tar well, 13.0% water before draining disp. tank; Tar well, 27.0% water after draining disp. tank; Storage tank, 16.5% water; Dehydrating tank, 16.0% water at top; Dehydrating tank, 7.5% water at bottom.

Note that after drawing off the displacement tank into the well, the water content more than doubled. Obviously there was a very decided source of trouble. The arrangement of the tar well and the drain line from the displacement tank is shown in figure 3. The tar discharged at a head of about thirty feet and spilled into the well at the top with such force that the flow agitated the contents of the well and churned back into the tar, the liquor which had previously separated out. Further, it was found that the overflow line from the top of the dehydrating tank emptied into the tar section of

the separator at the mouth of the line going to the tar well. And every time tar was pumped into the tank, the water was displaced and discharged directly into the top of the well, acting as in the above instance.

The remedy, its application, and results are more quickly told. In the first place, the overflow from the dehydrating tank was moved to discharge into the receiving section of the separator. Next, a new drain line was run from the displacement tank, and carried down into the tar well to a point just below the constant tar level, as determined by the elevation of the tar pump suction line. Thus the material discharging into the well, was carried to a point where agitation of the entire mass was eliminated, and where the liquor on top could not be driven back into the tar. This arrangement is shown in figure 4. Conditions immediately showed improvement. Subsequent shipments show an average water content not to exceed 8%—the minimum has been 5.5% and the maximum, 11.0%. One more improvement in equipment is now in progress. That is, the installation of a new and better type of heating coil in the dehydrating tank. Its construction and effect will be taken up later.

In addition to the above alterations, a new heating coil has been installed in the dehydrating tank. It is a continuous spiral of ¾" pipe, turned upon an 8" diameter, standing 15 feet over all, and has a total heating surface of about 200 square feet. A small spiral steam coil has also been located near the suction pipe of the tar storage, to facilitate handling the tar at that point. The changes which are chiefly responsible for improved conditions are those in connection with the tar well as outlined, and for them Mr. William N. Whitney is primarily responsible.

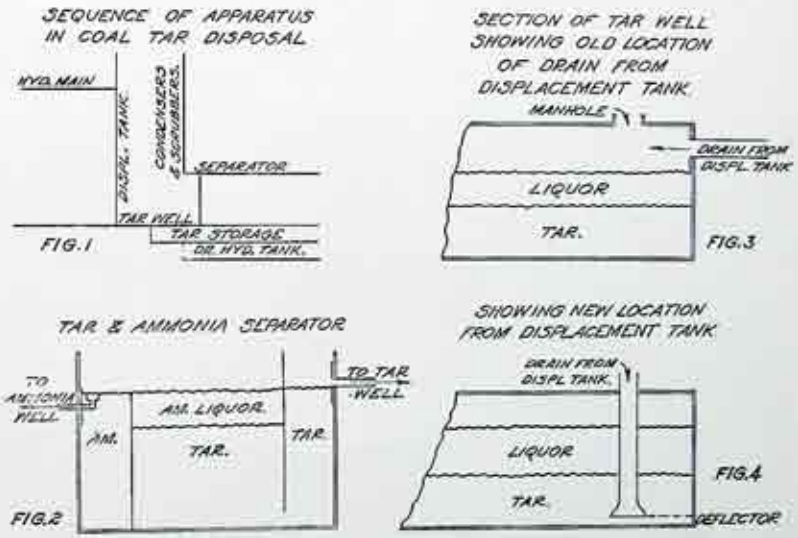

Fig. 1. Diagram of sequence of apparatus in coal tar disposal. Fig. 2. Diagram of tar and ammonia separator. Figs. 3 and 4. Show old and new method of connecting drain from the displacement tank to the tar well

The Telephone Department

GEORGE T. COLEMAN

THE telephone has become such a vital part of modern business, that should the world suddenly be relieved of its use, the amount of business transacted within a day would drop off enormously. How much, no one can tell. In serving the public a large part of this Company's business must necessarily be transacted over the telephone. The public uses it to order services and lamps, to obtain technical information and advice, to request duplicate bills, to enter complaints, and to get information of every description. Within the Company the telephone is the chief means of communication between the various departments located at different places, and since it is highly essential that all the electric stations operate as a unit, the telephone or some other signalling device is a necessity, because without it numerous troubles would no doubt be very common.

At present this Company has a "Central" board located at the Main Office. The equipment consists of two private switchboards controlling calls over the Bell and the Home phones, and also two Information Boards which are equipped so that four persons can give information at the same time. To the central boards there are connected sixteen tie lines, two monitor boards, and sixteen trunk lines to the telephone companies' exchanges. There are also one hundred and sixty-one extension telephones which are connected to the private switchboards for inter-communicating purposes. With the necessity of doing work in all parts of the city it is also essential

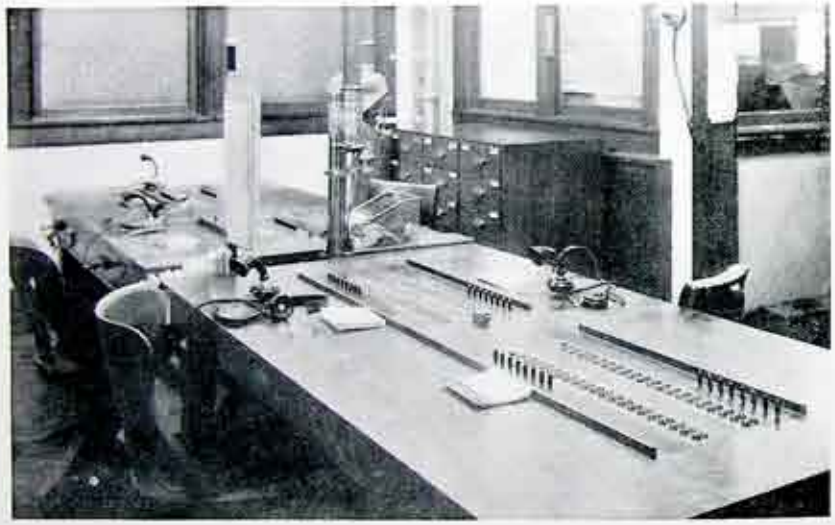

Fig. 1. "Information Board" at Main Office. These boards are equipped so that 8 operators can give information at the same time. The calls are transferred from the Central Board—a red light appears and the information operator pushes the corresponding key, lighting a green lamp before talking

to have a large number of street telephones for the use of all "outside men," and other employes on emergency cases.

In order to render service to the public and to the various gas and electric stations, the telephone boards must be operated twenty-four hours every day in the year. On Sundays and from 11:30 P.M. to 7:30 A.M. both boards are operated by one person, otherwise there is an operator for each board. The information boards are in operation from 8 A.M. to 5:30 P.M., there being one operator for each (Home and Bell), with an additional operator to relieve the congestion and handle the follow-up outgoing calls. As shown in figure 4 it is necessary to have five operators at the Central and Information boards between 8 A.M. and 5:30 P.M. at all times.

Men located in the Main Office day and night doing other work, have been instructed regarding the operation of the boards, and may be called upon at a moment's notice to take care of emergencies. There are times when due to storms or other interruptions, the telephones are as busy at night as they are in the daytime. In some cases the load is so heavy that the regular operators must be called from their homes.

Fig. 2. Miss Stroh and Miss Huddy, operators at the "Light Company" Central Boards

By timing the operators it has been found that in rush hours they have attained a speed of fifteen calls per minute. This is at the rate of nine hundred calls per hour and is about the maximum possible speed. From figures obtained by check on other switchboards it has been found that for the average calls per hour during a working day this Company compares quite favorably with the busiest switchboards in the city. The present daily average is about 3600 calls, including incoming, outgoing and Company inter-communicating calls. This means an average of about three calls a minute for each board on a 10 hour day basis.

