Only Specialists in Steam Line Construction Can Give You Assured Economy and Dependability

Every man to his "last." If you want the best possible results in any kind of work, call on specialists—put a trained man or organization on the job.

For over a half century the American District Steam Company has been engaged in the construction and installation of District Heating Systems and the installation of industrial steam lines. For the past few years this work has been handled by their subsidiary, the Northeastern Piping & Construction Corporation. As the result, Northeastern installations are faultless in operation, and economical to maintain.

Lansing, Michigan, is merely one of many District utilities that employ District on Dist.

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Over 50 Years Experience in the Installation of

In This Issue

DISTRICT STEAM HEATING IN DOWNTOWN ST. LOUIS
By J. E. Hillemyer

APPLICATION OF DISTRICT HEATING TO A TYPICAL CITY OF OVER 200,000

CORRECT INSTALLATION METHODS

Printed in U. S. A.
For many years the economic advantages of Central Station or District Steam Heating have been presented by heating and other technical publications; however, the general public does not realize that District Heating antedates the development of central station lighting. Like most modern developments, District Heating started in a small and experimental way. In 1877 Birdsall Holly, a noted hydraulic engineer in Lockport, N. Y., conceived the idea of transmitting steam through well insulated underground pipes. His experiments in his own back yard from the boiler in the basement of his residence during the winter of that year resulted in the establishment of the first District Heating system in the following year at Lockport. This system supplied a number of buildings from one central boiler plant for a quarter of a mile in either direction and after a year's operation proved economically satisfactory.

During the intervening fifty years, there has been a slow but substantial development of this business. With the rapid increase in the cost of coal and other commodities, and on account of the serious problem of traffic congestion in the cities, there has been in recent years a marked growth in the steam heating business. Steam and electrical engineers have given the heating and electrical problems of the large cities the most painstaking consideration and the developments in New York, Philadelphia, Detroit, Pittsburgh, Boston, Baltimore, Milwaukee, Dayton, Cleveland, St. Louis and other large cities demonstrate a general agreement upon the plan of supplying live steam for heating as a utility service independent of and separate from the plant operations for electric generation.

Heating plants are successful generally throughout the United States, especially in the northern and north-central portions, in over two hundred
(200) communities (eight companies in Missouri supply ten communities), and within the next ten years there will probably not be a northern city of over 50,000 population that cannot economically justify an underground District Steam Heating system, in the business sections at least.

Development of District Heating in St. Louis

The Union Electric Light and Power Company has supplied steam to a large area of the business district of St. Louis for a number of years. In 1905 the company leased the boiler plants in several downtown buildings and agreed to supply all of the customers' steam requirements for heating, hot water and mechanical service as well as electricity for lighting and power requirements. By 1909 twenty-three (23) such plants were operated under lease agreement, supplying some fifty-eight (58) buildings or customers. Some of these plants supplied "block" or so-called "neighborhood" systems and some were connected to the old Tenth and St. Charles Street Boiler Plant of the company (the site of which is now occupied by the new St. Charles Street Plant). In 1917 the new St. Charles Street Boiler Plant was constructed at 904 St. Charles Street to supply high pressure live steam to a network of nearly four and one-half (4½) miles of underground steam mains connecting all downtown isolated boiler plants. This plant has a capacity of four thousand (4000) boiler horse power and operates at one hundred seventy-five (175) pounds gauge pressure.

In 1924 a twenty inch (20") steam main was installed connecting the company's Ashley Street Electric Generating Station at the foot of Biddle Street on the Mississippi River with the uptown system of steam mains. This work required nearly four thousand feet (4000') of twenty inch (20") steam pipe conduit and about thirty-six-hundred feet (3600') of sixteen inch, (16"), fourteen inch (14") and twelve inch (12") piping to complete the connections to the steam heating system of the company from its Ashley Street source of supply, where it has fifty-six (56) boilers with an aggregate nominal rating of thirty thousand (30,000) horse power available.

This arrangement has made it possible to discontinue the operation of nearly forty (40) high pressure boiler plants ranging in capacity from one hundred fifty (150) to five hundred (500) horse power and more than seventy-five (75) smaller low pressure plants, all of which have been closed down since the building of the St. Charles Street Plant.

