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GAS AND ELECTRIC NEWS

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Welded High Pressure Gas Pipe Installation at East Rochester

BY WILLIAM F. SKUSE

WHENEVER a gas main, or gas transmission line is to be laid, one of the first problems is to determine the size and kind of pipe to be used. Up to the present time all the gas mains laid in Rochester have been made up of bell and spigot cast iron pipe. The problem of supplying gas to East Rochester and Pittsford involved many interesting phases.

Fig. 1. Trench at side of East Ave. road on way to East Rochester. Sign reads "This pipe will carry gas to East Rochester"

To transmit the gas at low pressure, would necessitate a pipe line 24 inches in diameter, and costing at least $3.50 a foot.

It was decided to transmit the gas to these towns under high pressure, thus making it possible to install a 6-inch pipe line at a much lower cost. The line emanates from the Blossom Road Holder, where the pressure will be about 5 pounds, and runs along Blossom Road, Clover St., Kelly Road and East Ave. From the junction of East Avenue and the Fairport Road the 6-inch pipe will be extended east on the Fairport Road to supply East Rochester, and a four-inch pipe will be extended south on Washington St., to supply Pittsford. In its entirety the pumping line will consist of about five miles of six-inch pipe and three miles of 4-inch pipe, all of welded joint construction.

All of the pipe used in this installation was made of steel because steel pipe is comparatively easy to weld. It is also possible to weld cast iron pipe but it is a more difficult process—the metal to be welded must be preheated and annealed to take care of expansion and contraction. The welding is accomplished by an oxygen-acetylene flame which develops a

Fig. 2. Welding pipe prior to dropping it into trench at East Rochester

heat of approximately 6300 degrees F. All pipe ends are chamfered to an angle of 30 degrees, and when butted together they form a V shaped opening of 60 degrees, thus insuring less welding cost both in time and filling material. Norway iron wire is fused into the molten metal as a filler to strengthen and build up the weld as shown in the accompanying cuts. Most of the pipe came in double lengths of about 40 feet, which were welded together on the bank of the trench in lengths of approximately 500 feet, according to the contour of the ground.

Before being placed in the trench each welded length of the main line was tested for "pin holes," or "sand holes" by being subjected to a 75-pound pressure of air. All services were tested at a 50-pound pressure. The pin holes could then be located by painting each weld with a rich soap mixture which would cause bubbles to be blown in case of an air leak. After the pipe was placed in the trench and the long lengths were welded together, the line was again subjected to a pressure and leakage test by allowing the air under 50-pounds pressure to remain in the line for a period of 18 to 24 hours. Accurate pressure gauges inserted in the line, helped to determine the amount of leakage. The welding was done very thoroughly and the pin holes numbered very few.

The pipe was subjected to a severe mechanical, or strength test by rolling enough of one end of a welded length of about 500 feet into the trench to pull the rest of the length in after it. The pipe went into the trench like a huge snake, and with such a tremendous snap that the one end would be thrown many feet into the air. This test, although it was somewhat crude, was severe enough to locate any mechanical defect that might have existed.

The cutting torch used to cut the pipe, is an important part of the welding equipment. With its aid, the men were able to make the necessary tees-crosses, drips and other "specials," by first cutting the pipe with the cutting torch and then welding the parts together as shown in figure 3. The gas services will have no screw joints,—welded construction will be used throughout. This is the first Company to weld its services solid from the main to a point just within the basement walls. The first operation in welding services is to weld a nipple to the main through which a hole has been tapped by a Mueller Tapping Machine. The hole tapped, varies in size from $\frac{3}{8}$-inch to $\frac{3}{4}$-inch according to size of service to be installed, the general size being $\frac{3}{8}$-inch. The service pipe is then welded onto the nipple through which a hole has been tapped thereby making an all-welded rigid connection, rather than a swing joint as ordinarily used on service connections made with threaded pipe. All services are welded from the main to the stop cock in the cellar. No outside shut-off will be installed except on services 2 inches in diameter and larger.

It will be noted that the possibilities of the welding outfit are almost unlimited. Prominent gas companies have been consulted regarding their practices and experiences with various phases of high pressure gas pipe welding, and it was found that there is some difference of opinion on certain branches of the work. This difference of opinion is due however to local climatic and soil conditions.

A Reynolds house regulator will be installed on every service in order to reduce the gas pressure before entering the meter. High pressure stop cocks tapped $\frac{3}{8}$-inch, made by the Hayes Manufacturing Company, will be used on all service risers.

The use of expansion joints on welded gas mains is considered good practice in general, but this Company will not use any on this installation. Contraction and expansion can also be taken care of by bends. This is the method that was used on this work—all pipe being laid in the trench somewhat zigzag rather than perfectly straight.

It is highly essential to have valves placed at regular intervals along a gas transmission line in order that certain sections may be segregated in case of trouble. Valves made of heavy semi-steel, manufactured by the Chapman Valve Company were placed at intervals of about 5000 feet. In order to easily indentify and properly locate the drips and valves, reinforced concrete post markers will be placed along the line of the main in a suitable location in front of each drip and valve. The posts will extend above ground 4 feet and be numbered in rotation. Those posts that mark valve locations will be painted a different

Fig. 3. Welding drip which was installed on East Rochester gas mains

Fig. 4. Trenching machine which was used for digging the trenches

color in order to distinguish them easily from the drip markers. In cases of emergency, both drips and valves can thus be readily reached.

The practice of gas pipe protection is still in the experimental stage, and there is a wide difference of opinion regarding its use. Many compositions are used for pipe covering, but in the opinion of gas companies in general the choice of any particular composition depends on the soil conditions. A rust preventing covering was not used on this line because the soil conditions did not warrant the large expenditure.

To expedite the work and reduce future trenching expense an Austin Trenching Machine and a tamping machine manufactured by the Pauling and Harnischfeger Company have been purchased. The accompanying cuts show these machines at work.

On Sunday, August 20th, the gas was in East Rochester ready for the use of over 600 anxious customers. The work of installing and connecting services is progressing as rapidly as possible, and it is expected that the work will be completed in the near future.

When the work is completed at East Rochester, there will be installed seven miles of 2-inch main pipe, one half mile of 3-inch and one mile of 4-inch pipe, together with 607-¾-inch services and 664 meters, while at Pittsford, four miles of 2-inch pipe, one third mile of 3-inch, over one half mile of 4-inch pipe, 367-¾-inch services and 381 meters will have been installed to furnish the gas required by this beautiful town.

Fig. 5. Tamping machine at work

Electricity—From Generator to Consumer

BY J. O. MONTIGNANI

IN a former article in this magazine (March issue) the writer traced the passage of electric energy from the generating station through the transmission lines to the sub-station. It is now in order, to consider the forms in which the current is distributed to meet the various classes of service.

Under balanced load conditions the neutral wire will not carry any current back to the station and there would only be a small current in the different sections flowing alternately in opposite directions, (See Fig. 4) so that the potential of the middle wire would be practically uniform.

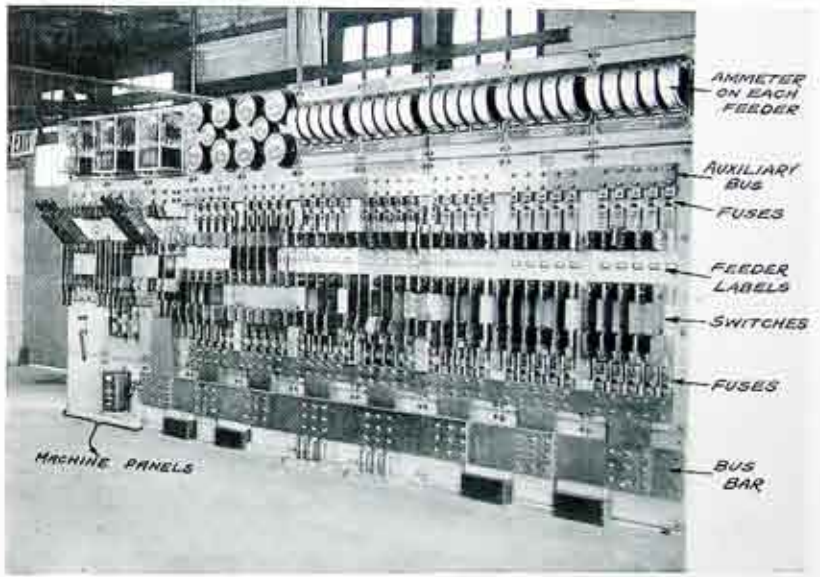

Fig. 1. "Positive" Switchboard for control of Edison feeders emanating from Station 6. "Negative" Switchboard about 12 feet to the left

Direct Current, 3-Wire (Edison) System

This system is employed in the down-town section of the city, and covers an area enclosed in approximately a three quarter mile circle. Practically, it amounts to two two-wire systems in which the positive of one system and the negative of the other are combined in a single neutral wire. The pressure from the outside wires to neutral is 115 volts, and between the outside wires it is 230 volts.

This wire then might be made of very small cross section. Owing, however, to the impossibility of maintaining perfect balance, the current corresponding to the difference of the loads on the two sides of the system will flow along the middle wire which must be made sufficiently large to prevent an excessive voltage drop. The common arrangement is to make the neutral wire one-half the cross section of the outer wires, although in Rochester the neutral wire is frequently dispensed with

and the lead sheath of underground cables is utilized as a return for the unbalanced current.

Among the advantages derived from the direct current system of distribution are: Its applicability to the operation of variable speed motors, (an important factor in many industrial processes), electro-chemical processes, storage battery charging, etc. With this system, continuity of service can be well assured by locating storage batteries at important points on the system so that in the event of failure of generating or sub-station apparatus, the batteries will carry the load until the trouble is remedied. In this connection it is important to note that the Edison system in Rochester has not suffered a complete shut-down in twenty years.

Figure 2 shows the essential features of a direct current net work arrangement which might be better understood if one remembers that the station or sub-station can be considered as a water pumping plant, and the various electric feeders, mains and services as analagous to the pipe lines emanating from the pumping plants. First, the feeders are carried from the station or sub-station to an economical point of distribution on the system of inter-connected "mains" paralleling the streets where the customers are located. Finally the service wires are run from the mains to the customers' premises.

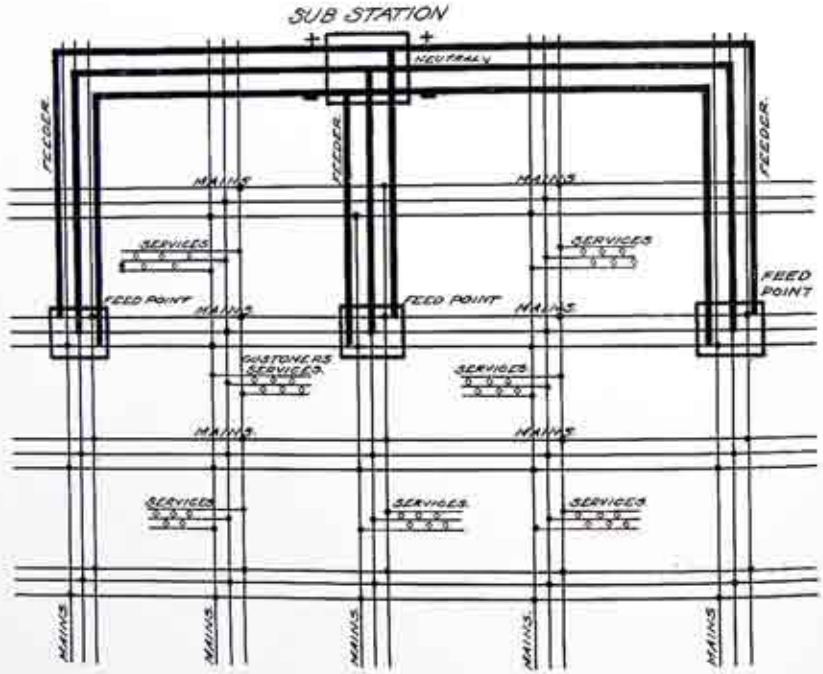

Fig. 2. Diagram showing general lay-out of sub-station, feeders, mains and customer's services on Edison systems

It is usual to have the neutral wire reduced to earth potential by connecting it to the water pipe system at the station. This reduces the risk of a person receiving a serious shock if accidental contact should be made with one of the outer wires, as only 115 volts' pressure will exist between line and ground. In general this voltage is not sufficient to send a dangerous current through the human body, and only a person having an exceptionally sensitive nervous system would suffer any discomfort from such a shock.