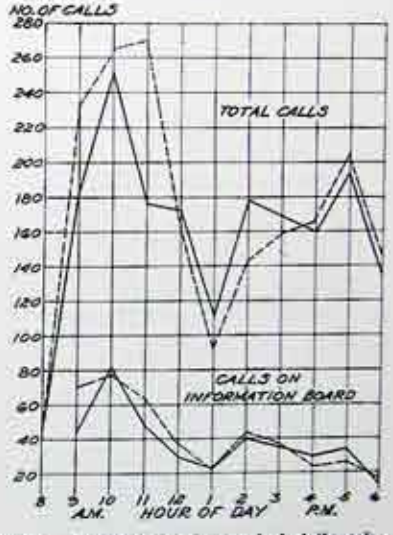

Fig. 3. Diagram showing typical daily telephone load on Home and Bell boards from 8 A. M. to 6 P. M.

Long distance calls, while they now average only about eleven per day, are steadily increasing and con-

stitute a very important item in the day's work. Considerable time has been saved by transferring all long distance calls to the Information Board. This branch of the service has been so perfected that not more than two seconds elapse from the time the operator at the main board answers, and the one calling is asked by the "Information" operator, "Whom do you wish to call?" The time of making most long distance calls is relatively short, the only delay being in those cases where the one calling does not remain in the department where the call is placed until the connection has been completed, or he does not leave word as to where he will be.

Clearness of instruction and enunciation, and promptness in answering, constitutes about 90 per cent of the successful operation of the telephone board. The desired goal is speed, and this can be attained only by co-operation and definite telephone etiquette or rules to be used by all. For instance the well-known, "Hello" has been replaced by "Light Company" at the central board, or by "Mr. At-your-service-man speaking" after the call is sent to a definite department. This means a saving of at least five seconds on every call, which during the course of a day would total several hours time. One would not consider five minutes a long time to wait in some place of business, but to hold the receiver to one's ear while waiting one-half of this time, would be considered very poor service indeed.

Figure 3 shows a typical daily load curve for both the "Home" and "Bell" boards. It will be noticed that the load steadily increases from 8 A.M. until around 10 A.M. when it is a maximum. In the afternoon there are two small peaks, one at 2 P.M. and the other at 5 P.M. From these curves many interesting facts can be derived, showing the general trend of business and the action of the public.

All information desired from the telephone department is transferred to the "Information" operators. The Information Board was at first located on the first floor, but was later installed near the main Board in the Telephone Department in order to obtain the highest efficiency in operation and speed in giving information concerning service connections, complaints regarding service, and requests of every description. In those cases where it is impossible to give the desired information within a short time, the operator secures the name, address and telephone number of the inquirer and calls him immediately after the information is obtained from some other department. This saves the inquirers time and also releases a trunk line which can be used

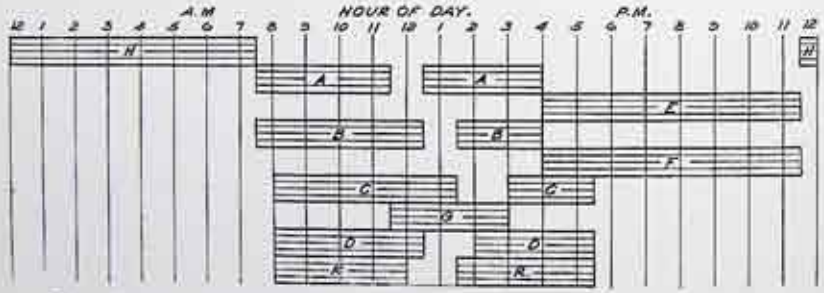

Fig. 4. Diagram showing number of operators at work during every hour of each day

for another call in the mean time—especially during the peak period. At present an average of about two hundred and fifty calls a day are sent to other departments for information. In order to please all those who seek information a complete reply is given with the utmost patience and courtesy. This may sound simple but it must be remembered that there are many unseen factors involved, as for instance in a great many cases the inquirer does not know just how to express what he wants, and it takes considerable questioning to get at the facts.

It may be of interest to know that telephone slips are made out for a large percentage of the calls on the Information Board. These slips as shown in figure 5 give all the information regarding a particular call, and are listed and filed for future reference in cases of dispute as to when a person called, and the information which was given. Where work is to be done by some other department, as for instance the Gas Shop an order is immediately sent out through the Order Department so that the work will be completed within the shortest possible time.

All telephone slips are classified and tabulated as follows:

Gas Complaints—Poor Pressure, No Gas, Leaks, Appliance, High bills, Turn-on Gas, Shut-off Gas, Set and remove Meters.

Electric Complaints—No Lights, Fuses Out, High Bills, Re-connect Meters, Disconnect Meters, Set and Remove, New Installation, Motor Trouble, Appliance Trouble.

Duplicate Bills—For Lamps, For Appliances, For Gas, For Electricity.

Commercial, Gas and Electric—Prices, Calls, Miscellaneous, Long Distance Calls.

When it is desired to know how many calls of a particular nature are received during a definite period, this information is obtained by a counting device which is merely pressed for each call. In addition to the many time saving devices used in connection with the Information Boards there has recently been installed a section of the Rand Card Index Filing System which will enable this Department to transmit information of almost any nature with


ROCHESTER RAILWAY & LIGHT CO.
GAS & ELECTRIC DEPARTMENT
TELEPHONE SLIP.
Received by ____ Time ____ M. Date ____
From ____
Address ____
Information Required ____
REPORT
Answered By Order ____ Phone ____ Mail ____
Date ____
Time ____ M. Signed ____

Fig. 5. Telephone slips which are filled out (during conversation) for a large percentage of the calls on the Information Boards

the utmost speed. It must be remembered that speed and accuracy are the watchwords at all times.

Service interruptions such as fuse blow-outs, etc., have been reduced to a minimum by having material for minor repairs constantly at hand. Extra sets of receivers are kept at all times so that changes in switchboard operators can be made without loss of time. Each operator has his or her own set which is cleansed with a disinfectant each day.

At present the entire telephone expense to this Company covering switchboards, trunk lines, private lines, operating expense, etc., is approximately $14,000 a year.

Broadway, Beware!

Walter Kelly was walking up the Strand, with an English friend, and he remarked on the darkness that enveloped that famous street after 9 p. m.

"Why," he said, "Broadway until after midnight is as bright as noonday. There is one sign alone that contains more than fifty thousand winking, blazing electric lights."

"But tell me, old chap," said the Englishman, "doesn't that make it frightfully conspicuous?"

GAS AND ELECTRIC NEWS

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The Public Library

Do you know that in Rochester's public library system there are 4 branches, 3 sub-branches, 71 stations, 453 class rooms, and 10 playgrounds, and that over 76,000 volumes are kept for the benefit of every man, woman and child in Rochester? The system is growing and it is expected to have ten or twelve of the large Branches. The ultimate plan also contemplates a magnificent central library which will be the intellectual center of the city. Are you taking advantage of the many opportunities which the library offers?

Many of us hope to have a library in our homes, but we would not make a collection as varied and enormous as that of a large public library which keeps books on history, biography, travel, literature, amusements, fiction, fine arts, science, foreign lands, and many other subjects. Many magazines and papers are available, and there are also reading and reference rooms, and children's rooms at one's disposal.

One cannot afford to, or does not care to buy all the books he would like to read or study, but it is very easy to go to the library and get the book. If one desires to read or study, the library habit is a very good one. Just try it—browse among the many books and you will soon get the fever.

Perhaps many of us stay away because we imagine there is considerable red tape attached to the getting of a library card. It is a simple procedure—just ask any of the attendants at one of the Branches and they will be delighted to take care of your request.

How many books can be taken out "on a card!" One fiction and as many non-fiction books as you like. Practically all books can be kept for a period of two weeks and can be renewed once.

Each of the branch libraries is open every day in the year including Sundays and holidays, from 2 P. M. to 9 P. M., both for reading and reference and for drawing books.

The four Branches now in operation are located as follows:

Exposition Park Branch, Building 9, Exposition Park.

Genesee Branch, 149 Cady Street. Will soon be at 705 Main St. West.

Monroe Branch, 269 Monroe Ave.

Lincoln Branch, 433 Joseph Ave.

Perhaps there is a Sub-Branch which would be more convenient.