In addition to the Ashley Street and St. Charles Street boiler plants, the company now has available for operation five (5) boiler plants containing thirteen (13) boilers of a nominal rating of two thousand nine hundred and twelve (2912) horse power connected to its heating system, and three (3) boiler plants with four (4) boilers of six hundred sixteen (616) horse power aggregate rating, operated as isolated plants (not connected with the distribution system).

Growth of the Heating Load

During the year 1928 the steam heating business of our company has required the generation of over one billion pounds of steam to supply the requirements of slightly more than two hundred (200) customers. The maximum rate of use was a little over four hundred fifty thousand (450,000) pounds per hour.

The types of buildings supplied from our system include hotels, garages, furniture houses, billiard halls and bowling alleys, department stores, churches, theatres, warehouses, wholesale houses, office buildings, banks, small mercantile stores, loft buildings, newspaper and printing establishments, men's and women's apparel stores, barber shops, a tobacco factory, a refrigerating plant, candy kitchens and bake shops. In fact, all buildings and classes of business are potential steam customers.

Our new business comes to the company from (a) new buildings in which, on account of the availability of steam from the district system, and because of high initial investment costs and value of space, no boilers are being installed; (b) old buildings in which the boilers and generating plant are depreciating or becoming obsolete or uneconomical; (c) buildings from which boiler plants are being removed in order to release space for other purposes, and (d) buildings or businesses whose owners have realized that it is more economical and satisfactory to purchase steam than to produce it in small, old and inefficient boiler plants.

With the increased building activities and because of large civic developments in the St. Louis downtown district, many changes are occurring which afford considerable encouragement as to the future of the steam heating business. A careful survey made by the company's engineers about a year ago would indicate that within the next five to ten years the company's annual steam sales may quadruple while the hourly steam demand may be more than tripled. With the present very fair promotional rates and extension practices, it is commercially feasible to attain this goal. Additional boiler plant capacity must be provided to supply this increased requirement and expansion of the distribution facilities developed.

The City Planning Commission developed a study of the trend in land values in the commercial district (from the River to Eighteenth Street and between Franklin and Clark Avenues) extending over a period from 1918 to 1927, which showed the rate of increase of values and the westward trend of higher values. Its report was published about one year ago and received considerable publicity in the daily papers.

The Mammoth Stewart Building of St. Louis
at that time. That study and report taken in conjunction with the development of the Municipal Plaza and Union Station Plaza districts of the city, and its accompanying general building activities, should commercially afford an area for the ultimate economic development of an enlarged heating district. The civic aspect of such a development cannot be overlooked. Perhaps the worst curse on St. Louis today is the smoke nuisance. There is no better way to completely eliminate smoke in a district than to displace all of the small, inefficient individual boiler plants with their smoking stacks by service taken from a central, highly efficient, smokeless, heating plant.

If this were done in the district now supplied by our steam service more than one hundred (100) boiler plants, with total rating in excess of ten thousand (10,000) boiler horse power, could be shut down and the buildings now being supplied thereby could secure our service on an economic, comparable basis. This group of buildings has in excess of one hundred forty million (104,000,000) cubic feet of contents or volume, requires in excess of one million (1,000,000) square feet of direct radiation in their heating systems, and uses approximately four hundred fifty million (450,000,000) pounds of steam annually for heating and hot water requirements. Other compactly or densely built up districts in St. Louis offer similar treatment for the elimination of smoke. However, it is probably not economically possible to provide District Heating throughout the entire city, but by supplementing in such localities as do not lend themselves to this handling, the oil or gas as a fuel in place of bituminous coal, practically all of the smoke nuisance would be eliminated.

Although the company now supplies less than thirty percent (30%) of the total number of buildings now located in the district served by its system, its service provides heat and hot water for more than sixty percent (60%) of the radiation and building volume of those buildings.