Fig. 3. Booster type rotary converter installed at Station 6.

For the transmission of a given amount of power, the voltage or pressure varies inversely as the current or flow. This is true because on the direct current system, watts, or power is equal to Voltage x Current, or W = V x C. If the power transmitted, W, is constant, and the voltage V, is increased or decreased, the current C will have to decrease or increase (i. e. inversely) to keep the product V x C constant. For instance, if 10 KW (10 kilowatts = 10,000 watts) of power is delivered over a simple 2-wire circuit to a certain point at a pressure of 100 volts, there will be $\frac{10000}{100} = 100$ amperes flowing in the circuit. But assuming the same amount of power at pressure of 1000 volts the current flowing would be $\frac{10000}{1000} = 10$ amperes.

It will, therefore, be seen that when low voltage is employed the cables must be large enough to carry the greater current and so, as stated before, the low voltage Edison system is confined to a comparatively small area in the downtown district, beyond which the cost of running the heavy cables would be prohibitive.

Practically all the cables in the direct current district are laid underground. For various well-defined reasons it is best to run the cable protected through "ducts." Ducts are made in various ways—pump log duct, iron pipe, fibre, stone and clay product. Most of the conduits used by this Company are made of vitrified tile, each duct of which has an inside dimension of about 3½ by 3½ inches. Square ducts are used because the cable may be pulled into them more easily on account of less friction. The number of ducts laid on any particular street depends upon the number of mains, feeders, etc., and also upon possible future extensions.

In the underground duct system (A. C. or D. C.) it is essential to construct vaults called "manholes" at all points where cable joints are made, where branch services or mains are connected, where intersections of duct lines occur, etc. They should be placed sufficiently close together—400 to 500 feet—so that the cable insulation will not be overstrained during the time the cable is drawn into the ducts. Most large companies use electric trucks for hauling the reels of cable, and also to pull the cable in or out of the ducts.

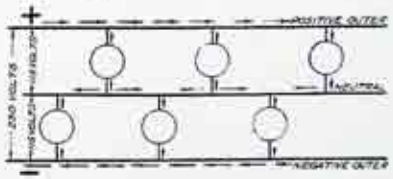

Fig. 4. Diagram showing current flow in Edison three wire system

It is readily appreciated that on large systems especially, it is very essential to have some method of identifying each cable. The method varies in different cities according to the local conditions, but the general method is to label the cables with metal tags which have symbols or figures stamped, embossed or stencilled on them. This Company also keeps record books and maps which show every cable and wire on its large and complicated electric distribution systems.

It is essential to keep the voltage on all parts of the Edison System constant at all times regardless of the power load which is being carried. Therefore from numerous points (generally where feeders connect onto the system) a small wire called a "pressure wire" is run back to the station and is connected to a voltmeter which indicates to the station operator, the voltage at the point of connection on the system. The operator is thus enabled to regulate the voltage accordingly.

Figure 1 shows the positive switchboard of the Edison feeders emanating from Station 6. The negative board which is a duplicate of the positive board except that it contains the bus voltmeters and machine control switches, is located about ten feet to the left of the board shown. The pressure wire terminals and voltmeters are located in back of the board. The auxiliary bus is used principally in the fall of the year when it is necessary to "boost" a few of the long feeders. Stations 3, 4, 6, 26, 34 and 35 operate on the Edison system.

There are about 450 miles of conductors in the Edison system, of which 300 miles are underground. The maximum demand on the system for the year 1915 was 10,605 KW which is equal to 14,220 horsepower.

(To be continued)

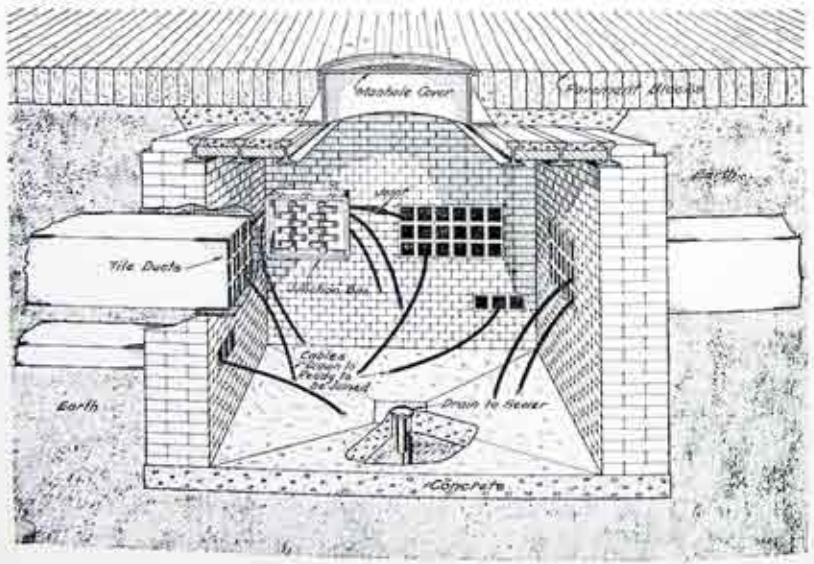

Fig. 5. Interior of manhole picturing ducts, cables, and fused "Edison" cable junction box.

Rates for Electricity

BY H. C. DEFFENBAUGH

IN THE early days when Edison had developed the bipolar dynamo for the generation of electrical energy, the chief use for this energy was in producing light by means of arc and carbon filament lamps. Meters for the measurement of the energy used had not been developed, so that the rate charged for lighting a building was either a flat rate for the building, based upon what the seller could get, or a flat rate per lamp used.

As the use and number of these lamps increased, the need of a meter for measuring the energy consumption became apparent because a flat rate per lamp would not meet all conditions; as for instance, a consumer using his lamps four hours per night would not want to be charged the same rate per lamp as his neighbor who used lamps ten hours each night. As a result of this need the electrolytic meter was developed. The electrodes of this meter were periodically weighed and the consumption of energy calculated by a laboratory method. The charge then made was based upon a flat rate per ampere hour as calculated.

The increased use of electricity for lighting, the increase in the number of customers and the development of the electric motor for industrial purposes, soon brought about the development of the kilowatt-hour meter as we now know it. For a considerable length of time the Flat Rate, or Uniform Rate as it is now called, was the basis of charge for service, the rate per kilowatt-hour depending entirely upon a system of bargaining in which the purchaser tried to get as cheap a rate as possible, and the central station tried to get as much as the traffic would bear. In time the Uniform Rate was modified by discounts for quantity, as for instance, allowing 10 per cent discount for bills of $25 to $50 per month; 15 per cent for bills of $50 to $75 per month, etc. In effect this discount was also handled by two other methods of charge, that is, by the well-known Block and Step Rates. The Block system is one in which a certain block or number of units are sold at one price per unit, the next block at a lower rate, etc., the rate applying to one block only. As an example of a Block Rate, the following may be taken: For the first 100 kilowatt-hours per month, a charge of 8c per kilowatt-hour; for the next hundred, 6c, the next hundred, 4c, etc. From this it is seen that the average rate for 100 kilowatt-hours is 8c, for 200 kilowatt-hours, 7c, for 300 kilowatt-hours, 6c, etc. The Step system is one in which a certain number of units are sold at one rate, and for an increased number of units a lower rate is given, the rate applying to all units used. As an example: On a consumption of from 1 to 99 kilowatt-hours, a charge of 8c per kilowatt-hour for each kilowatt-hour of the 99; from 99 to 199 kilowatt-hours, a charge of 7c per kilowatt-hour for each kilowatt-hour of the 199; from 199 to 299 kilowatt-hours, a charge of 6c per kilowatt-hour for each kilowatt-hour of the 299, etc.

When shown in the form of curves, these Block and Step systems appear as shown in Figs. 1, 2, 3 and 4. Figs. 1 and 3 show how the total cost increases with the increase in KW Hr. consumption; Figs. 2 and 4 show this cost reduced to a KW Hr. basis.

The Step system has the disadvantage that there are breaks in the total cost curve at which points the cost of a smaller number of kilowatt-hours is greater than a larger number

of kilowatt-hours in the next step. As this condition is contrary to good business policy these breaks are usually cut off so that within the limits of the breaks an increase in consumption does not make an increase in cost. For this reason the Block system has come into more general use than the Step system.

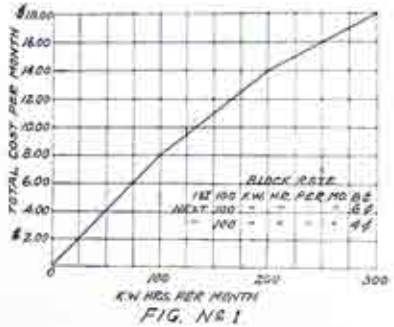

FIG. No 1.

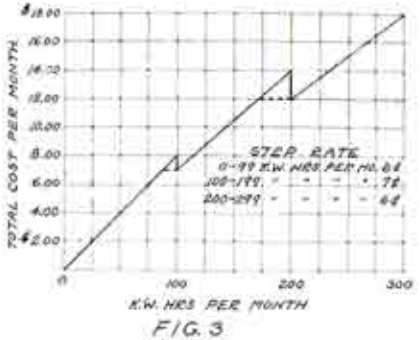

FIG. 3

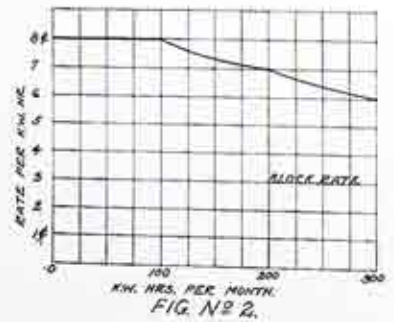

FIG. No 2.

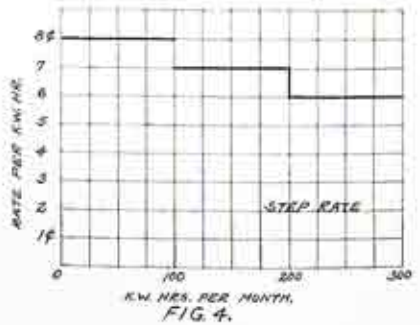

FIG. 4.

Block and Step Rate Systems reduced to curves to show their general operation.

and has been employed most generally in Public Service Commission rate cases.