Service

Many of us know that the Women's Club is a very active organization, but we perhaps have not been informed regarding its noble charity work. Charity has its many interesting phases, it is a problem which is broad and complex—one (whether we call it charity, service, duty or welfare) about which we should know more than we do. The needs, the sufferings, the ignorance of our fellow men should concern all of us. How true it is that we are our brother's keeper, and toward this end the Women's Club is bending some of its efforts. Although, in the past this phase of the Clubs' activities has been somewhat spasmodic, in the future it will be constantly directed toward an unfortunate mother with one arm, and a family of seven children, the oldest one being fifteen years of age. What service could be more noble?

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A State of Mind

Youth is not a time of life; it is a state of mind. It is not a matter of ripe cheeks, red lips and supple knees; it is a temper of the will, a quality of the imagination, a vigor of the emotions. It is the freshness of the deep springs of life.

Youth means a temperamental predominance of courage over timidity, of the appetite for adventure over the love of ease. This often exists in a man of fifty more than in a boy of twenty.

Nobody grows old by merely living a number of years. People grow old only by deserting their ideals.

Years wrinkle the skin, but to give up enthusiasm wrinkles the soul.

Worry, doubt, self-distrust, fear and despair—these are the long, long years that bow the heart and turn the greening spirit back to dust.

Whether sixty or sixteen, there is in every human being's heart the lure of wonder, the sweet amazement at the stars and at starlike things and thoughts, the undaunted challenge of events, the unfailing, childlike appetite for what next, and the joy of the game of living. You are as young as your faith, as old as your doubt; as young as your self-confidence, as old as your fear; as young as your hope, as old as your despair. * * *—*Inland Steel Company.*

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Corporation Employes

Why are corporation employes the most loyal workers of the world?

Because down through the long line to the new recruits in the ranks, hope is the inspiration; fear does not exist to impair efficiency; the square deal is every man's due and woven in with every day's work is the purpose ahead. Each worker knows that the company is trying to help him achieve the highest purpose for which he is fitted and that his superiors are his friends, his co-laborers are his partners and that within the organization is his present and his future.

He is encouraged to achieve—not goaded on by carping to the constant rattle of the tin can. It is a practical day-by-day living out of the Three Guardsmen slogan—"One for all; All for one."—*R. H. Ballard.*

Time-Saving Device Used in Billing Department

HOMER C. DEFFENBAUGH

UNDER the three Rate Schedule the total charge is made up of three parts, the Consumer Charge, the Demand Charge and the Kilowatt-hour Charge. The Consumer Charge is a fixed amount, depending on the class under which the consumer is supplied; and the total Kilowatt-hour Charge is obtained by multiplying the kilowatt-hours consumed by 1 cent per kilowatt-hour. The Calculation of the Demand Charge is more complicated and is done as follows: If the consumer's demand is obtained by Wright demand meters it is necessary to multiply the sum of the two ampere readings taken from the instrument by 115 volts and divide by 1000 to obtain the kilowatts demand which must be multiplied by the charge per kilowatt to obtain the total demand charge. Ordinarily, the multiplication of the ampere readings by the volts was done with a slide rule, and the remainder of the operation by hand. If a meter of the Graphometer type is used the reading is given directly in kilowatts and the only operation necessary is to multiply this figure by the charge per kilowatt.

The demand calculating machine shown in the accompanying illustration was designed in an effort to economize time in making out the Demand Charge. All the charges from .1 kilowatt up to 100 kilowatts by steps of .1 kilowatt were calculated and tabulated on one sheet. On this sheet are three columns; first AMPERES which multiplied by 115 volts will equal the second column. KILOWATTS (in red figures), and the third column is the amount in DOLLARS obtained by multiplying the kilowatts in column two by their respective charge per kilowatt.

Demand calculating machine used to save time in making out bills for customers on Three Rate Schedule

The reason for mounting this sheet on a roll is apparent when the clumsiness of a sheet twenty-inches square is considered. The table on the roll is covered also with a sheet of celluloid which will enable it to last a considerable length of time. For ease in finding a charge the table is arranged in ten main columns from .1 to 10 kilowatts in the first, 10.1 etc., up to 20 kilowatts in the second, etc. For further speed the horizontal guide shown is an aid in quickly finding a particular number. In using this device it is seen that any reading above 88.3 amperes up to and including 89.1 amperes would be 10.2 kilowatts which at the CLASS 1 rate of $3.60 per kilowatt would amount to $36.72, total. The dividing line between kilowatts is taken at the half point, (that is, 10.15 kilowatts would be considered 10.1 kilowatts and 10.16 would be considered 10.2 kilowatts) and therefore it is necessary to take the amperes corresponding to this dividing point. For example: 88.3 amperes at 115 volts actually equals 10.15 kilowatts instead of 10.1 as given on the sheet, but for billing purposes the last figure is dropped and the bill made out on the basis of 10.1 kilowatts.

Amp.	K.W.	$
88.3	10.1	36.36
89.1	10.2	36.72
90.0	10.3	37.08
90.8	10.4	37.44
91.7	10.5	37.80
92.6	10.6	38.16
93.4	10.7	38.52
94.3	10.8	38.88
95.2	10.9	39.24
96.1	11.0	39.60

Actual size of figures on calculating machine

By the old method of working out the charges by hand it was found that it took from 20 to 35 seconds per account to reduce the ampere readings to total demand charge. With the machine this can be done, in some cases almost instantly, and at the most from four or five seconds. As this Company has in the neighborhood of 2000 Three-Rate Consumers, the saving of a few seconds on each account, will in the course of a year amount to considerable time. Also, by eliminating the long-hand multiplication, the chance of error in calculation is decreased. This machine was built by Mr. French, of the Electric Meter Department, the design and calculations being made by members of the Engineering Department.

Circulating Library for Women's Club.

The most recent activity of the Women's Club is to have inaugurated a Circulating Library for the use of its members. The books constituting this library come from the Rochester Public Library, there being similar branch libraries in other large companies in the city. The Public Library has some 17,000 books in circulation through the medium of such clubs and organizations definitely attached to big companies in the city.

Miss Zachert, well known in library circles in the city, was the guest and chief speaker at the recent banquet of the Women's Club, and at that time gave a very inspirational talk in regard to the broadening of one's life through good literature. The library will be open once a week for the exchange of books, and it is felt by the officers of the club that having the library convenient in the office will make reading possible for the girls where otherwise it might not have been, and therefore it will prove of inestimable value to them in many ways. It may be decided later to allow the boys and men in the offices the privilege of using this library but that has not been definitely determined as yet.

"Now, children," said the Sunday School teacher to the juvenile class. "Can any of you tell me what an epistle is?"

"I can", answered the little fellow at the foot of the class. "An epistle is the wife of an Apostle."

Educational Talks

The Company's Educational work of the past year has been a success and will be continued. The speakers and subjects for the first six months of 1917 are:

I. Lundgaard—Electricity and Gas, Their Respective Fields; C. A. Tucker—The Finances of the Company; J. P. Haftenkamp—How Gas is Made; E. C. Scobell—Public Service Commission Regulation; L. A. Newman—Methods and Efficiency of Reading Meters; J. B. Eaton—Stores and Obsolete Material; T. H. Yawger—Departmental Co-operation; H. C. Deffenbaugh—Rates and Rate Schedules; A. S. MacDowell—Conversion of Electricity; C. G. Durfee—Construction, Installation and Tests of Electric Meters; J. P. MacSweeney—General Salesmanship; R. D. De Wolf—How Electricity is Made; C. E. Schake—Appliance Sales Demonstration; V. Hoddick—Construction and Test of Gas Meters; B. B. Yeomans—Industrial Gas Service; C. Miller—Electric Motor Service.

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Practical Economy

A very practical way of being economical was suggested to us recently by Mr. Layman, and it consists in simply "cleaning house." Almost everyone who has use for a desk gradually accumulates a stock of pencils, pads, ink wells, rubber bands and other supplies in excess of any possible need.

By going through your desk, you will probably be able to make some contribution to the stock-room, which will not only make available some supplies for other's needs, but will give yourself more desk room for your own needs. Do not keep a lot of things against a possible future need, for when that comes you can call on the stock-room to supply it. Supplies may be a great deal cheaper at that time.