The total building volume served at the first of the year 1920 was 159,535,000 cubic feet and the total equivalent direct radiation was 2,041,000 square feet, or an average ratio of one square foot to about eighty cubic feet. The amount of steam required annually in the various classes of buildings for heating varies from about two (2) pounds per cubic foot of building volume in the case of theatre buildings to about eight (8) pounds per cubic foot of building volume in the case of hotels; or from approximately one hundred seventy (170) pounds of steam per square foot of radiation per season to as high as eight hundred (800) pounds of steam per square foot of radiation; the ratio of amount of radiation supplied by the heating contractor to the total building volume affecting these results somewhat. Churches and theatres as a rule require less steam because of their shorter hours of use than do factories, office buildings, etc., and hotels require the most, generally, because of the usual attitude of hotel managers towards hotel guests. Radiation ratios often vary from 60 to 1, to as high as 150 to 1.

Description of Heating System
(a) Live Steam Distribution

Unfortunately the steam requirements for heating buildings are greatest when the electric lighting and power load is least and the lighting and power load is greatest during those hours of the day when steam heating peak has passed; therefore, exhaust steam from electric generating units is generally not available at the time and in quantities necessary for supplying fully the heating requirements of buildings. It has been the experience of a number of the public utility companies that have been supplying steam for heating buildings in the business section of our largest cities, particularly in the older cities having narrow streets, that the most practical and economical system is to supply live steam for distribution through mains, thus making the steam service independent of the operation of electric prime movers.

(b) Diversity of Steam and Electric Loads

A careful study has been made of the seasonal and daily electric load curves, both for the system and for the Ashley Street Plant, together with the seasonal and daily load curves of the steam heating system. As the heating load in St. Louis is generally a forenoon load, it was agreed that the load factor of the Ashley Street Plant would be improved greatly if live steam could be supplied to the heating system.

(c) Kinds of Systems and Advantages

In District Heating there are high pressure, low pressure and exhaust steam systems and hot water heating systems. The high pressure systems are used more extensively than any other system, as the customer may secure any pressure desired and the installation of such a system is cheaper and can be operated more economically.

One of the reasons why District Steam service is more desirable than the individual plant is cleanliness, the smoke nuisance which every city and community is striving hard to abate. Eliminating the smoke nuisance not only eliminates the soot and grime on the exterior of the buildings, but the interior painting and cleaning costs are materially reduced. The coal and ash hauling in the congested downtown district and the dirt caused from loading, hauling and unloading coal and ashes are also eliminated.

The consumer will no longer be worried with labor troubles, strikes or failures of boiler equipment. The boiler plant can be eliminated or removed and this space may be rented or used for storage; also the fire hazard is removed and in the case of older buildings which are not fireproof, the insurance rate may be substantially reduced.

On newly constructed buildings the boiler plant investment is saved and maintenance costs are eliminated; investment in basement space may also be saved.
Steam can be purchased for all purposes and in most cases a better quality of steam is received since most of the companies operating underground systems superheat their steam, whereas most individual plants have no superheaters.

Steam service is available at all times and as most all companies meter the service, when the service is shut off the costs stop, which is not true of the individually operated plant. The bills are rendered monthly and you pay for what you use, and you do not have to watch the ash pile to see if the fireman is getting all the B.t.u.'s out of the coal or whether the coal dealer is short weighting you or giving you a lower B.t.u. value coal than specified in the contract.

The mains are built of extra strong steel pipe, insulated with three inches (3") of high grade asbestos covering, laid in conduit. The conduit has a concrete base laid on gravel with multicell tile and the top is a slab of reinforced concrete. The steel pipe is butt-welded and four (4) reinforcing steel straps, three inches (3") wide by one-half inch (½") thick by twelve inches (12") long are welded longitudinally across the butt-weld on larger sized mains. The lines are built for two hundred fifty (250) pounds steam pressure, with 100 degrees Fahrenheit superheat. Steam travels a maximum of seven thousand nine hundred (7,900) feet from the Ashley Street Plant to the most remote steam customer now served from the system.

The principle of building all types of lines is similar, that is, welded construction, well drained soil around the conduit, conduit to be made water-tight, manholes trapped and drained to sewers, anchors that are positive and strong enough for any strain, true alignment at the expansion joints, no pockets in the line except at unavoidable places, and these places drained by traps.

On the high pressure line up to two hundred fifty (250) pounds the welded steel valve should be used, then there would be no flanges or gaskets on the entire line, and the only leakage which could occur would be on the valve stem and bonnet and at the stuffing box on the expansion slip joints.