Both the Step and Block systems recognize the general commercial principle that prices should be decreased as the quantity increases, but neither of these rates recognizes a factor which is of greater importance, that is, the load factor. It is evident that if each of two consumers consumes the same number of kilowatt-hours, and one consumer has a maximum load of four times that of the other, the station capacity and distribution system required to supply the consumer with the larger demand is four times as large as that required to supply the consumer with the smaller demand, and the investment expense is greater although they each pay the same amount. This means that the small consumer can never earn as low a rate as the large, poor load factor consumer. From the cost standpoint, the consumer who uses service many hours each day can be served at less expense per kilowatt-hour than the one who uses a large amount of power for a short time each day; that is, to use an example cited by Hopkinson in 1892, it costs less to serve ten lamps for ten hours than it does to serve 100 lamps for one hour. This condition has been met in two ways; in the first by a Load Factor Rate, which is known by various names, such as the Sliding Scale Rate, the Wright Demand Rate, etc.; and in the second, by a method of charge called the Two Charge or Hopkinson Rate.

The rates advocated by Wright, as well as by Hopkinson, made use not only of the kilowatt-hours used or average rate of consumption, but also of the maximum demand; that is, the maximum amount taken at any time between meter reading periods. By the use of two meters, that is, the kilowatt-hour meter and the demand meter, the average load factor could be determined and the rate based upon it. The Load Factor Rate in most general use is a Step or Block rate, depending upon average hours' use per day or month. By hours' use is meant the average number of hours per day, or per month, that the maximum load or demand would have to be used in order to account for the total number of kilowatt-hours consumed per month. An example is as follows: For the first 30 hours' use of the maximum demand per month, a charge of 8c per kilowatt-hour; for the next 30 hours' use, 6c per kilowatt-hour; for the next 30 hours' use, 4c per kilowatt-hour, etc. To determine the hours' use per month it is necessary to divide the total kilowatt-hours registered by the maximum demand registered—or by the rated load, if no meter is used—and this in turn is divided by 30 to determine the number of blocks of 30 hours each.

Example: 800 kilowatt-hours per month, 10 kilowatts demand. 30 hours' use at 10 kilowatts, equals 300 kilowatt-hours; therefore, there would be two blocks of 300 kilowatt-hours, and one of 200 kilowatt-hours. The bill would be as follows:

300 KW Hrs. @ 8c	$24.00
300 KW Hrs. @ 6c	18.00
200 KW Hrs. @ 4c	8.00
800 KW Hrs.	$50.00
Average rate per KW Hr	6.25

If, instead of having a demand of 10 kilowatts, the consumer's demand was 20 kilowatts and the consumption was the same; that is, 800 kilowatt-hours, then 30 hours' use would equal 600 kilowatt-hours, and there would be one block of 600 kilowatt-hours and one of 200. The bill would then be as follows:

600 KW Hrs. @ 8c	$48.00
200 KW Hrs. @ 6c	12.00
800 KW Hrs.	$60.00
Average rate per KW Hr	7.5c

These two examples indicate how this rate takes care of the load factor. This Load Factor Rate may be approximated quite closely by the Hopkinson or Two Charge Rate. This rate, as well as the Three Charge Rate, which will be described later, is based upon the fact that the cost of service does not vary directly as the number of kilowatt-hours produced. There are certain expenses which run on continuously whether few or many kilowatt-hours are sent out. In other words, there are fixed expenses and output expenses. In order to supply service, it is necessary to build stations, set poles and meters, run lines and send bills. The interest on this investment has to be paid whether there is any kilowatt-hour send out or not. The meter must be read and the bill made out, the cost of which is the same whether one kilowatt-hour is consumed or five thousand. On the other hand, the amount of coal burned, exclusive of standby and banking, is a function of the kilowatt-hour output. The knowledge of these facts led to the establishment of the Two Charge Rate in which there is a charge made for each kilowatt of demand, and a charge for each kilowatt-hour.

(To be continued)

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A Glimpse at Our Industry

There was a time when gas and electricity were not considered essential to our well-being, and gas and electric utilities were unknown. It took men of vision, men of determination and power to develop an industry which today has grown to be a utility—it is useful and necessary. The pioneers of the early days had every iota of responsibility thrust upon them by the public who wanted none of it. These men accepted this responsibility gracefully, they worked hard in the face of innumerable obstacles, and, as a result the industry has assumed enormous proportions.

The magnitude of the work of supplying power is indicated by the fact that according to government statistics the present aggregate capacity of over 5,200 central station power plants in the United States for electric light, power and street railway service, is about 13,000,000 horsepower, or one quarter (including railroads) of the total power used in this country. The total output for 1915 was 18,400,000,000 kilowatt hours. The monetary value of the energy output of central station service alone in 1915 is given at $360,000,000 or approximately $3.60 per capita. The 1912 report of the Census Bureau placed the nation's wealth at $187,730,071,090, and of this amount it is estimated that over 1% or $2,098,613,122 was invested in privately owned central station plants which employ over 80,000 men.

The latest government report on the gas industry shows that there were 1,285 gas plants in this country in 1914, employing about 60,000 men. These plants produced 203,730,191,000 cubic feet of gas, which sold at $175,065,930. This is an increased production of 458% for 25 years, whereas the revenue derived from the sale of the gas increased only 286%. It requires about 60,000 miles of gas mains to distribute this gas, and the investment in gas manufacturing plants and mains amounts to approximately $1,000,000,000.

These few but important figures will bear reflection!

The amount of coal mined annually in this country is increasing each year. Since 1910 the amount has been over 500,000,000 tons a year, and although it is estimated that more than 99.5 per cent of the original (3,554,383,400,000 tons) supply is still available, it is essential that we practice economy and conservation, especially when one considers that under present conditions the cost of coal is continually going up, and for every ton of coal mined and marketed, a half a ton is lost through necessary waste in mining. In 1915 the railroads used over 128,000,000 tons, (25% of production) of which 40% is loss—pure waste. A large percentage of the remaining coal is lost in the form of smoke which does millions of dollars worth of damage annually. Possibilities are ahead! Most of this coal could be used economically in large central stations and gas manufacturing plants. A time will come when all electric transmission systems in this country will be tied together, when thousands of industries, and all railway locomotives will be operated by a silent and mysterious force—electricity—generated at many points along the huge network of transmission lines. A time will come when gas and coke will replace coal in all manufacturing industries, and in the home. The smoke nuisance will be past history, our present heating and cooking burdens will be eliminated, and we will be a happier and healthier people.

There is something inspiring in the knowledge that during a hot spell, electric fans are relieving the sufferings of thousands of human beings lying on beds of illness; that millions of gas and electric appliances are lightening the burdens of housewives in America, thereby making the homes brighter, cleaner, better tempered, more healthful, and happier. It means a great deal to know that millions of homes are lighted, and that millions of workers in factories and buildings are enabled to work under safe, sanitary and healthful conditions through the use of gas and electricity.

As an added reason for pride in our work, it is indeed an honest satisfaction to know that in spite of the fact that prices in general, and the cost of living are continually going up, the cost of gas and electricity to consumers is constantly getting lower. This is a vital fact, and should not be forgotten.

We may further feel proud to know that we are affiliated with an industry which was the first to put the Golden Rule into effect as a practical business proposition. We are affiliated with an industry which set the example of service—service to our fellowmen.

But in our flight of pride, we should not forget that we must all share and be responsible for the dissatisfaction as well as the satisfaction of the community we serve. An individual's mistake or tardiness, one man's clumsiness or disregard of instructions or details, may condemn the whole service. To those we meet, we are the Company. If we knew only one lawyer and he was a crook, if we knew only one doctor and he was a quack, we would be prone to condemn both professions. And similarly, if we knew but one public utility employee we would judge the industry by him. Each one of us is responsible for the welfare of the industry we are enthusiastic about and of which we are justly proud.

11th Annual Picnic of R. R. & L. Co. Employees

Eleventh Annual Picnic a Large Success

BY UNANIMOUS OPINION

DID YOU go to the picnic? If you didn't you missed the time of your life! There was something doing every minute, the weather was ideal, everything took place without the slightest hitch, and as a stranger said, "It was the jolliest and best natured large crowd I have ever seen." Mirth and jollity reigned! There was an unlimited amount of pent up energy, part of which was used when ladies, men, girls and boys vied with each other in keen competition for the prizes offered in twenty well-chosen contests. There was a baseball contest, there was dancing in the hall, the lake was popular and a twelve piece band kept the air filled with strains of enchanting music.

Fish and Chicken Dinner

Radishes Olives
Clam Chowder
Broiled Whitefish
Served with Sliced Lemon and Cucumbers
Half a Broiled Spring Chicken
With Hashed Potatoes in Cream
Tomato and Lettuce Salad
Green Corn Apple Pie Coffee

But that was not all! About 800 hot and well served delicious fish and chicken dinners disappeared in the dining hall. There were refreshments, and when the days bombardment had ended it was found that 3,000 hot dogs, 250 dozen buns, 2400 bags of peanuts, 80 gallons of ice cream, 3300 cones and 180 gallons of orangeade, lemonade and cherry cheer had fallen into the hands of the happy picnicers.

Employees and their friends always look forward to the annual picnic as the one big day of the year; it is a time that they can all have a day of enjoyment together. No accidents of any description marred the pleasures of the recent picnic. The various Committee members worked hard, and deserve a great deal of credit for the flawless manner in which every detail was taken care of. Everyone is ready to go again!

Commissioner of Public Safety Hamilton, Mr. Geo. Cripps and wife, of the City Water Works, Capt. Herman Russ of the Sixth Precinct and Mr. R. Post, director of the City Laboratory, were some of the guests who helped make the day a success.

Sports and Prize Winners

1. 100-yd. dash for men.
   1st, Friedman; 2nd, Landschoot.
2. Nail driving contest for ladies.
   1st, Mrs. Ralph; 2nd, Mrs. Gay.
3. 50-yd. dash for girls under 12.
   1st, H. Mittley; 2nd, M. Guida.
4. 100-yd. dash for boys under 12.
   1st, J. Smith; 2nd, T. Knowles.
5. Dress-up race for ladies and gents.
   1st, Mrs. Faulstick, Mr. Faulstick; 2nd, Miss Mills, Mr. E. Unger.
6. Standing broad jump for men.
   1st, Dr. Baldwin; 2nd, Friedman.
7. Shoe race for boys and girls under 12.
   1st, J. Livock, F. Cross; 2nd, M. Brown, H. Mentle.
8. Marshmallow race for ladies.
   1st, Miss Keeleen; 2nd, Mrs. Barlow.
9. Fat men's race (200 lbs. and over).
   1st, Swasson; 2nd, McCloud.
10. Tug of war for ladies.
    Brunettes won.
11. Hop skip and jump for men.
    1st, Cook; 2nd, Guppy.
12. Potato race for boys under 12.
    1st, H. Cross; 2nd, J. Livock.
13. Potato race for girls under 12.
    1st, M. Murphy; 2nd, F. Malone.
14. Needle threading contest for ladies and gents.
    1st, Miss Aid, Chas. Hauck; 2nd, Ruth Hauck, Ed. Faulstick.
15. Spooning race for ladies.
    Miss McClellan.
16. Wheelbarrow race for men.
    1st, M. Landschoot, Chas. Maloney; 2nd, J. De John, G. Farese.
17. Tug of war, man — Gas and Electric Electrics' won.
18. Sack race for men.
    1st, De John; 2nd, Aherns.
19. Time race for ladies.
    1st, Miss Primeval; Miss Quetchenbach.
20. Largest family.
    J. Manion.

Baseball game won by City League team.