Accident Prevention Inspection Work

The Accident Prevention Inspection work for the year 1917 has been reorganized considerably and it is hoped that much good will result from the change. There are eight sub-committees each consisting of either three or four men, who will inspect a different group of Company properties every three months. The Chairman of each Sub-Committee will be furnished with a standard inspection form shortly before the inspection is due, and the General Safety Committee will rely on the Sub-Committee Chairman to call his committee together, to make the inspection and submit the report on the form furnished according to schedule.

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Night Shift in Order Dept.

In order to have the records up-to-date the Order Department is experimenting with a night-shift.

At present Mr. R. Patten is the only one working nights. His duties are to look over the orders completed by the Special Men, sort these for summary sheets, make out the necessary summary sheets, code all turn on and set orders and sort all orders according to ledger numbers. This system makes it possible to have all orders entered in the records and ledgers within 24 hours after they are completed, while before this night-shift was started, there was a period of at least three days between the time of completing and entering orders.

Received in the Morning's Mail

DEAR SIR: You sond us slit That we dident pay our gas. that .42 I was pay the gas Nov. the 5th.

We wont pay the .42 becoust we pay oredy you thing we will pay two times.

Dont bodder us with those .42.

The Company's Research Laboratory

CARROL G. BROWN

IN ANY company as large as the Rochester Railway & Light Co., and especially one with so many different lines of activity, it is very natural that there are a large number of problems constantly arising, which require some special investigation and perhaps experiment, before they can be answered. Many of these problems can best be handled at a laboratory which is especially equipped to investigate unusual problems. The Research Laboratory located at the Front Street yards, has been created in this Company to handle some of these special problems. It is not as the name might indicate—a laboratory for deep research—but is rather a laboratory for the study of the many problems which are constantly arising. It has been the aim of the laboratory force to study problems from as practical a point of view as possible. While considerable theory must be used in such a variety of investigations, yet the results are checked as closely as possible with the practical working conditions.

This Laboratory has been in existence about a year and a half, and the number of employees has steadily increased from one man at the beginning, Mr. Joseph Putnam, now Assistant Professor at Cornell University, to four men at present, the latest addition to the force being a man who is spending most of his time in solving problems requiring a knowledge of chemistry. The function of the laboratory as it is being operated at the present time can perhaps be best explained by a brief mention of some of the larger items which have been studied during the last few months.

Boiler Feed Water. At Station 3 there is a large amount of water used daily in the boilers. In order to avoid forming hard scale in the boilers it is necessary to soften this water in special treating tanks. Even though this water is so softened there is considerable solid matter of such a nature that it does not easily form a hard scale, carried into the boiler. As the water in the boiler evaporates the solution is left more and more concentrated until after a few days a sample of the water from the boiler tastes very much like sea water. This concentrated water sometimes foams and thus carries solid matter into the steam pipes. This is not only troublesome, but at times causes considerable interference with the service. The laboratory was asked to make a study of conditions and find, if possible, whether the degree of concentration of the boiler water was related to the foaming in the boilers. A study was started by the laboratory and is now being handled by Mr. Davis of Station 3, while some of the details are still being watched by the laboratory.

Concrete. Considerable Portland cement is constantly being used by the Company and occasionally a carload of cement is not fully up to the Standard. Instead of sending this cement to some outside testing laboratory, or to the gas works, it is now being tested here in our own laboratory, thus putting the results of the test into available form quicker and at less expense than as though samples were sent away. Another advantage in having the testing done in the Company's laboratory is that when a sample of cement seems to be at all doubtful it is easy to have a number of tests of a different nature applied to that same sample. Thus we can tell whether the cement should be rejected entirely or whether it should merely be used with caution.

Cement is only a small part of the concrete as a whole. The rest is sand and either gravel or crushed stone.

If the ratio of sand to gravel or sand to crushed stone is not about right, a larger proportion of cement will be required to obtain a concrete of a given strength. This is not as simple a matter as might be supposed; for example, if it is stated that the ratio of sand to gravel is to be as one is to two, it would be possible to have the sand all very coarse, almost as large as gravel, and to have the gravel all very fine, say nearly as fine as sand; or it would be possible to have the sand very fine and the gravel very coarse. Either of these conditions would be absurd and would not give satisfactory results. The ideal condition is to have the sand and gravel so graded as to have a small percentage of each of the various sizes from the very fine sand up to the very coarse gravel. Tests are now being made to find whether the proportions of sand and gravel as they are now being used can wisely be altered, and thus decrease the cost of construction as well as increase the strength of the concrete.

A corner of the Laboratory, showing precision balances

Edison System. The Edison system, as it is now installed, has the neutral wire grounded at a great many points. Since the Street Railway has a network of lines through that part of the city where the Edison system is installed there is a heavy return current through the rails and ground. Some of this current however instead of returning through the rail or ground returns through the neutral of the Edison system and causes an appreciable voltage drop on the Edison neutral. As a result, the voltage is unequal across the two sides of the Edison system at many points near the outskirts of the system. The Laboratory has helped this condition a little by removing some of the Edison grounds which were doing considerable damage. A study is soon to be made of one section of the city to find out just where the current is leaking into the neutral. It is hoped that there will be a very considerable improvement in the voltage of the Edison system after this work has been finished.

Lightning Arrester Grounds. All high tension lines scattered over the city have lightning arresters at various points. The grounds for these lightning arresters have in many cases deteriorated so as to be very much poorer than they were when first installed. In testing these grounds it was found that when the ground wire was connected with the neutral of the high tension system, there was always a low resistance ground through the neutral to some other point. When this connection to the neutral was cut it frequently left a much higher resistance to ground. Other tests showed that a current was frequently flowing from the ground connection to the neutral wire. This may be accounted for by the return currents from the railway flowing through the ground to the lightning arrester ground, from there to the neutral of the high tension system, and from there (since it is direct current) through the primaries of the transformers to the phase wires of the high tension system back to the power house, and again through the high tension wires to ground, and from there to the ground of the railway system. It is to be hoped that by changing these solid grounds from the high tension neutral into very short air-gap grounds we can prevent the railway return current from flowing through these lightning arrester grounds. The reason that such current is detrimental is that it flows for weeks or months at a time and so causes a heating effect which dries out the ground of the lightning arrester. The lightning arrester is then no longer thoroughly grounded and not ready to do the protective duty for which it was installed.

Rubber Gloves. Rubber gloves which are used by the linemen and station men who work with high tension lines are liable to receive injury in a number of ways. Sometimes a sharp point on a piece of wire punctures the gloves; at other times the natural deterioration of the rubber causes them to crack easily at certain points; or, again, the gloves are sometimes kept in a box where there is pressure on the creases, thus tending to crack the gloves. At present gloves are being tested at Station 33. When purchased they are also tested by the men using them, and this test consists in rolling the gloves up from the wrist and so that the fingers are under air pressure. The laboratory is not now equipped for making high tension tests but transformers have been obtained and will soon be connected up for the purpose of making these tests at regular intervals.

Compound for Gasoline. One of the minor jobs which was given to the laboratory and required less than half a day's time was that of testing a compound which was offered for sale. The compound was to be put into the gasoline used in automobiles and was supposed to have very wonderful properties, such as giving a large increase in the mileage and preventing carbon from depositing on the walls of the cylinders. Some very simple, and perhaps crude tests of the compound showed that it was probably about 98 per cent alcohol and the other 2 per cent amyl acetate, or as it is sometimes called banana oil. It did not seem as if such a preparation would be worth the price of the alcohol, to say nothing of being worth the price (ten or twenty times as high) asked for the compound; so an investigation was made of the results obtained in the running automobile test and it was found that the reason this compound had shown such good results was that in various minor ways the tests were not fairly made.

Electrolysis. The pipe line which runs from the Blossom Road Holder to East Rochester is made of steel

pipe with welded joints, thereby making it a solid piece of steel with the exception of a few bolted joints. This made a very easy return path for any stray electrical currents which might be flowing in the ground in that general direction. In as much as this pipe is not very far from the street car line running to East

Another corner of the Company's laboratory

Rochester, a large part of the railway return current travels along the pipe. The first trouble which was noticed in this connection was the burning out of a lead gasket at one of the bolted joints. Tests made at the time showed that with the pipe open at the point where this lead gasket was, there was a difference of potential as high as thirty volts between these two parts of the steel pipe. The return current is ordinarily harmless in the steel pipe—the real trouble being the electrolysis caused by the current where it leaves the pipe to pass through the soil. This we are trying to remedy by putting a bond from the pipe to the negative bus at the sub-station at East Rochester so the current will leave through a metal bond instead of through the soil. Other bonds have been tried at East Rochester but have failed because of the very good conductivity of the soil. It is thought that the new bond will carry all of the current back to the negative bus instead of letting some of it leak off through the ground to the tracks.