The advantages of the high pressure lines are: (1) greater volume in smaller line, (2) less difficulty in going through congested streets, (3) being able to furnish any type of service, and (4) less condensate loss.

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generate our own electricity, and then we can use our exhaust steam for heating and such additional live steam as we may require for cooking, laundry work and other similar purposes. If a District Heating plant were located and operating in this district, every one of these potential customers would be glad to shut down their individual plants and buy electricity from the Utility company and steam from the District Heating plant. Not only would it pay them to do this, but it would release valuable space in their basements which would be immediately turned to revenue-producing uses.

Because of climatic conditions, it would be necessary for every one of these buildings to have artificial heat about eight months of the year. In practically all of these buildings there is now installed radiation for heating by either steam or hot water. In many of them steam is used for purposes other than heating. There are under construction and being planned for future construction in the territory available for steam service, a number of modern office buildings, hotels, etc., and these will add materially to the density of the steam load.

In the area of twenty blocks under consideration there is an annual demand for steam for heating purposes of 730,000,000 lbs., this figure representing 75% of the total available load. To provide for station requirements, line loss and customer demand, it would be necessary to generate annually 900,000,000 lbs. of steam. The maximum hourly demand for steam would be about 300,000 lbs., determining the boiler capacity required.

Since the above total of 730,000,000 lbs. of steam represents the season's demand of 75% of the total available load, this is a fair estimate of the potential load to be built up within three years. By applying a rate for this typical "City A" of $.90 per thousand pounds (which is somewhat less than the rate received in most cities of similar size and location) the total annual income from 75% of the available load would be around $657,000.00 gross.

The total cost of the underground steam distribution system, to serve the area of twenty business blocks, would be $400,000.00. This estimate of cost includes trenching, installation of lines, the company's share of cost of installation of services, meter equipment and other work connected with the installation of the system, ready for operation. On an overall depreciation on this investment of 5% (which is a liberal provision) there would be an item of $20,000.00 to be provided for this purpose.

If it were necessary to install a modern boiler plant with which to provide the steam supply, an additional investment of $900,000.00 would be required, but it so happens that the Utility company has a boiler plant available for immediate service.

During recent years the Utility has closed down one or more of its boiler plants located within the city limits, and is now feeding current into its city distribution lines from a combination of hydro-electric plants and modern high pressure steam plants located some distance away. Each year sees them adding to their investment in generating equipment, or fitting into a super-power plan of high tension transmission which renders more and more unnecessary and obsolete the old boiler plants within the city limits which are still carried on their books as assets.

There is not the faintest chance that these old plants, under existing conditions, will be utilized for the generation of electricity, but the Utility company keeps the equipment in good condition under a skeleton

(Continued on Page 14)
EXPLANATION and CONTRACTION

Completely and Permanently Controlled by ADSCO Expansion Joints

When you install an expansion device the paramount considerations are:

1st. Is it the most economical device that can be used — both from the standpoint of installation costs and maintenance?

2nd. When installed, is it going to be efficient and trouble-free — not alone for days or weeks but for years?

That ADSCO Expansion Joints possess these qualifications has been proved in thousands of District Heating and industrial installations. Their ability to give continuous, faultless service is indicated by the numerous instances where they have been in service for 30 years or more without a single repair.

ADSCO Expansion Joints are designed to meet every operating condition of pressure and temperature for steam, water, oil, and other liquids and gases. The illustrations on this page show a few of the many combinations in which they are available; there are a thousand other possible combinations, providing a design to meet every requirement.

The ADSCO "Blue Book", (Bulletin No. 201) on Expansion in Pipe Lines gives complete reference on all ADSCO Expansion devices. Send for it.

American District Steam Company
North Tonawanda, NY

ADSCO B-1
All-brass screwed end joint. Furnished internally-guided. R-1 for risers.

ADSCO DUPLEX-SLEEVE GUIDED EXPANSION JOINT
For pressure up to 500 lbs. and temperatures to 750 degrees F. Air-cooled slip eliminates excessive packing and maintenance costs and assures a tight joint. The super-joint for severe service.