Industrial Exposition Exhibit

BY E. A. ROESER

The Company's booth at the Industrial Exposition commanded the attention of all visitors and was without doubt one of the most attractive exhibits shown. The twinkle of the lights mounted on artistic fixtures skirting the top of panel work, directed the visitors to the booth. Further investigation revealed the presence of a model of the new power development which is now under way at the Lower and Middle Falls. This model with its realistic reproductions of actual conditions induced many people to study the new construction features and also to make favorable comments on the Company's spirit as a public service corporation.

Many curious remarks were made concerning the functions of the sector and taintor gates and the surge tank was simply a mystery. How the water found its way to the purring turbines below and finally was released from captivity, caused many to wonder at the complexity of details.

Within the confines of the Company's booth, a fireproof receptacle housed the wheels of progress which carried thousands of feet of educational and entertaining films regarding the electrical industry. Every performance taxed the seating capacity of the booth to the utmost, and those who were tired before going in, came out with a pleasing smile of satisfaction which spoke volumes for the success and quality of the entertainment.

Mr. Vail, who at one time was one of Thomas A. Edison's capable engineers and who is now guiding some of the many activities of this Company, gave an illustrated lecture on "The Development of Commercial Electricity in Rochester." Some of the slides shown and their significance as explained by Mr. Vail seemed to favorably impress those who were fortunate enough to hear him. Much of the information presented was taken from Mr. Vail's personal experience in an industry which has outstripped all others in the progress of development.

Mr. Amdursky of the Industrial Sales Department gave an interesting talk on gas manufacture, which was illustrated by a series of carefully prepared slides. While the lecture progressed the model gas plant was being put into action so that at the conclusion of the illustrated talk the actual conditions which obtain in the manufacture of gas might be witnessed by those eager to become more familiar with the hidden secrets of a piece of coal. Those who showed an exceptional interest by asking questions, also wondered at the steady column of varied colored liquids which proceeded from the retort. Everything was apparently explained to the complete satisfaction of all who made inquiries.

Women's Club September Outing

The Women's Club of the Rochester Railway & Light Company held a very enjoyable "Corn-roast" on September 7th, at Station 33. Mr. Bailey and his assistants were indefatigable hosts, and proved equal to the occasion when an electric storm forced the party to seek protection among the 60,000 volt lines within the Station.

The excellent supper provided by the Demonstration Department was in no way slighted by the thirty or forty girls who were determined to show their appreciation of "hot-dogs, corn and peaches" while the thunder pealed merrily overhead. The girls now feel competent to read any of the mysterious charts carefully explained by Mr. Bailey, and the increased kilowatt consumption for the month of September can easily be accounted for by some of the Club members.

Coal and Coke Conveying System for Station B

BY J. P. HAFTENKAMP

SEVERAL hundred tons of coal and coke will have to be handled at the new gas plant each day. In order to handle this enormous amount of material it was necessary to design a system of distribution that would be both practical and economical. The accompanying two-page cut shows the culmination of the ideas gathered by Asst. General Manager Herman Russell and the writer, after an inspection trip embracing the New England States and the Middle West. With the able assistance of the manufacturers, and the assistant Engineers in the Gas Manufacturing Department, there has been developed an excellent solution to a very difficult problem.

The conveying system shown has been designed to handle 100 tons of coal, and 100 tons of coke per hour by means of large belts. These belts which have proven so successful for similar work in the middle West, seem especially adapted for handling large quantities of material. They are made of alternate layers of heavy canvas and rubber of from 2 to 8 ply —depending on the load to be carried. Over these thicknesses of canvas and rubber is moulded a rubber sleeve which is ⅛-inch thick on top and ¼-inch thick on the bottom. The belts are carried on pulleys so shaped as to hold the sides higher than the center of the belt and in the trough thus formed the material is carried until it is discharged over the end pulley, or over a specially designed tripper into a storage bin, or at its final destination.

The entire conveying apparatus embraces two systems—one for the gas coal, and the other for the resultant coke.

Gas Coal System

The gas coal will be received in 50 ton cars on the Rome, Watertown & Ogdensburg Railroad, and will be placed in that Company's State St. yards. Eight cars of coal, or 400 tons, will be required at the new plant each day. These cars will be placed over the track hopper which is being designed to hold one car of coal. While an empty car is being moved away to be replaced by a full one, a vibrating feeder in the bottom of this track hopper, will feed the lump coal onto a 36-inch wide belt running at a speed of 250 feet per minute. This coal will be carried to the top of the crusher house where it will be discharged over a screen having a 6-inch mesh. The large lumps which do not go through the screen will go through No. 1 crusher. The crushed coal and that which has passed through the screen, will unite and spill over a ¾-inch screen. The coal which does not go thru the screen will in turn go thru No. 2 crusher before uniting with the coal which has gone thru. The general idea of this crushing and sifting system is to get a uniform sized product, by bypassing the finer sized coal through the screens in order that it will not be pulverized while going through the crushers with the larger pieces of coal.

The uniform sized coal discharges from the final crusher at the bottom of the crusher house onto a 24-inch belt which in turn discharges onto a 24-inch belt in the top of the Retort House, some 85 feet above the ground level. The latter belt distributes the coal in bins having 800 tons capacity, or a 2 days' supply.

One week's supply of coal will be carried in the yard storage pile at the plant. As this coal leaves the 36-inch belt it is carried in a chute outside the crusher house, which empties into the large hopper. After the hopper fills, the coal spills to

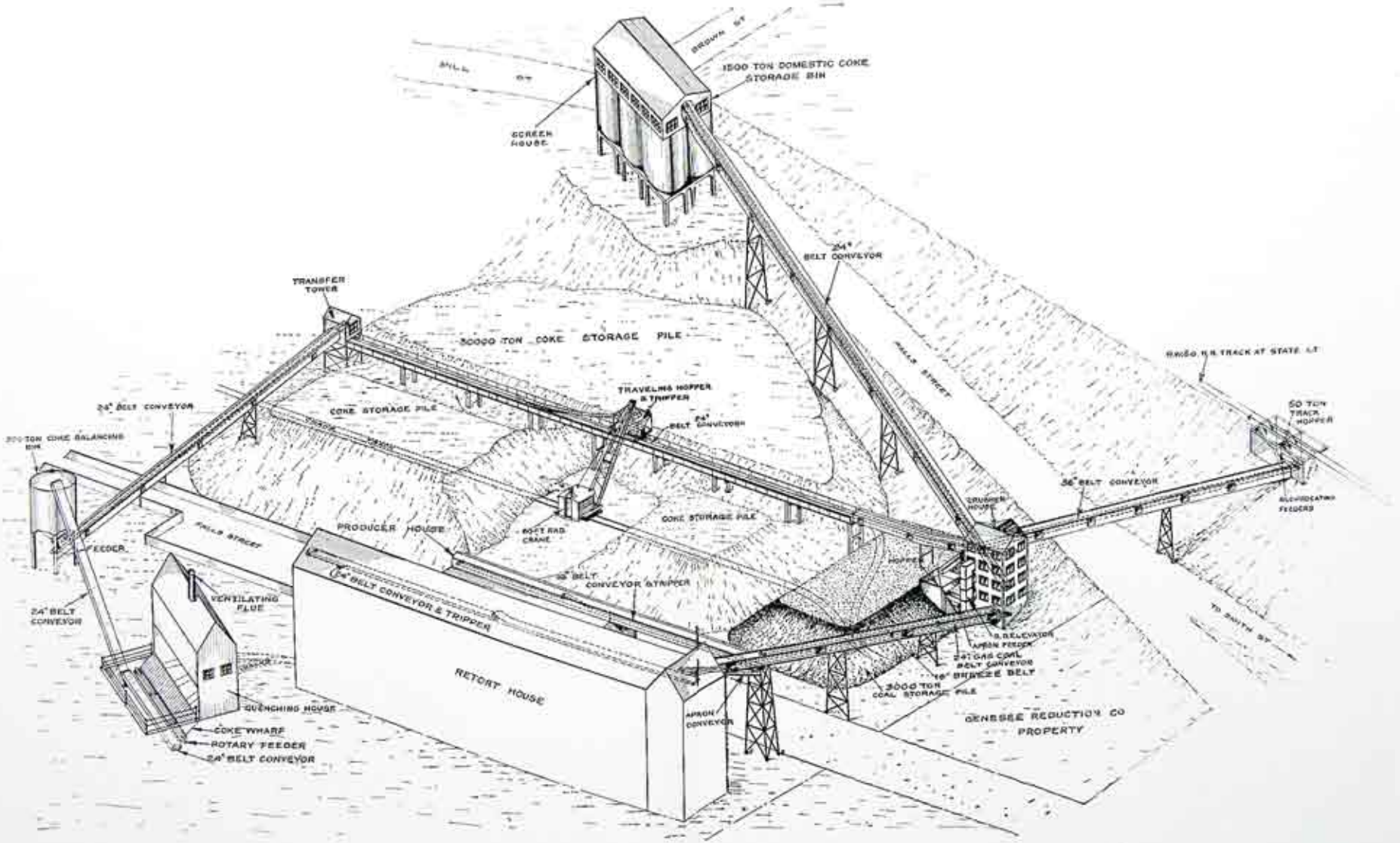


Diagram of conveying system which will be installed at Station B. This system will carry 100 tons of coal and 100 tons of coke an hour

the ground and is stocked out by the Locomotive Crane. The hopper has a bottom discharge, so that the coal may be drawn off the bottom by means of an apron feeder, after which it is lifted by a gravity discharge elevator into the mouth of the first crusher located in the top of the crusher building. In the meantime the Locomotive Crane is busy taking coal from the yard pile and dropping it into the large hopper to keep the crusher supplied.

Gas Coke System

The gas coal is fed from the top of the Retort House by gravity through the gas making process, and the resulting hot Coke emerges at the ground level. The Coke is drawn red hot into electric motor driven cars lined with heavy cast iron plates, and is propelled to the quenching house where water in a large volume and for a very short period is thrown over the coke. The coke is then discharged over a Coke Wharf or inspecting table, to eliminate the possibility of any red hot coke going out on the belts and inpairing their use. It is then fed by means of the Rotary Feeder onto a 24-inch belt and elevated either to the 300 ton Balancing Bin or sent direct by means of a system of belt conveyors to the 30,000 ton yard storage pile. The 24-inch belt which runs down the center of this pile is equipped with a special motor driven tripper or unloader, so that the coke may be discharged at any point on either side. Over the entire length of this 450 foot coke belt, on heavy bridge work, is a large steel Traveling Hopper onto which the Locomotive Crane may dump coke when reclaiming some from the yard storage pile. The Traveling Hopper is a device for feeding the coke onto the belt evenly. The belt would be ruined should the coke be dropped onto it direct from the crane shovel. The belt carries the coke to the top of the Crusher House where by means of a duplicate system of screens and crushers similar to that previously mentioned under the Gas Coal System, the real fine coke or "Breeze" for which there is no market, is separated from the domestic saleable coke. The Breeze is deposited in a small 20-ton bin at the base of the Crusher House, and is in turn fed onto a 16-inch belt which deposites the material into a storage bin located on the top of the Producer House. These bins will hold 125 tons or about a 2 days supply.

The saleable or domestic coke leaves the Crusher House by means of a 24-inch belt running parallel to Falls Street, and is fed over two 4 feet by 40 feet vibrating screens in the top of the Domestic Coke Bins. The screened or sized coke is carried to its resting pocket and is then ready for bagging, or loading direct into wagons or railroad cars.

These bins will have approximately 1500 tons capacity and will be located at the point where Mill, Brown and Falls Sts. merge. A careful study is being made of round bins of this type which are so prevalent in the large grain belt of this country, and it is believed that the general construction will be of concrete. The location of the bin has many excellent features. The most prominent feature is its proximity to the population center of Rochester which bespeaks a minimum hauling cost per ton in the distribution of Coke for fuel.