Testing Paint. As an illustration of the many ways in which a chemist is of value in such a laboratory, the following may be of interest: In connection with the work on the dam at the new Station No. 5 considerable steel was bought which was painted at the factory where it was made up. The paint did not seem to be the same as specifications called for, so the laboratory was asked to analyze samples of this paint. After finding a method which would satisfactorily remove the dried oil from the paint it was comparatively simple to run an analysis to find how much iron and how much lead were in the paint.

The Laboratory is located on Front Street between Central Ave. and Andrews Street. There are two driveways into this block from Front Street. Anyone going in the southern one of these two will notice an outside stairway leading up to the second floor. The rooms now occupied by the Laboratory are at the head of this stairway, and any of the employes interested in the experimental work might find it of interest to see the work in actual progress.

(In the future we expect to print some interesting articles regarding the work done by the laboratory.)—*Editor.*

Gas and Electricity in the Home

BY THE GAS DEMONSTRATORS

Miss Frances E. Moore, Miss Mona A. Pratt and Miss Irene Walsh

Common-sense Use of "Left-Overs" in Cutting the Cost of Living

IT IS a well-known fact that the good French housewife never wastes anything. The tempting dishes that she serves, from what are popularly known as "left-overs," are not only many but they are often far more tasty than the original dish.

Numerous cook books have been written about using "left-overs," but in many cases the recipes given are so costly to use that it would be considerably more saving to throw away the "left-over" in the first place. One "left-over" recipe of this kind read in this wise:

"Do not throw away a tablespoonful of marmalade, but use it with two eggs, one-half cup of butter, a cup of sugar, two teaspoons of baking powder, etc., and make a pudding which is to be served with the following sauce—" and then there is a recipe for a sauce that calls for two more eggs, a half-cup of butter, etc.! Now with eggs at forty cents a dozen and butter at forty cents a pound, the spoonful of marmalade might better have been eaten on a slice of bread and the pudding not concocted at all. But there are, nevertheless, many ways in which "left-over" foods may be utilized to advantage by the housewife, resulting in actual savings, instead of further outlays of money for materials.

"Left-over" vegetables, such as peas, asparagus, lima beans, carrots, etc., may be mixed and put into a white sauce, which is to be poured over slices of crisp toast and served at once.

A bit of cold fried ham, an egg that was fried with it, may be chopped and, with a little onion juice, added to a cup of "left-over" mashed potatoes which have been re-heated with a little milk. These are to be well beaten and put into buttered muffin tins, and baked until nicely browned on top. The "tag-ends" of cold roasts may be heated in gravy and poured over toast. Served hot this forms a delicious meat-dish for one meal.

There is also the time-honored stew, made from "left-over" meats and vegetables. For a change, put it into a casserole, cover with strips of pastry crust which were left when the pie was baked, and bake in the oven of your gas range until the crust is done.

Or roll these bits of crust into one sheet, spread it with sugar and cinnamon, roll it like a jelly-roll, slice into one-inch pieces and bake. The "kiddies" will like them for their noonday dessert.

If there is a dish of berries, a few bananas, a little pineapple or any kind of fruit left over, do not throw it away, but make a clear cornstarch custard, add a little butter and a pinch of salt and sugar to taste. Stir the fruit into this and set it away to get cold and mold. Or make a simple rice pudding and place or pour the fruit over it.

Just a little thought and ingenuity on the housewife's part will show her many ways by which she may be the "originator of new dishes" from "left-overs." When she knows she is saving money by her efforts and, in addition, hears her family's enthusiastic praises of her culinary results, she cannot but feel well repaid for whatever time and thought she may devote to making two dishes go to the table where only one went before!

First Principles of "Left-Over" Cookery

Simple Rules for Keeping Down the Cost of Living Laid Down by New York City's Food Supply Committee

Don't re-heat left-over cooked meat for a long time at a great heat, or the meat will become tough.

If left-over cooked meats are highly seasoned, they will be much more "tasty."

Left-over beef, lamb or mutton, with any left-over vegetables added, make delicious stews.

From left-over beef, lamb, mutton and veal, you can make the best of hash, scalloped dishes, croquettes, a loaf or a salad.

Any left-over meat, vegetables and gravy may be used to make a fine meat pie.

Stuffing left from chicken or turkey may be sliced thin, browned in the gas oven and served on toast.

Use left-over fish for creamed dishes, croquettes, scalloped dishes, etc.

Vegetables are not hurt by re-heating.

Small pieces and broken slices of bread may be used for stuffing, for griddle cakes, bread omelet and puddings.—*Monthly Gas Chat.*

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MEAT AND PASTRY ROLLS

1 lb. meat
Butter
½ teaspoon salt
Seasonings.

PASTRY

4 tbls. shortening
2 cups flour
1 teaspoon baking powder
Salt
water or milk to make soft dough

Chop cooked meat fine, season well and mix with butter to hold it together. Form into rolls about the size of a finger. Make pastry, roll out thin, cut into strips and fold about the meat rolls, care being taken to keep the shape regular. Bake in a quick oven until delicate brown and serve hot with or without gravy or sauce.

COTTAGE PIE

Cover bottom of a small greased baking-dish with roast beef, chopped or cut in small pieces, (seasoned with salt, pepper and a few drops onion juice) and moistened with some of the gravy; cover with a thin layer of mashed potato, and bake in a hot oven long enough to heat through.

SCALLOPED TOMATOES AND CORN

This is a very satisfactory way of using a part of a can of either vegetable with a whole can of the other. Into a buttered baking dish put a layer of buttered bread crumbs, a layer of tomatoes, then one of crumbs and then a layer of corn. Repeat until dish is full having buttered bread crumbs on top. Place in hot oven until the whole is thoroughly heated and the crumbs are brown.

Feminine Facts and Fancies

When peeling oranges save the peelings and parboil them until clear and tender, changing the water two or three times. Preserve them in a thick rich syrup and put them away in a glass jar, adding new peelings as you have them. They can be used for ginger cake, cookies, fudge, Banbury cakes and the like. The flavor of the syrup adds to many dishes and the orange jar is a great convenience.

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Gravies or sauces thickened by pouring hot liquid of any sort on fat, or butter and flour blended over the fire, are apt to lump more quickly than sauces where cold liquid is poured in, and allowed to come gradually to boiling point with steady stirring.

❖

When you scorch peas, beans, meat or potatoes remove the kettle from the fire immediately and place in a dish of cold water. Turn the contents into another pot as soon as possible and finish cooking.

❖

When boiling eggs always add a teaspoon of salt to the water in which you boil them. This is done to prevent the egg from boiling out if it should crack.

The Marketer: "Aren't you wasting a good deal of that steak in trimming it?"
Butcher: "No, ma'am; I weighed it first."

Sales

How a Gas Burner on an Embossing Machine was Modified to do the Work Required

SAMUEL S. AMDURSKY

WHEN doing embossing work it is necessary to have the head of the embossing machine heated to a temperature of 250 deg. F., in order to soften the material to be embossed. By softening the material, less pressure is required, thereby resulting in a more uniform product. The head of an embossing machine is provided with cylindrical heating chambers opened at both ends, in which are placed the burners to supply the necessary heat. The burners supplied with the machine by the manufacturer, are called pipe burners and consist of long pipes with one or two rows of holes drilled into them. This Company experienced more or less difficulty in getting these burners to operate properly under the existing conditions, and it became necessary to modify them.