ADSCO SEMI-GUIDED EXPANSION JOINT
For 4, 6, 8, 10 or 12" traverse, 125 and 250 lbs. pressure. Extensively used in high and low pressure lines where external guide is not required.

ADSCO SEMI-GUIDED JOINT WITH TIE RODS
Has all features of semi-guided joint plus protection, provided by tie rods against slip pulling out of body.

ADSCO EXTERNALLY-GUIDED EXPANSION JOINT
For 4, 6, 8, 10 or 12" traverse, 125 and 250 lbs. pressure. Checks distortion. Assures correct alignment of the slip. Provides a secure anchorage and a service outlet.

ADSCO VARIATORS (Packless Expansion Joints)
For pressures up to 125 pounds. Thousands of variators installed from 15 to 35 years ago are in service today without ever having been touched.
Correct Installation Methods

Insure Sustained Good Performance From Expansion Joints

THE correct installation of slip-type expansion joints is a simple problem for the engineer who has familiarized himself with the fundamental principles concerning their operation.

Like most mechanical devices, the results obtained by the use of this type of expansion joint depend largely upon the correct method of installation. There are thousands of these joints giving satisfactory service, having been in use for 25 years or more.

Knowing the maximum temperature to which the pipe line will be subjected in service, it is not difficult to determine the amount of expansion which will take place, and the number and length of traverse of the expansion joints required to provide for this expansion. (Tables given on page 3 of the ADSCO "Blue Book" No. 201, on "Expansion in Pipe Lines" will be of great assistance in this connection.)

The most important feature in the correct installations of expansion joints is proper anchorage. It is not only of great importance where pipe lines are installed underground, but even more so where the construction is overhead—on piers, poles, towers, or other supports. The kind and type of anchorage to be installed is sometimes influenced by the use of Alignment Guides. These Guides hold the pipe line in rigid alignment, and as they are installed ahead of the expansion joints, insure a true thrust of the expansion joint slip into the body of the joint. This eliminates any lateral movement of the pipe which, without their use, would take...
heat the packing and the slip before expansion takes place, thereby greatly relieving the strain on the anchorage by permitting easy movement of the slip.

Care should be given to proper protection of the slip during installation. Very frequently on inspection, it is found that dirt and mortar have been dropped on the extended slip. When expansion occurs and the slip moves into the body of the joint this dirt becomes lodged in the packing where it will scratch the slip and cut the packing. Scratches from the shoes of workmen will cause similar difficulties, all of which can be avoided by having the slip properly wrapped with burlap or other material during installation.

Much has been said and written about packing for expansion joints. Special packings have been developed for steam, others for water, oil, gas, and in fact for every kind of service. Each such class is again subdivided for varying ranges of pressure and temperature. The selection of packing should not be left to guess work but should have careful study. No one packing is good for all classes of service. When ordering expansion joints the purchaser should definitely state the operating conditions, whether for steam, water, or oil, and for what pressure and temperature. If previous experience has indicated a satisfactory packing, this should be specified on the order. The suggestions of the packing manufacturer might well be sought on this matter.

By giving proper attention to aligning and anchoring of the line, careful consideration in placing the expansion joint, keeping the slip clean during installation and accepting the packing manufacturer's recommendation for packing, you will be assured of unfailing and efficient operation of the expansion joint with little or no maintenance trouble and expense.

Application of District Heating

(Continued from Page 14)

being in a position to supply both steam and electricity to the isolated plants, they would secure both the steam and electric business and eliminate practically every isolated private plant in the city.

These considerations are quite aside from the material benefits derived by the community from the extension of a District Heating Service. With the shutting down of individual boiler plants, smoke and soot are eliminated. Traffic congestion is materially lessened with the absence of trucks delivering coal and collecting ashes. Fire hazard is reduced, etc. Since the object of the Utility company is to furnish utility service on a basis that is beneficial to the public and profitable to the company, there is, obviously, an overwhelming argument why the executives of these companies should not only give immediate and serious consideration to the application of District Heating in "City A" but proceed immediately with engineering layout and construction of such a plant so that the coming heating season will see them in the District Heating business, making their erstwhile "dead plant" investment a revitalized producer of profits.
On the slip type, if it is not in true alignment there will be continual trouble with the packing.