The contract for the conveying system has been let to the Robbins Conveying Belt Company of New York City.

You will never be the real big thing in your line; you will never have as much fun as you might have; you will never make the money you are entitled to; and you will always be number two, if not number twenty-three, unless you play the game fair and square.—Theodore J. Goe in Current Opinion.

Gas and Electricity in the Home

BY THE GAS DEMONSTRATORS

Mrs. Gabrielle Gay, Miss Frances E. Moore, and Miss Mona A. Pratt

Pickle Making

"Sugar and spice and all things nice."

Brine in which pickles are to be stored should be strong enough so that an egg placed in it will float. A generous pint of coarse salt to one gallon of water is the usual proportion.

Brine in which vegetables for pickling are to be kept over night should be made in the proportion of one cup of salt to one gallon of water.

Scalding pickles in vinegar in a saucepan lined with grape or cabbage leaves, the top of the pickles also being covered with the leaves, is thought to aid in retaining and perhaps intensifying the natural color of the pickles. Grape leaves are usually preferred.

A clean board, a plate holding a clean stone, or a similar weight is often necessary to keep pickles stored in an earthen jar beneath the vinegar or brine which preserves them.

Articles to be pickled lose crispness on being scalded but they will absorb vinegar more easily.

Spices and the pungent horseradish are an aid in keeping pickles in good condition, but too many spices should not be used. Green or red peppers of any variety are better than pepper corns, which often give a bitter taste to the article in which they are used.

Cloves are the strongest of the spices put in pickles and should be used less freely than mace or cinnamon. A tablespoon of cinnamon, eight or ten cloves and one inch of ginger root is a good proportion for a quart of pickles.

When white specks appear on the vinegar surrounding pickles stored in a stone jar, drain it off, scald this same vinegar or a fresh supply and pour it over the pickles. Cover when cold.

Pickles put up in a stoneware or unglazed earthen jar will keep for months, if the vinegar and spices are of good quality, but it is preferable to store them in small quantities in fruit jars which can be closed as in canning and opened as needed.

Use a wooden spoon, a porcelain or agate skimmer or ladle to take the pickles from an earthen jar; vinegar attacks metals causing dangerous compounds which are liable to be imparted to pickles handled with a metal spoon.

Sugar tends to harden fruits and vegetables and too heavy a syrup may toughen and spoil peaches, pears and melons made into sweet pickles. Often such articles must be cooked tender in water before the pickling syrup is added to them. This is the case with some varieties of peaches and is always true with melons and ripe cucumbers.

A Few Good Recipes

GREEN PEPPER MANGOES OR STUFFED PEPPERS

Score a circle around the stem of green peppers, a short distance from the stem, then, leaving a half-inch of the pepper to hold the top in place, cut in the scoring. Take out and discard the seeds and veins. Make a brine of salt and water strong enough to float an egg. Let the peppers stand twenty-four hours in this brine. Drain and fill with chopped cabbage, green tomatoes, onions and peppers, either one alone or all combined, in such proportion as is preferable. Season the chopped vegetables with mustard seed, grated horseradish, whole cloves, cinnamon bark and nasturtium seeds. Prepare the vegetables in the same manner

as in making piccalilli. Use to fill the peppers. When filled, sew the tops of the peppers in place with white thread. Pack the peppers in a stone jar, and cover with cider vinegar, scalding hot. Let stand over night; drain off the vinegar, scald, and return to the peppers. Drain off the vinegar, and scald several succeeding mornings. Then cover with fresh vinegar, made scalding hot, and set the pickles aside. A pint of sugar may be added to each gallon of vinegar. The time of preparation may be shortened by cooking the mangoes half an hour in the hot vinegar. Then drain, cover with a fresh supply and set aside.

ENGLISH MIXED MUSTARD PICKLES

1 quart whole small onions or large ones sliced.
½ peck green tomatoes, sliced.
6 green peppers, sliced.
5 whole red peppers.
100 small cucumbers or 50 large ones.
2 large cauliflowers.
1 Quart of beans.
½ cup salt.

Mix all together and let stand over night. In the morning, drain well and add whole spices tied in muslin bag. ¼ ounce each of mace and whole black peppers, ½ ounce each of cloves and celery seed, one ounce of mustard seed. Cover with vinegar and set on stove with one pound of brown sugar; when nearly boiling add one pound of ground mustard and one tablespoon of tumeric mixed smooth and thin with cold vinegar. Stir and let boil ten or fifteen minutes. When done remove spice bag and bottle pickles.

MUSTARD PICKLES

Take equal quantities of small cucumbers, green tomatoes, cauliflower and small button onions, slice and cover with strongly salted water for twenty-four hours. Then scald the brine and dissolve in it a bit of alum the size of a nutmeg. When cold, drain well and prepare as much vinegar as there was brine. To each quart of vinegar add one cup brown sugar, one-half cup flour and one-fourth tablespoon mustard. Boil sugar and vinegar, mix flour and mustard with cold water to a paste and add to boiling liquid. Cook until it thickens and pour hot over the prepared vegetables.

CHOW-CHOW

Take to one peck green tomatoes, 6 large onions, one dozen green peppers, one large cabbage. Chop the whole, sprinkle over one cup salt and let stand over night, drain off the liquor. Put on to cook with enough cider vinegar to cover, then add black pepper, cinnamon, cloves and allspice to taste. Cook until tender, then cover closely in jars.

CHILI SAUCE

12 medium sized tomatoes	2 tablespoons salt
4 onions	2 tablespoons celery seed
2 red peppers	¼ cup brown sugar
	2 cups vinegar.

Wipe and peel tomatoes and cut in one-fourth inch slices, crosswise. Put in preserving kettle and add onions peeled and chopped, peppers chopped and remaining ingredients. Bring to the boiling point and let simmer three hours.

OLIVE OIL PICKLES

100 small cucumbers or an equal quantity of large pickles.

1 pt. small onions	½ cup black mustard seed
1 cup olive oil	½ cup white mustard seed
1 quart vinegar	1 tablespoon celery seed.

Cut the cucumbers and onions in slices. Put in an earthen dish and cover with brine made of 1 cup salt and 2 quarts boiling water, let stand two hours and drain. Mix oil, vinegar and seasoning; pour all over the pickles, mix well and store in cans, sealed as in canning. These make a delicious sandwich filling.

❖

To extract juice from onion. Cut a slice from root end of onion, draw back the skin and press onion on a coarse grater working with a rotary motion.

❖

To chop parsley. Remove leaves from parsley. If parsley is wet, first dry in a towel. Gather parsley between thumb and fingers and cut with a sharp knife.

❖

Before using new broom tie strands closely together, let soak for 2 hours in pail of boiling water, then dry thoroughly.

❖

Never put cogs of a Dover egg-beater in water.

❖

Upon what did primitive man cook?—Mountain Ranges.

Sales

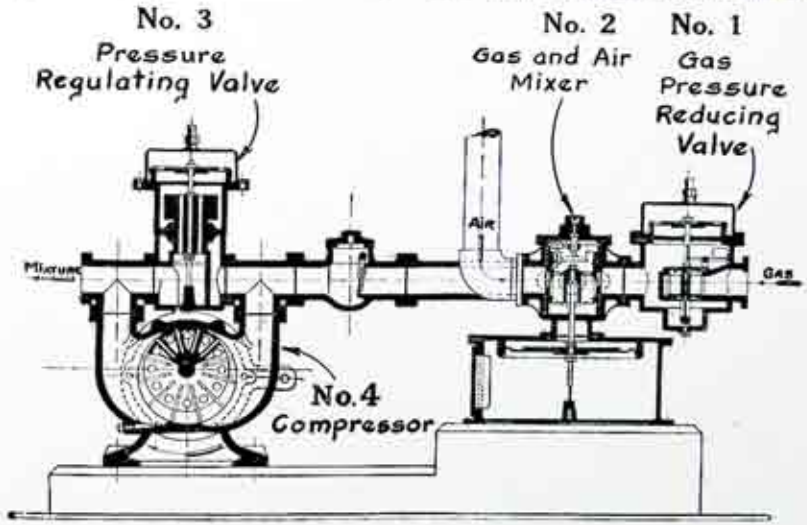
Automatic Control of Gas and Air Mixture Supplied to Industrial Machines

BY B. B. YEOMANS

THE field for the application of city gas to industrial appliances and processes, is being enlarged every day. The constantly increasing cost of gasoline for instance, has made it possible to demonstrate the superiority of city gas, both economically and otherwise, over gasoline gas although the cost of gasoline should be much lower than at present.

In many factories where industrial appliances are used it is necessary to maintain a certain temperature at the machines, and to burn the gas economically under all conditions. This means that a device should be used which will mix the gas and air in certain proportions and maintain these proportions automatically regardless of the fluctuating demands of the different machines. Such a device is necessary in laundries for instance, because laundry managers in general are opposed to any system which calls for adjustment of the burners by the operator at the machine.

The Star Palace, Cluett Peabody and Kelso Laundries have all installed an interesting apparatus manufactured for this purpose by the Selas Company of New York City. As shown in the accompanying cut the gas is taken in at the pressure reducing valve (Fig. 1) where it is reduced to atmospheric pressure. It is then drawn into the mixer (Fig. 2) which is so designed that any predetermined proportion of air



Selas Apparatus designed to automatically control gas and air mixture

and gas can be obtained. The mixture is then drawn into the compressor (Fig. 4) and compressed to any desired pressure—depending upon the class of work performed. This pressure is controlled by the pressure governor (Fig. 3).

With this system it is therefore possible to always get the same mixture at the same pressure regardless of what the operator is doing, or how many machines are being operated. Also, it is not affected by any variation in pressure which might occur in the city main. After the gas valve is once set at a certain point a constant heat will be supplied at the burners, thus assuring uniform temperatures at the various heating appliances.

The Star Palace and the Kelso Laundry use gas for heating body ironers, sleeve ironers, collar shapers, neck band ironers, and stoves for heating flat irons. The Cluett Peabody Company uses gas for collar work exclusively. These companies are all leaders in the laundry industry and their methods are always up to date. Each saving that can be effected means more improvements and larger dividends.

In the case of the Kelso Laundry, for instance, there was a saving effected of about 37%, as follows:

368 Gal. gasoline (high test), used during 35 working days at average of 25c per gallon=$92.00. Gas consumed for same period was 60,900 cu. ft., which, at even 95c per thousand,=$57.86. $92.00 — $57.86 =$34.14, or a saving of 37%, since overhead charges in both cases are about the same. At the present rate the saving in a year will amount to over three hundred dollars.