A sectional view of an embossing head, showing one chamber provided with a pipe burner, is illustrated in Figure 1 of the accompanying sketches. The gas flame with this arrangement would not heat as it should. The flame floated and smouldered due to incomplete combustion causing the head of the embossing machine to become covered with soot, besides filling the surrounding air with unburned gases which made it uncomfortable for the operator. After an investigation it was soon found that the unsatisfactory burning of the gas flame was due to an insufficient supply of air for com-

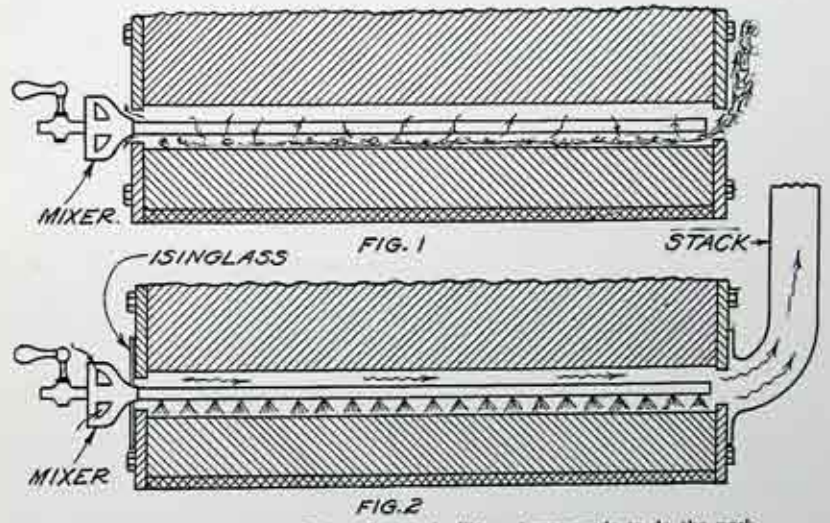


Diagram showing how inefficient burner in Figure 1 was made to do the work it was intended for

plete combustion. The air could have been applied by a fan blast, but the additional apparatus required would have embraced, besides the first cost, the cost of operation and maintenance.

A cheaper arrangement was found by supplying a draft flue at one end of the combustion chamber and sealing the opening around the pipe burner at the opposite end with isinglass, as shown in Figure II. The draft through the flue produces a partial vacuum causing the air to be drawn in through the mixer. The air is then mixed with the gas and the mixture when burned gives a hot blue flame. The isinglass prevents the air from being drawn over the flame and also enables the operator to see that the burners are lighted. The pipe burners could also have been replaced by a bunsen burner with equally good results.

With the first arrangement it took from two to three hours to heat the head to the required temperature, while with the latter arrangement it takes from 15 to 20 minutes after which only a few burners are required to retain the necessary heat.

❖

Actual construction of Rochester's Barge Canal Harbor has commenced. The M. H. Ripton Co. is at work building a concrete retaining wall on the east side of the river. Two ten-horsepower motor-driven centrifugal pumps are now being installed for pumping out the coffer dam. As the coffer dam is to be built in sections the pumps will have to be moved several times. Electrical connections can be made at any point along the river bank to a distribution system which has been installed. Electricity will also be used for lighting and to operate the machinery in the blacksmith shop.

❖

The Lineatime Manufacturing Company has occupied its new quarters at 924 St. Paul Street where the production is to exceed that of any past period. New machinery has been purchased for the purpose of carrying out the results of their experimental department and also to improve the quality of the product. Rapid adoption of efficiency methods in the large offices of the country has caused a large demand for the copy holder manufactured by the Lineatime Company. Plans and specifications were prepared by this Company, which covered the installation of motors and lighting equipment. The combined load will give a demand of about 12 KW.

❖

The heating loads of the City Fire House on Central Avenue and the Bristol & Savoy Hotels, have recently been obtained. This new business has necessitated considerable extension of the Company's steam distribution system. This particular steam main extension runs from old No. 2 Station up the river bank to the old Cotton Mill building, then across Commercial Street and over Brown's Race to the Company's Front Street buildings. The pipe then crosses Front Street, goes into the Fire House, and from there across Mill Street into the Bristol & Savoy Hotels.

❖

The Municipal Christmas Tree, located at Washington Park during Christmas Week, was more attractive than in former years. It might be of interest to know that the large star on top of the tree contained about 500 lamps while more than 1100 colored lamps were intermingled with the decorations. A circle of flood lights around the base of the tree furnished that added touch of beauty, which makes flood lighting so popular for many purposes.

❖

About one month ago this Company designed and installed a special ring burner for the T. H. Symington Company, Lincoln Park Plant, to melt the lead out of the "raceway" in order to get the defective race plates out of center car bearing castings. This burner replaced one of two coke-fired furnaces and has proved so successful that the second furnace will be replaced by a burner of the same design but of smaller size.

❖

The Ribstein-Holter Company is erecting a permanent asphalt and stone crushing plant at the corner of the Ridge Road and Hollenbeck Street, to replace its present portable plant. A large building is also being constructed and will be used for repairing that Company's contracting equipment during the winter months. All of the machinery is electrically operated.

The above up-to-date complete gas kitchen equipment was installed at the Rochester Club on October 18th. The equipment consists of three sections of Garland Hotel Ranges, 1 Rex Ray Surface Combustion Broiler, 1 Vulcan Bake Oven, 1 40-gallon Stock Kettle, 1 Vegetable Steamer, 1 Battery of Coffee Urns with urn stand and cup warmer below, 2 Plate Warmers, 1 stove used by Pastry Cook, together with gas burner apparatus under dish washing machine. The gas consumed for the past two months totaled 484,000 cu. ft., costing about $160.00 a month. The club management and chef are very much pleased with the superiority of the gas equipment over the use of coal.

The City's Skating Rink at the Eastern Widewaters is exceedingly well illuminated by means of five large flood light projectors placed on top of poles on Culver Road, thus doing away with the setting of poles in the ice, and also the stringing of overhead wires. With this system the amount of glare is considerably decreased while the cracks and rough spots can be seen more distinctly.

❖

After the old Newbury Building on Aqueduct Street has been completely remodelled it will be occupied by the Rochester Herald. Rochester Railway and Light Company steam generated at Station 26 will be used to heat the building, while the motors will be operated by this Company's electric power.

The Industrial Department is preparing a complete set of plans and specifications for the re-wiring of the Atlantic Stamping Company's factory on Ames Street. This plant has a connected motor load of 70 horsepower and a lighting load of 8 kilowatts.

❖

The Rochester Iron and Metal Company is now setting up a large metal shear and hoist at its new plant at the corner of Maple Street and Field Road. This installation, which consists of a fifteen and ten horsepower motor, will be doubled in the spring.

❖

The five horsepower motor which replaced Mr. T. J. Kelley's gasoline engine in his woodworking shop on Champlain Street has made such a good impression that an additional "ten horsepower" is now being installed.

❖

A number of motors have been installed at the Lehigh Valley Railroad's transfer yards at Manchester. The Ontario Light and Traction Company is furnishing electric power for their operation.

❖

A wood working factory has recently been opened by Parks and Ford on Wisconsin Street. The initial motor installation totals 27½ horsepower.

❖

After being shut down for a number of months, the Shortsville Wheel Company is again turning out large quantities of wooden wheels.

Reasoning It Out

"I have calculated that I can't lose much if I put my money in electric illumination."

"Why not?"

"Because there couldn't possibly be a heavy loss on a light investment."

Recent Industrial Gas Installations

The Vacuum Oil Company has displaced the oil burning equipment in its main tin shop by R. R. & L. gas. The oil company uses the gas to heat solder used to solder the thousands of tin cans which are filled with various kinds of oils.

❖

The Northeast Electric Company has purchased a cylindrical hardening furnace to be used for treating high speed steel in Barium Chloride. They have also installed twelve Johnson furnaces for heating soldering irons.

❖

The Movette Camera Corporation has installed eight pipe burners under the solution tanks in its plating department. Two enameling ovens have also been installed.

❖

Hubbard, Eldredge and Miller have installed one ten gal. coffee urn, and a hot plate to provide lunches for their employes who work overtime.

❖

The Eastman Kodak Company has purchased one section of a Garland Hotel Range to take care of the increased demand on the restaurant for its employes.

❖

Ottman Brothers have installed two sections of a Garland Hotel Range to take care of their increased restaurant business.

❖

The Lineatime Company has purchased one enameling oven for enameling the device manufactured by them.

❖

The Clark Novelty Company has installed an oven furnace and blower in its tool room.

Electric Distribution

Annual Survey of Company's Edison System

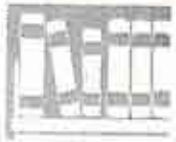
ARTHUR WAGNER

OWING to the heavy demand on the Edison system during the fall and winter season, and the necessity of being in a position to properly provide for this demand, the Distribution Department in cooperation with the Meter Department makes a systematic survey each year of all overhead and underground feeders and mains. The Edison system might be likened to a spider's web in which the heavy supports radiating from the center of the web can be compared with the feeders of the system, while the fine connecting threads designate the sub-feeders and mains, the whole being connected together in such a manner as to form a network. In order to determine if the copper is properly distributed at all feeding points, the Meter Department takes volt meter readings at numerous places throughout the system. The record of these readings is compared with the readings taken the previous year and a positive check can be made of those locations where the demand on the system is increasing or decreasing. When a contour is made this method will readily show where re-arrangement of the feeders is necessary. Poor voltage condition trouble may cover a wide area and can be caused by a single installation which demands more current than the feeder in that particular locality can supply. The surrounding network is therefore called upon to furnish the extra current for this installation causing consumers over the affected area to be deprived of a proper supply. The remedy for a condition of this nature is the installation of more copper in the form of feeders to the particular location. This does not necessarily mean that the copper must be bought to make the required change. The Company may have removed copper feeders from some location on the system where they were not required, and held them for the purpose of eliminating a condition as has been described. This is what applies to the term "re-arrangement."

The survey to January 1st has resulted in the removal of about 5,000 lbs. of copper conductors ranging from No. 6 to 1,000,000 CM capacity. A large amount has been reinstalled in locations demanding greater feeder capacity, whereas short lengths, and conductors deprived of insulation by weather and long service, are sold at the market price of scrap copper. Unbalanced conditions (that is the potential from neutral to the negative side or vice versa, reading higher than from neutral to positive on an Edison system) are usually caused by improper load distribution, but may also result from other causes, such as the current from the street railway system seeking a return to the station over the Edison system due to poor rail bonding. This condition is difficult to eliminate without a large expenditure of money because it necessitates that the neutral of the system should be insulated.

This Company operates at the present time one hundred and ten Edison feeders which range in capacity from 350,000 CM to 1,000,000 CM and supply direct current over an area covered by a mile circle from the center of the City.

Auditing



New Business

Net Increase in Consumers in First Eleven Months of 1916

	Dec. 31, 1915	Nov. 30, 1916	Increase
Gas	69,090	72,547	3,457
Electric	19,664	22,077	2,413
Steam	41	43	2
	88,795	94,667	5,872

Net Increase in Consumers in Twelve Months Ending Nov. 30, 1916

	Nov. 30, 1915	Nov. 30, 1916	Increase
Gas	68,868	72,547	3,679
Electric	19,398	22,077	2,679
Steam	41	43	2
	88,307	94,667	6,360

Statement of Consumers by Departments as of Nov. 30th.

1908	40,284	5,638	....	45,922	.....
1909	44,695	6,363	....	51,058	5,136
1910	49,985	7,598	....	57,583	6,525
1911	54,703	9,150	17	63,870	6,287
1912	59,352	11,233	23	70,608	6,738
1913	64,335	13,896	23	78,254	7,646
1914	67,671	16,026	33	83,730	5,476
1915	68,868	19,398	41	88,307	4,577
1916	72,547	22,077	43	94,667	6,360
Inc. in 8 Yrs.	32,263	16,439	43	48,745	48,745

Increase in Consumers by Months

	1914	1915	1916
Increase in January	228	364	252
Increase in February	231	144	219
Increase in March	281	247	317
Increase in April	469	460	652
Increase in May	564	306	716
Increase in June	451	544	613
Increase in July	426 Dec.	132	584
Increase in August	619	421	743
Increase in September	653	459	892
Increase in October	681	460	331
Increase in November	574	548	553
	5,177	3,821	5,872

Company's Savings Depositors

STATEMENT TO JAN. 1ST, 1917

No. of depositors Dec. 1, 1916	76
Increase during Dec. 1916	0
Amount deposited during Dec.	$643.00
Increase over Nov. deposits	5.50

Miscellaneous Data

	Nov. 30, 1915	Nov. 30, 1916	Increase
Miles of Gas Main	432	442	10
Miles of Under ground Cable	1,032	1,058	26
Miles of Overhead Line	1,694	1,804	110
Miles of Subway Duct	901	956	55
No. of Street Arc Lamps	4,250	4,009	(Dec.) 241
No. of Street Incandescent Lamps	4,212	4,949	737
Total No. of St. Lamps	8,462	8,958	496
No. of Employees	1,128	1,250	122
Amt. of Payroll (Mo.)	$85,882.29	$10,379.58	$17,916.29

Employees' Benevolent Association Statement to December 31, 1916

Receipts		
Bal. on hand 1st of month		$3,804.73
Dues—Members	$479.87	
Dues—Company	479.87	
Fees—Members	10.00	
Fees—Company	10.00	
Assessment No. 5—Mem	24.75	
Assessment No. 5—Comp	24.75	
Int. on Bk. Bals. and Inv.	48.00	1,077.24
Total		$2,727.49
Disbursements		
Sick benefits	$318.10	
Accidents off duty Benefits	30.00	
Accidents on duty Benefits	12.29	
Death Benefit No. 5	400.00	
Medical Examiner's Expense	7.50	
1000 R. R. & Lt. Co., 5% Bond, 1954 @ 101 accrued int. 5 mo. 26 da	1,009.44	1,777.33
Bal. on hand Jan. 1, 1917		950.16

Membership

Members in good standing Nov. 30, 1916	742
Affiliated during Dec.	3
Unaffiliated during Dec.	27
Loss	24
Total Membership ending Dec. 31, 1916	718

Empire State Gas and Electric Association

The Gas Manufacturing section of the Empire State Gas & Electric Association met in Schenectady on December 8. The morning session was held at the plant of the Mohawk Gas Company. Mr. H. C. Stone, formerly State Gas Inspector and author of "Practical Testing of Gas and Gas Meters" gave a short talk and a demonstration of standard methods for conducting calorimetric tests. The members were also afforded an opportunity to inspect the manufacturing plant.

Following luncheon at the Hotel Mohawk, a general meeting was held, devoted to a discussion of the heat unit standard as established by the Public Service Commission, effective on January 1, 1917, with emphasis on those phases of the question which affect the gas operator. Assistant General Manager Russell who is chairman of the Association's Calorimetry Committee, presided.

Some Recent Accidents

Mr. L. H. Fosmire slipped on a step recently and bruised his left hip.

Mr. F. J. Howes slipped on snow at the Front Street yards and fractured his left wrist.

Mr. William H. White fell on an icy sidewalk, on December 16, and fractured his left wrist.

Mr. C. B. Lerkins ran a nail into his knee while he was removing a large piece of timber from the fore bay at Station 15.

Mr. Louis Jacobs, of the Construction Department, injured his thumb when it caught between a heavy chain he was lifting, and the floor.

Mr. Wm. M. Wilkins, of the Gas Shop, had his eye injured by a particle which entered it while he was cutting a hole in a flue pipe.

Mr. Walter Gargan, of the Gas Shop, was riding a motorcycle recently when a dog ran out and bit him on the foot.

Mr. R. J. Barlow, of the Gas Shop, had his foot injured by pipe stocks which stood at side of work bench and suddenly slipped and fell on his foot.

Mr. Homer D. McGrath, of the Electric Construction Department, had his head and leg bruised by concrete which overflowed from an overhead concrete pouring trough.

Mr. Gerald Streb, of the Construction Department, was struck on the head by a plank which was standing on end resting against a large casting. The casting was moved, causing the plank to fall.

Mr. G. L. Bushnell, of the Gas Shop, was working at a pipe threading machine recently when the shifter was accidently struck, causing the machine to suddenly start. Mr. Bushnell's hand was thereby caught between a wrench and the bed plate of the machine, bruising his middle finger quite badly.