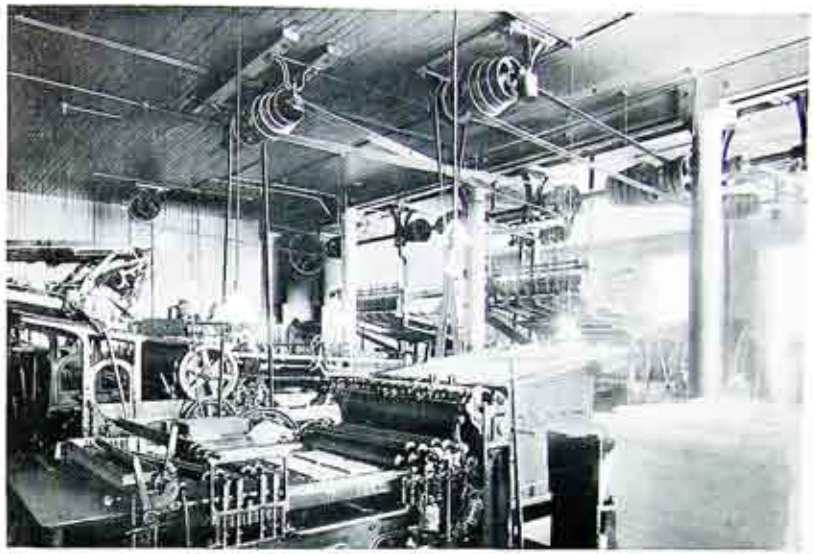
Disraeli said: "The secret of success in life is for a man to be ready for his opportunity when it comes," but I think it may be revised to read: "The secret of success in life is for a man to take advantage of what he sees and create the opportunity so he can go ahead."
—H. F. Frasse in Public Service.

Electric Operation of Printing Presses

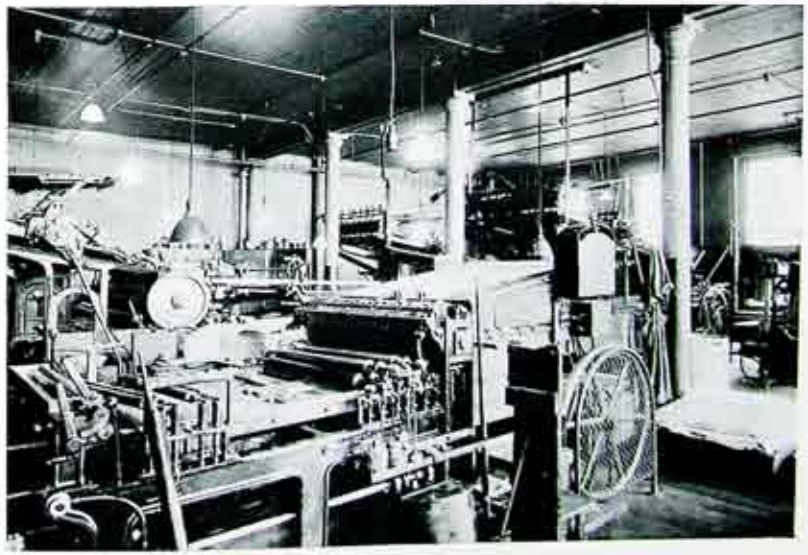
BY H. O. STEWART

THE purpose of this article is to point out some of the prominent advantages of individual electric drive in the printing industry. A glance at the accompanying cuts will immediately impress upon one, what some of these advantages are. In figure one the belting, pulleys and shafting show up conspicuously, and the various pails and cans placed under the bearings to catch the oil and dirt which drops and is thrown about the room by the pulleys and belts, thus destroying a large amount of printing work, certainly do not add to the safety nor the appearance of the room. Belt drive in this industry is dangerous unless the belts are very carefully guarded, and also it is much easier to work around the presses without these moving obstructions. Belts are also an obstruction to light, although that is not the case so much in this particular shop as in many others.

It should be noted that, with the line shaft type of drive, the operation of any one or all of the presses is entirely dependent on the operation of the engine and the main drive. In case of a break in either of these parts of the power equipment, all of the presses stop. The greatest disadvantage, however, in line shaft drive is the difficulty in speed control and the lack of devices for obtaining different speeds. Wide speed range is very desirable in printing work as each job is apt to require a definite speed in order to obtain the best quality of work, and the completion of the job in the shortest time. Certain kinds of paper and ink require very slow operation for the best printing results, while others require a much higher speed. If the press has been idle for some time and the press and ink are cold when a job is started, it is necessary to



These two pictures show a printing establishment before and after installing individual motor drive on the presses. Note the congestion on the ceiling, and also the unsafe conditions caused by the belting



Line shafting replaced by individual motors on each press. Illumination also improved

operate the press slower than when the press and ink have warmed up and everything is running smoothly.

In order to obtain the best results these speed adjustments should be very gradual, and capable of being made easily without stopping the press. It will be noticed in figure one that step pulleys were used to obtain speed control. It is not an easy undertaking to shift belts on step pulleys and consequently the press operators generally run the machine at one speed, regardless of its fitness for the particular job. One of the greatest objections to step pulleys is that steps give too great a jump in speed; each step on the pulleys shown in the picture gives a speed change of 10%.

The second illustration shows how this same printing shop looked after individual motors had been installed on the presses. The motors were placed beside and under the presses so as to be out of the way and not occupy valuable floor space. Each motor is controlled with an adjustable speed controller fastened on the side of the press and conveniently located for the press feeder. The controller operating the press in the foreground is shown to the right of the center of the photograph. This controller starts, stops by means of an electric brake, reverses the press, and supplies the means of operating the press at any desired speed. Most of these controllers change the speed in 2% steps and have 21 different speeds forward and 3 on the reverse.

Push button stations are located at various points for the purpose of turning the press over very slowly while it is being adjusted and cleaned or being made ready for a job. By simply pressing any one of these buttons the motor starts up very slowly and stops as soon as the button is released. One of these buttons can be seen in the lower left hand corner of the picture.

Each press operates entirely independent of the others and one or more presses can be run overtime at a very small expense. This type of drive saves a very large amount of power by eliminating the constant friction losses of line shafting, which go on whether all of the presses are in operation or not. It has invariably been found that individual drive on printing presses increases production. This very important factor is due to the various causes which have been enumerated and which might be summed up as follows:

Better speed control.
Easier to start and stop.
Easier to adjust press.
Each press independent of others.
No spoiled work, due to oil and dirt from overhead drive.
Safer and more flexible installation.

❖

The Rochester Ball Bearing Co., of 203 State St., has purchased and installed a gas fired oven furnace for hardening the rings of ball bearings. It is essential that their product be of uniform quality and to accomplish this the temperature of the furnace must be easily controlled. Uniform temperatures are easily maintained in gas-fired furnaces and for this kind of work gas is superior to all other fuels.

❖

Another large gasoline engine has been shut down and its load is now being carried by an electric motor. The Collamer & Chilson Company on Halstead St., up to quite recently, have been driving their woodworking machinery with a 20-horsepower gasoline engine. The 20-horsepower motor just installed is giving very satisfactory results.

❖

Mr. T. J. Kelley, a progressive building contractor of Champlain St., has replaced his 5-horsepower gasoline engine with a 5-horsepower motor to drive woodworking machinery.

Auditing

Monthly Report on New Business

Net Increase in Consumers in First Seven Months of 1916

	Dec. 31, 1915	July 31, 1916	Increase
Gas	69,090	71,098	2,008
Electric	19,664	21,009	1,345
Steam	41	43	2
	88,795	92,150	3,355

Net Increase in Consumers in Twelve Months Ending July 31st, 1916

	July 31, 1915	July 31, 1916	Increase
Gas	68,118	71,098	2,980
Electric	18,265	21,009	2,744
Steam	36	43	7
	86,419	92,150	5,731

Statement of Consumers by Departments as of July 31st

July 31st	Gas	Electric	Steam	Total	Increase each yr.
1908	38,941	5,485	....	44,426	
1909	42,345	6029	....	48,374	3,948
1910	47,767	7,061	....	54,828	6,454
1911	53,041	8,413	16	61,470	6,642
1912	57,261	10,264	19	67,544	6074
1913	62,492	13,014	22	75,506	7,962
1914	66,128	15,047	28	81,203	5,697
1915	68,118	18,265	36	86,419	5,216
1916	71,098	21,009	43	92,150	5,731
Inc. in 8 Yrs.	32,157	15,524	43	47,724	47,724

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	654
Increase in May	564	306	716
Increase in June	451	544	613
Increase in July	426	(Dec) 132	584
	2,650	1,933	3,355

Company' Savings Depositors

STATEMENT TO SEPT. 1ST, 1916

No. of depositors Aug. 1, 1916	75
Increase during Aug. 1916	2
Amount deposited Sept. 1, 1916	734.42
Increase during Aug. 1916	136.25

Miscellaneous Data

	July 31, 1915	July 31, 1916	Increase
Miles of Gas Main	428	437	9
Miles of Underground Cable	1,001	1,045	44
Miles of Overhead Line	1,677	1,792	115
Miles of Subway Duct	876	931	55
No. of Street Arc Lamps	4,347	4,137	(Dec.) 210
No. of Street Incandescent Lamps	3,799	4,622	823
Total No. of Street Lamps	8,146	8,759	613
No. of Employees	1,210	1,078	132
Amt. of Payroll (Mo.)	$97,832.14	$86,763.12	$11,069.02

Employees' Benevolent Association

Statement to August 31, 1916

Receipts		
Bal. on hand 1st of month		$4,537.63
Dues—Members	$488.79	
Dues—Company	488.79	
Fees—Members	12.00	
Fees—Company	12.00	
Assessment No. 3—Mem.	160.00	
Assessment No. 4—Mem.	25.25	
Assessment No. 3—Comp.	160.00	
Group Life Insurance	1.44	
Members' add'l life ins.	378.27	1,726.54
		$6,264.17
Disbursements		
Sick Benefits	$335.52	
Accidents off Duty Ben.	44.10	
Accidents on Duty Ben.	13.50	
Death Benefit No. 3	275.00	
Death Benefit No. 4	125.00	
Group Life Ins.	2,238.37	
Medical Examiner's Exp.	12.00	
Mem. Additional Life Ins.	250.25	
Investment—Roch. Ry. & Lt. Co.—Bond	1,007.50	
Advanced Interest	5.14	4,306.38
Cash Bal. on hand Aug. 31, 1916		$1,957.79

New Methods Outlined at Recent Convention

BY A. S. MACDOWELL

THE CONVENTION of the American Institute of Electrical Engineers held at Cleveland, June 27-30, was very interesting in every respect and many papers were presented relating to the various phases of electrical engineering.

Mr. Roper of Chicago gave a very comprehensive analysis of his Company's line troubles, with a view to showing improvements effected by the installation of lightning arresters on all transformer poles. The paper covered data secured from an observation of conditions since 1912, and his conclusions in general indicated that while there could be no general recommendations for absolute protection from lightning, due to the different characteristics of lightning strokes, great improvements could be effected by removing transformer terminal blocks and installing arresters on each pole having a transformer over 3 KW capacity and all power transformer poles. He showed a 40% decrease in trouble after removing terminal boards, and 50% when each transformer was protected by an individual arrester. Further conclusions were:

First—that low frequency strokes of moderate volume can usually be taken care of by arresters placed at intervals to protect several transformers each, but that high frequency strokes require individual transformers.

Second — grounding transformer cases has little effect on efficiency of lightning protection, and in fact, more troubles are experienced, principally the burning of transformer leads near terminal bushings.

Third—the installation of arresters on transformer poles is not warranted by any saving in cost, but is only justified by improving the quality of service.

Two very excellent papers were presented by Mr. Ricketts of the Baltimore Company on "Restoring Services after Necessary Interruptions" and by Messrs. Pollock and Lawson on "Recent Developments of Station Protective Apparatus."

Mr. Ricketts outlined a method for automatically cutting a faulty generator free from the system by means of a balanced relay operating on the secondaries of two series transformers on each side of each generator phase winding. Any internal generator trouble disturbs this balance and operates a relay which trips the main oil switch and generator field switch. The two new 12,500 KW water wheel generators for Station No. 5 and the 10,000 KW steam turbo-generator unit for Station No. 3 will be equipped with this device, instead of the present reverse energy relays, because one set of series transformers may be installed at the board and the 3-phase cable between generator and board may be considered as part of the generator winding.