Mr. H. J. King, of the Despatch Company, was recently sawing off a large limb near the trunk of a tree. The far end of the limb was supported from above by a rope. When the cut was completed the rope broke and the far end of the limb struck Mr. King, injuring his neck, shoulders and back.

Personals

Mr. E. Gardiner, of Station 15 has been transferred to Station 6.

Mr. C. B. Lerkins has returned to work after recovering from an injured knee.

Mr. John Martin, of the Addressograph Group, spent Christmas at his home in Greece.

Mr. Norman Goldworthy, of Station 6, has resigned to accept a position with the Symington Company.

Mr. John Schwan spent his Christmas holidays with his family in Wayland, N. Y.

Miss Florence Nicholay, of the Billing Group, has been transferred to the Appliance Group.

Miss M. Moody, of the Relief Group, spent Christmas with her family in Cleveland, Ohio.

Mr. E. Hoagland, chief clerk in the Line Department, is the proud father of a 7½ pound baby boy born Dec. 12. Congratulations.

Miss Florence Hart has been employed in the Electric Meter Department to do clerical and telephone switchboard work.

Mr. C. F. Schake, of the Domestic Sales Department, spent a very merry Christmas day with brothers who are located both East and West.

Mr. Manie Freedman is Captain of the Central Basketball Team which will represent the 3rd Infantry Company G, N.Y., S.A. this year.

Mr. Raymond E. Stephany has been transferred from the Order Group to the Billing Group to operate a Burroughs Debit Posting Machine.

Mr. James Nichols, of the Credit Department, is now living in his new home on Vermont Street. The air on the sleeping porch is said to exceed that of the mountains.

Mr. W. H. Earle attended the meeting of the Empire State Gas and Electric Association in Schenectady in December, and also spent several days at the plant of the Syracuse Lighting Company.

Aren't the girls of the Women's Club of the Company setting a pretty stiff pace for the men in the way of progressive activities with their social service endeavors, Reading Club, work for the war sufferers, lectures on current topics, etc.?

Miss Leila Rogers, of the Balancing Group, met with a painful accident a short time ago when she slipped on the walk in front of Sibley's and injured her knee-cap. Miss Rogers has been confined to her home ever since.

Mr. I. Lundgaard has been appointed Chairman of the Fuel Appliance Committee, which was created as the result of an appeal made by Mr. Russell at the Chicago Convention, to give greater attention to the industrial fuel business.

Mr. Sydney Alling has been transferred from the Industrial Sales Department to the Electric Department. Beginning January 1st, 1917, he will act in the capacity of Engineer in the Electric Distribution Department under Mr. Yawger. He will carry on the work which Mr. Montignani was engaged upon, and assume such other duties as may be directed by Mr. Yawger.

Mr. Royal Parkinson, Manager of the Despatch Heat, Light and Power Company, has resigned to accept a position as Supervisor of Employment and all work relating to the personnel of the American Optical Company at Southbridge, Mass. This Company employs about 3500 men and is, with the Bausch and Lomb Company, foremost in the eye glass industry in the United States. Mr. J. O. Montignani, former Engineer of Distribution for this Company, will take the position of Manager of the Despatch Company.

Obituary

Rochester, N. Y.,
December 29th, 1916.

Mr. John Branscomb,
Summerville, N. Y.

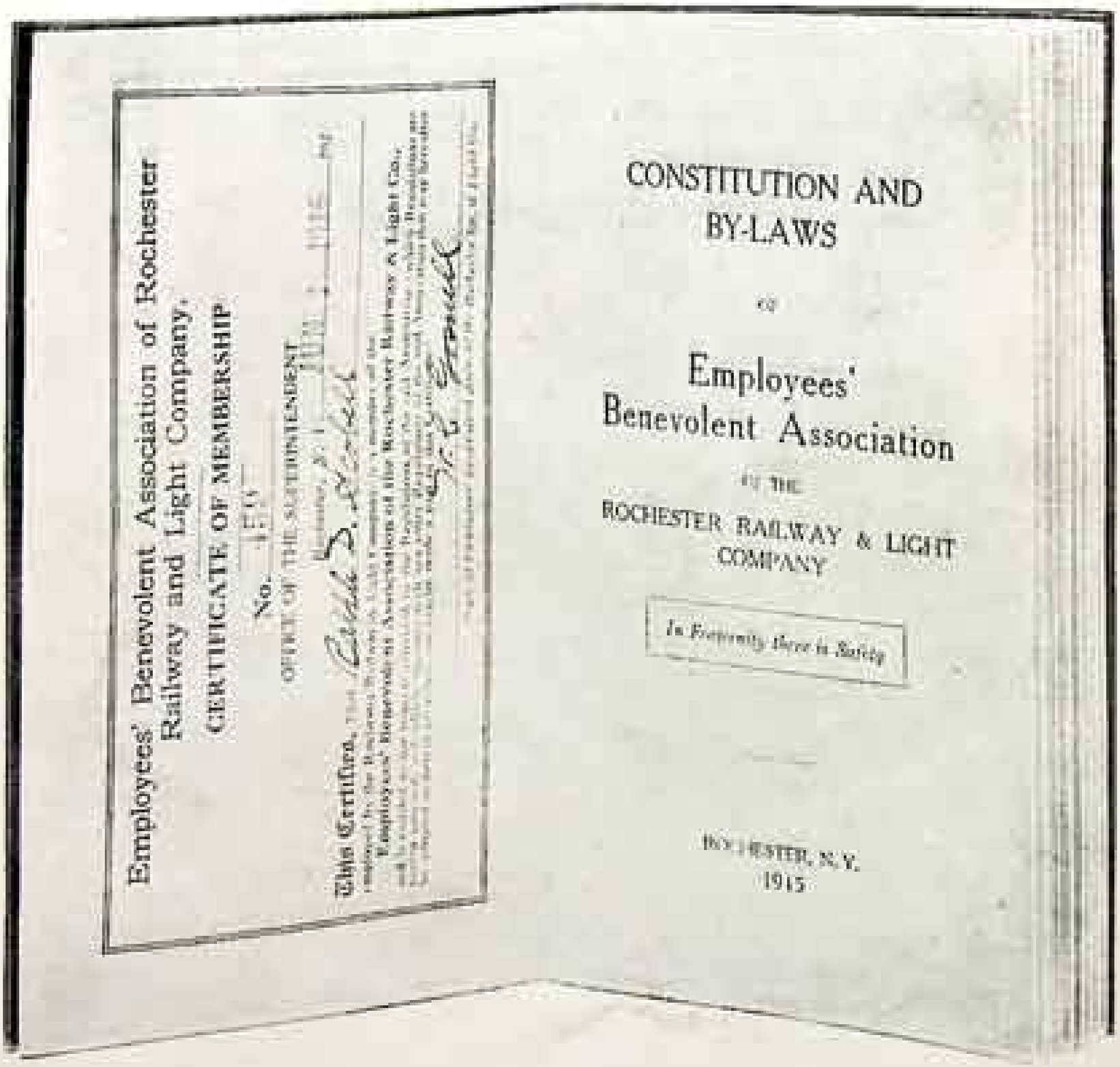
Bereaved Friend:—Your co-workers and brother workmen at the Rochester Railway and Light Co., having learned with deep regret of the loss of your devoted wife and help-mate, through the call of the Almighty, extend to you and your family, their genuine sympathy.

It is further resolved, that a copy of these resolutions shall be printed in the Gas and Electric News, the official organ of our company.

Yours in sorrow,

Committee,
G. W. Banks
Elmer C. Forest
Joseph Kinnen

DO YOU OWN ONE OF THESE?



Employees' Benevolent Association of Rochester Railway and Light Company.

CERTIFICATE OF MEMBERSHIP

No. 1511

OFFICE OF THE SUPERINTENDENT

This Certifies, that

is a member in good standing of the Employees' Benevolent Association of the Rochester Railway & Light Co.

CONSTITUTION AND BY-LAWS

OF

Employees' Benevolent Association

OF THE

ROCHESTER RAILWAY & LIGHT COMPANY

In Fraternity there is Safety

ROCHESTER, N. Y.
1915