Another method was shown, for tripping the field switches on all generators in case of a fault on the outside system, and cutting them back in again after a short interval.

A third scheme was shown for distributing feeders whereby a feeder is automatically cut out three times before the switch remains out. This is effected by means of a balanced potential relay operating on potential transformers on the bus and line side of the feeder oil switch. A ground or short circuit on the line trips the oil switch through the overload relays; one potential transformer is de-energized and the closing relay, which is operated by the remaining potential transformer, throws the switch back in. If the short circuit, or ground, still holds, the overload relays again trip and the operation is repeated. After kicking out the third time, the closing relay ceases to operate and the line trouble must be investigated. Mr. Ricketts claims that 80% of their line troubles have been eliminated by this device, but it seems to be open to some objection. The reason is that low voltage releases cannot be used on motors, and motor circuits must be fused for 400% normal, thereby tending to increase motor troubles, although the line troubles are reduced. This relay system will shortly be tried on one of the feeders of this Company.

The paper by Messrs. Pollock and Sawson, was a description of the various devices used to obviate their Company's troubles and the aim was to secure better continuity of service, rather than to protect apparatus. Among the devices mentioned were:

1. The arcing ground suppressor which consists of 3 single pole oil switch elements interlocked electrically and mechanically, and operated from a 3-phase potential relay to ground any phase bus at the station, on which an arc might occur outside, thus extinguishing the arc. The suppressor operates within a third of a seconds' time and the Public Service Corporation claims that six lives have been saved during the last year by the operation of the suppressor, when linemen came in contact with a live wire.

2. Faulty cable localizer operated from relay in ground wire of feeder current transformer to indicate line in trouble.

3. Reactances are installed in bus tie circuits, tie line circuits between stations and outgoing feeder circuits. The system seems to be "over-reactanced," as much cable trouble has been experienced from a combination of the inductance of the various reactors and the distributed capacitance of the cables. This matter is now receiving close study and should result in valuable information for all central stations.

4. Balanced selective relays are installed on parallel tie feeders which have operated on every case of trouble over fifty times.

5. A multi-recorder is installed to indicate the time of all switch kick-outs etc., in order that an accurate analysis of troubles may be made.

6. A coherer is used to indicate lightning arrester discharges which are registered on the recorder by means of a relay.

7. A curve drawing insulation resistance recorder is installed to measure the strength of cable insulation, insulators, etc.

8. Resistance bulbs on generators have been discarded for thermo couples.

The Cleveland Company showed the delegates every hospitality, and a party visited the sub-station in the Office Bldg., where are installed two 1000 KW 60-cycle Edison rotaries. An interesting feature is the 3-phase reactance coils which are installed in tie lines between stations.

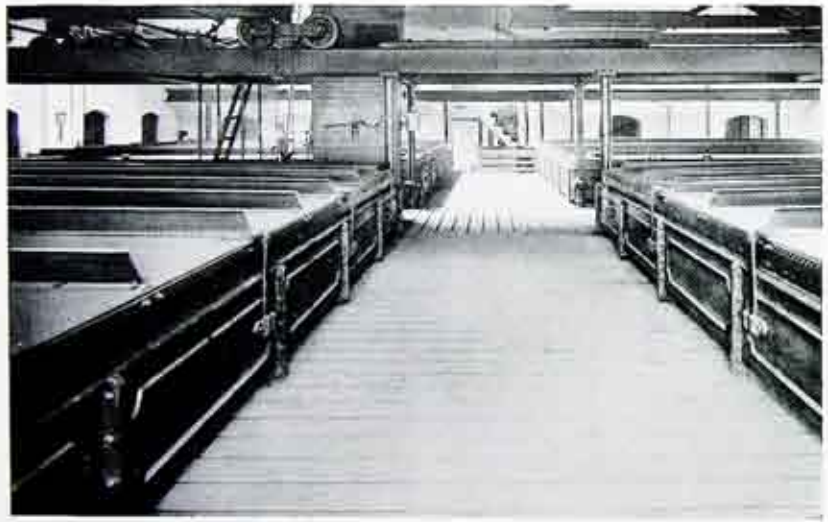
The Cincinnati Company has experienced considerable cable trouble due to the increased voltage of the magnetite rectified circuits over the old 7½ amp. circuits, and have installed electrolytic arresters to overcome this trouble, as was the case with this Company. They have been getting an average of 7000 hours on rectifier tubes and have succeeded in prolonging the life of tubes, which have become defective, by baking them a half-hour at 400° F. This throws down the mercury adhering to inside of tube. Defective tubes treated in this manner, often give a thousand hours additional service and this method of prolonging tube life is now being tried out by the Company here.

Gas Manufacture

An Interesting Purifying Box Problem at the Gas Works

BY WM. H. EARLE

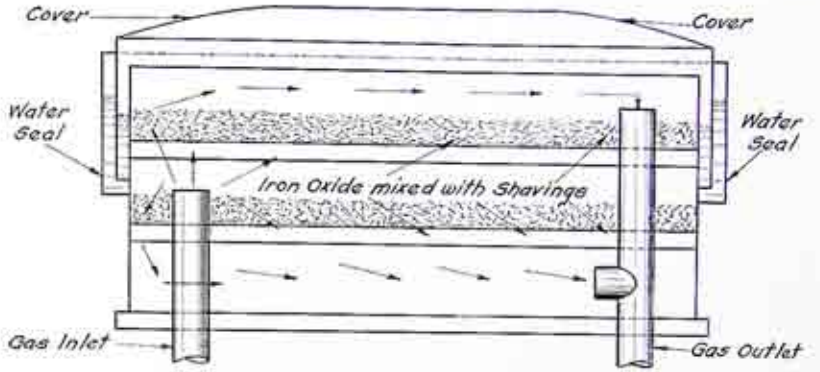
THE quantity of gas which a water gas exhauster can pump—up to the designed limits of its capacity—is chiefly dependent upon the back pressure, or the resistance to the passage of gas offered by the purifiers. The amount of this back pressure at which



Iron Purifying Boxes at Gas Works. From left to right, Nos. 2, 3, 4 and C.

the purifiers may be operated is in turn limited by the depth of the water seal on the purifiers constructed of iron as shown in the accompanying sketch. The pressure of the gas in the purifying box should not be greater than the pressure exerted by the water seal, because if this were not the case the gas would leak out through the seal. Twenty-seven inches of water (height) is equal to one pound pressure. Since there are 16 ounces in a pound, one inch of water is equivalent to a pressure of about 0.577 ounces.

On May 26th, the Foreman at the Gas Works reported that he was having difficulty in getting the requisite amount of gas through the boxes without creating a pressure in the boxes greater than that of the water seal. At that time the water gas boxes were running in the following series 5-6, 7-8, 2, 3, 4; 5 and 6 being in parallel, and 7 and 8 being in parallel. A series of pressure measurements throughout the system disclosed the fact that the maximum back pressure exerted by any one unit was that in Box 2. A series of determinations of the hydrogen sulphide content of the gas further indicated that boxes 5 and 6, and box 2 were doing practically no work. So it was decided to renew the material in 5 and 6, and to empty box 2 and by-pass it, using a four unit series instead of five. This was done, and on June 16th a second set of pressure observations was made under practically identical conditions. These readings proved that the exhauster would pump the same amount of gas as in the first test with an initial pressure 6.4" lower than before. Consequently there was an additional working limit equivalent to the 6.4" pressure which could be utilized for pumping still greater quantities of gas. Whereas in the first case 190,000 cubic feet per hour was the maximum working capacity of the pump, the new conditions made it possible to pump 250,000 cubic feet per hour and still have a safe pressure margin. This means an economy equivalent to the cost of changing two or perhaps three purifiers at a cost of $150 each, which would otherwise have been necessary in order to produce the same decrease in back pressure. It also means a better working out of the purifying material. The following brief tabulation shows the results of the pressure observations:



General cross section of purifying box showing how gas is brought into intimate contact with iron oxide—the purifying material

Pressure Differential in Inches of Water

	May 26	June 16
Loss through conc. purifiers	2.7	2.4
Loss through iron purifiers	11.6	5.6
Loss in center seal	4.8	2.3
Loss in box 2	3.4	by-passed
Loss in box 3	2.2	2.0
Loss in box 4	1.2	1.3
Pumping, cu. ft. per hour	190,000	190,000
Temp. at outlet exhauster	114	114
Holder	in full cup	in full cup

Additional precaution was taken to insert blank discs between flanged pipe connections on the inlet and outlet lines of Box 2, to prevent any gas from getting into the house from possible leaking valves of the center seal.

From right to left, purifying boxes Nos. 5, 6, 7 and 8

Athletics

Standings of the Clubs Sept. 11th.

	Won	Lost	P.C.
Nationals	10	3	.769
Kodak Park	10	3	.769
R. R. and L.	8	5	.615
Eagles	6	7	.444
Maltops	5	8	.384
Independents	0	13	.000

The Baseball Team

Although the boys have lost two of the last four games, the Railway and Light Team is considered one of the best teams in the City League. The team is largely made up of youngsters in baseball, who lack the experience of many of the men on the other teams, and this being the first year they have taken the opportunity to get into fast baseball, it can certainly be said that they are hitting the mark of success. Another year will show results that will be convincing.

The team as made up at present consists of Guppy, catcher; Connell, pitcher; Friedman, first base; Durbin, second base; Brown, shortstop; Groh, third base; Flynn, centerfield; Habel, leftfield and Webber rightfield.

Guppy is considered one of the fastest catchers in the league.

Iron Man Connell established a new City League record recently by striking out 14 men.

Friedman is considered a fast man at first and may break up the league on short notice.

This is the first year for Durbin in semi-pro baseball and he looks like a sure winner.

Brown, who gathers 'em in at "short" has captained the Cathedral High School team, and was one of the fastest men in the Catholic League.

Groh has had several years' league experience, and his trusty bat has broken up many games.

Habel who is hitting around the 400 mark, is without doubt the fastest outfielder in the City League.

Webber is playing both a good fielding and hitting game.

Flynn is an old Premier star, who adds strength to the ranks of the Railway and Light team.

There are three games on the remaining schedule, and should we be fortunate enough to win all three, while the leaders drop a few games, the pennant will come this way. The high grade of baseball that is being played in the City League deserves the loyal support of the boosters behind each of the teams. Have you been out to see them play?

❖

Tennis

The Bausch and Lomb Company's new Athletic Field on Conkey Ave., was opened about the end of August. Since that time the B. & L. tennis team has been successful in defeating both the Kodak and German American Button teams. On September 9th they will match their ability against that of this Company's team which will be composed of W. R. Yorkey, A. J. Wagner, George Bailey, Withred Cook, W. H. Kiefer and Don Crawford.

A traveler who believed himself to be the sole survivor of a shipwreck upon a cannibal isle, hid for three days in terror of his life. Driven out by hunger, he discovered a thin wisp of smoke rising from a clump of bushes inland, and crawled cautiously to study the type of savages about it.

Just as he reached the clump he heard a voice say: "Why in Hell did you play that card?"

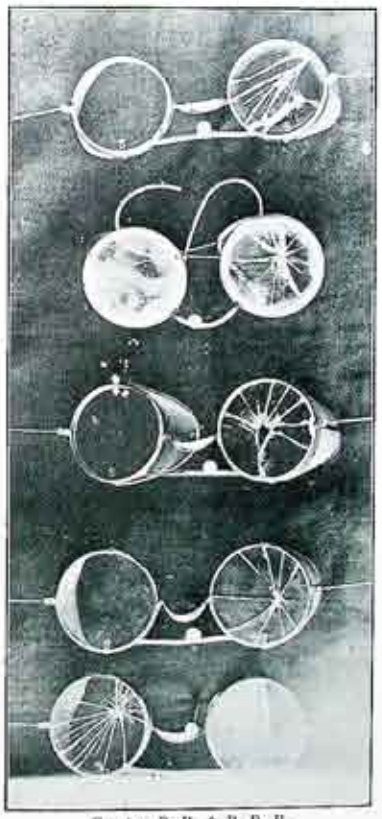
He dropped to his knees and, devoutly raising his hands, cried:

"Thank God, they are Christians!"

Silent Testimony to the Worth of Goggles

Each of the broken goggles shown in the accompanying cut represents a painful accident *prevented*—perhaps the avoidance of permanent loss of eyesight.

Authorities on "Safety First" work lay great stress on wearing goggles. Not only when grinding, chipping and calking is being done, should goggles be worn, but in every employment where a sharp blow of the hammer



Courtesy B. R. & P. R. R.

is required; not only a hand hammer, but tools electrically and pneumatically driven.

Just recently a case came to our attention in which an employee lost one eye. He had removed his goggles for a few minutes, and at the moment when they should have proved of infinite value to him, they were in his pocket.

Don't neglect to wear these goggles. Take no chances. Injury to your eyes means suffering and loss of time. It means loss of your services to the Company, interferes with the organization and that concerns all employees as well as the Company.

And speaking of eye injuries. Not long ago one of our Engineers got a cinder in his eye. Several fellow employees attempted to remove it by various means. As a result, the Company occulist advises that while the injury caused by the cinder was not serious, the infection from the fingers and implements used by the well-meaning "first aiders," may cause loss of the eye. When you get a foreign substance in your eye *Don't* let Tom, Dick and Harry experiment in removing it. Go to some one who knows how.—B. R. & P. Railway Magazine.

Personals

Mr. Harold Hoagland and family are spending the summer at the Lake.

Miss Alice Baker has returned after a week's vacation in Canada.

Mrs. Gabriel Gay of the Domestic Sales Department is spending her vacation at Summerville.

Miss Mae Hoffner left for a two weeks' sojourn on August 28th. As yet we do not know her whereabouts.

Mr. H. J. Culliton is the proud father of a six pound baby girl. Congratulations!

Mrs. Edith MacDonell, of the Meter Reading Department, has been vacationing at Alexandria Bay.

Mrs. Mary Clum, of the Order Department, spent her vacation at Sodus, N. Y.

Mr. Fred S. Redden has returned from a vacation trip to Perry and Mt. Morris.

Miss Frances Moore has returned from Columbia, and she is brimful of news about little old New York.

Miss Ethel Patrick spent her vacation at Beckers Camp, Fourth Lake, in the Adirondacks.

Assistant Foreman Henry Heckman is spending a month with his parents in Lincoln, Nebraska.

Mr. Louis Isbitz has resigned to take a post-graduate course at Columbia University, New York City.

Mr. and Mrs. Wm. H. White are spending their vacation at Atlantic City.

Mr. Arthur Kelley recently attended the Grand Lodge of Odd Fellows in Buffalo.

Mr. John Cox of the Line Department has returned from a week's fishing trip in Canada.

Miss Marie Brown, of the Entry Order Group, is spending her vacation at Boston, Mass.

Mr. and Mrs. Frank C. Taylor are spending their "honeymoon" trip at Tupper Lake in the Adirondacks.

We are glad to report that Mr. William Hill has been promoted to 3rd Trick Operator at Station 6.

Mr. Wilmot E. Hall, of the Engineering Department, spent his vacation at Lockport and Olcott Beach.

Mr. J. Pollice of Station 6, was absent for a period of two weeks. Yes, his vacation was a good one.

Mr. Maurice O'Connell of Station 34, was absent from the Station for two weeks—vacation.

Mr. D. H. Rodgers, representative of the Domestic Sales Department, left August 26th for a week's visit in Buffalo.

Mr. Jacob Greiner, switchboard operator at Station 3, reports a very enjoyable fourteen day vacation at Sea Breeze.

Mr. J. P. O'Neil of Station 3 believes in having a good time around Rochester during the vacation days.

Mr. George Dady, of the Gas Shop, and wife are the proud parents of an 8 pound boy. Thomas Henry arrived August 5th.

Mr. and Mrs. C. O. Morehouse have returned from Fenton, Michigan, where they spent two weeks enjoying the country life on their farm.

Mr. James Fassanella of the Domestic Sales Department has returned after a pleasant vacation in and around Rochester.

Mr. George Myers, outside electric iron repair man, has been transferred to the Lamp Sales Counter, Domestic Sales Department.

Mr. Irving Milow, formerly of the Lamp Sales Counter in the Domestic Sales Department, has been transferred to the Collection Department.

Miss Alice Baker has returned from Presquile, Canada, where she enjoyed herself immensely for at least two weeks.

Miss Adelaide Rice spent a very happy vacation at Boston, Mass., where she had many interesting experiences.

Mr. Harold Nichols of the Domestic Sales Department left August 26th to spend his vacation cruising on Lake Ontario.

Mr. F. J. Howes, Head of the Engineering Dept. and wife, are enjoying their vacation days at the Thousand Islands and vicinity.

Miss Charlotte Atkinson has returned from a very pleasant two weeks' visit with her family and friends at Asheville, North Carolina.

Mr. R. E. Kruger, a graduate of the University of Rochester in 1916, has been engaged as chemist in the Gas Manufacturing Dept.

Mr. Robert Mullen, Assistant Clerk in Stockroom of Domestic Sales Department, has been transferred to outside electric iron repairs.

Cleveland has many attractions that lure Mr. James Coyle of Station 4, when he has two weeks to devote to vacationing.

Miss Margaret Belknap, of the Auditing Department, returned from an enjoyable vacation spent on the Great Lakes.

Mr. William Weaver, formerly of the Order Group, has been transferred to the Accounting Department to take the place of Mr. M. Owen.

Mr. P. Connellan is wearing a broad smile these days—a smiling baby girl arrived at his home on August 18th.

Mr. Herbert Appel has been engaged as assistant to Mr. Rhodes in the stock room of the Domestic Sales Department.

The office of Mr. Thomas Nash—Foreman of the Transportation Department, has been transferred from the Gas Street Department to the Garage.

Mr. Adrian Mahon, Timekeeper, spent most of his recent 14 idle days, submerged in the waters of Lake Ontario. Did anyone say that it wasn't warm this summer?

Mr. Ed. Crane of the Gas Street Department says that Sandusky, Ohio, welcomed him with the hottest weather he has experienced in some time.

Mr. Frank Herring, formerly Mr. Nash's assistant, has been promoted to the office of Chief Clerk in the Gas Street Department. Keep up the good work.

Miss Minna Stroh formerly of the Mailing Dept., has been transferred to the Telephone Dept., where she will take the place of Miss May Whyley who is to be married.

Captain Ivan Lundgaard and First Mate, E. G. Scobell, on the good ship Island Queen

A wee drop o' Scotch. Mr. Scobell and Mr. Montignani, at Thousand Islands

Superintendent Thomas H. Yawger, Mr. Durfee and Mr. I. Lundgaard are attending the Convention of the Association of Edison Illuminating Companies at Hot Springs, Va.

Miss Lennon of the Stenographic Department, and her mother recently visited many friends and relatives at Saginaw, Michigan, and vicinity.

Vice-President Granger A. Hollister and family, motored to Mt. Rose, Pa., and from there they expect to extend their trip through the White Mountains.

Mr. and Mrs. Frank C. French (Electric Meter Department) of 41 Otis Street are rejoicing over the arrival of a 10-pound boy, on August 19th.

Fighting sharks is great sport. Mr. Herbert Eaton of Station 4, gained 25 pounds recently while indulging in this pastime at Revere Beach and Boston.

Mr. Sol. Isbitz and Mr. Raymond Murphy of the Addressograph Group have both resigned to continue their studies at East and West High School respectively.

Mr. D. Bruce is enjoying his happy vacation days. Upon his return Mr. Bruce will assume his new position as day operator at the new sub-station—Station 1. Congratulations!

Miss Elizabeth R. Gorst has returned from a delightful vacation spent on a motor trip to Letchworth Park, Portage, Silver Lake and vicinity.

Miss Irene C. Walsh has joined the demonstrating force of the Domestic Sales Dept. Miss Walsh is a graduate of Mechanics Institute and comes to us well equipped for the work.

We regret to report the illness of Miss Mona Pratt of the Domestic Sales Department, who has been confined to her bed for a short time. We hope Miss Pratt will be able to be with us soon.

Mr. Oliver DeGeer of the Engineering Drafting Department will leave about September 15th for Syracuse University, where he will complete his last year in the Engineering Course.

Miss Ross of the Purchasing Department has returned after an absence from work of about a month, Miss Ross was acting under doctors orders, and took a rest cure at McCordsville, Indiana, near Indianapolis.

Mr. Charles G. Binder of the Industrial Department, spent a few days of his vacation at Wildwood, N. J., looking for sharks. The rest of his leisure time was spent in Philadelphia.

Mr. Thomas Morrow of Station 4, is well versed in the art of catching fish. Tom spent a profitable vacation at Conesus Lake, where he caught enough fish to supply the wants of the boys at the Station.

Mr. H. C. Deffenbaugh of the Engineering Department put in two week's time at the Bald Mountain House, Third Lake, in the Adirondacks. "Deff" says that his vacation was "100%."

Mr. Milton Reid, Draughtsman at the Gas Street Department, was absent from his work for two weeks while he paddled his new canoe around in the sparkling waters of the upper Genesee.

We regret to report that Mr. A. S. MacDowell has been in the Graham Hospital for some time, on account of a sprain he received while putting on an automobile tire. We expect to see "Andy" back on the job soon.

In spite of the hot weather most of the men at Station 4 have the happy faculty of gaining a few pounds avoirdupois, during their vacation days. Mr. Thomas Kewin was 15 pounds heavier when he returned from a Canadian trip.

Mr. John F. Clark of the Industrial Department recently attended the Convention of the Tau Beta Pi, which is a national honorary engineering fraternity. Mr. Clark was sent as a delegate from the University of Michigan.

Assistant General Manager Herman Russell, and his son spent a very happy vacation recently with Mr. Russell's father and mother at Manistee, Michigan. While Mr. Russell was there the Commonwealth Edison Company laid the cornerstone for a new $1,000,000 power development near Manistee.

Marriages

Mr. Leo. J. Sullivan of the Industrial Sales Dept., and Miss Marion E. Maguire of 449 Alexander St., were married on Wednesday, September 6th, at the Corpus Christi Church. After a breakfast at home, Mr. and Mrs. Sullivan left for an automobile trip through the Berkshires and Massachusetts. Mr. and Mrs. Sullivan will live at 184½ North Union St.

Mr. Samuel S. Amdursky of the Industrial Sales Dept., and Miss Carrie G. Levy, were married on Tuesday, August 29th. Mr. and Mrs. Amdursky left for a week's trip, and will be at home after September 15th, at 33 Cambridge St.

Mr. Edwin H. Fisher of the Electric Dept., and Miss Helen V. Stewart will be married on Saturday, September 23rd, at the home of the bride, 11 Buckingham St., by Rev. R. E. Brown, D.D., of Asbury Church. The wedding will be attended by a few intimate friends, and after a reception the bride and groom will leave for a three weeks' Southern trip.