Next is the covering—magnesia and the multiple type asbestos have about the same insulating values, but there is a great difference in the cost, the magnesia being very much the cheaper and can be used on low pressure lines where the first coat is a deciding factor, but if used with care in installation, with an outside wrapping of asphalt impregnated asbestos fastened on with copper wire will give good service unless the line should become submerged in water and then it would probably disintegrate. On the high pressure line, a double thickness of multiple layer asbestos is generally used and put on so the outer and inner shells break joints both horizontally and vertically and with an outside cover of waterproofing, copper wire fastened. No vegetable fibre cover will stand the heat of higher temperatures without carbonizing so it is useless to put such a covering on high pressure lines.

Next is the connection to the customer. If possible, there should be a street valve controlling the customer's service and a service valve for him inside his building wall. All valves should be gate valves. Lines should drain back to the mains, but when this cannot be done a trap will need to be installed in the building and the condensate wasted, as no charge can be made until the steam is delivered inside of the customer's wall. On the low pressure system no reducing valve will be needed except by those who have the atmospheric systems and they will cut the pressure at once.

Uses of Steam Service

Steam is supplied for a variety of purposes, the most important, of course, is for heating of building space during the winter heating season and for hot water the year around for domestic or toilet uses and for cleaning. Hotels and restaurants use the service extensively for cooking, warming-tables and coffee urns. It is said that it requires but two minutes to properly make good coffee from steam coffee urns used on our service.

Extensive laundry service is supplied from our system, mostly, of course, confined to hotels. Hat blocking and clothes pressing and cleaning establishments are satisfactorily and economically using our high pressure steam service. Matrix beds in newspaper and printing presses are heated by steam. Candy cooking and other special cooking processes are in quite common use by steam. The operation of mechanical equipment in buildings is extensive such as steam driven hydraulic elevator pumps, house and vacuum pumps, etc., refrigeration machines and in a few instances engine driven generators. Some new processes are developing from time to time such as the steaming, treating and curing of tobacco for pipe, cigarette and cigar; heating of construction materials on building jobs during cold weather—sand, gravel, water, etc., and for the hoisting engine on such construction jobs.

(g) Dependability of Steam Service

For a number of years several of the leading newspapers of St. Louis have depended solely upon the Union Company for steam for printing papers. The printing of a daily newspaper on a schedule to match the schedule of the mail and the railroad service is a marked proof of the dependability of the steam heating utility now serving most of our large cities.

Customer Supply

After the steam is delivered to the customer's valve, all equipment in the building belongs to him, except the metering equipment, and he is to handle the steam and return all condensate to the meter. In meters, there are condensate meters, which measure the steam after being used, as condensate, and flow meters which measure it when it enters the building. Flow meters, either the mechanical or differential type, need constant expert attention, as they go wrong in ways that would not be detected by the ordinary inspection. The condensate meter also needs regular reading and inspection, but their main trouble is stoppage which is easily seen, and they should be cleaned yearly, repaired, tested and adjusted. This, of course, presupposes that no one would attempt to furnish steam on a flat rate or a price per square foot of radiation or based on the volume heated, as it would be financial suicide to attempt it.
When the company has placed its line and meter in the building, it is not through, but is just beginning its contact with the customer. The customer should be taught how to use the steam to best advantage and there should be available for him at all times expert advice, based on knowledge and experience that cannot be found outside of heating companies, that cover all little details, which go to make a heating system a success. Any heating system which is not successful with two pounds pressure should be rearranged and the defects removed, the system should be made automatic and free from manual control, keeping a predetermined temperature for the working hours, nights and Sundays; economizers installed on the return condensate to extract all the heat possible for water heating, etc. This alone should effect a saving of from six to ten per cent.

If the customer can be induced to put in effect all the little economies which are possible in steam heating, it has the same effect on him as though his rate were reduced 20 or 25 percent.

(i) Automatic Regulation

Until a few years ago little thought was given to economic regulation of heating service, but today there are a number of thermostatic regulator controlling devices, individual thermostatic radiator valves, diaphragm valves and patented heating system designs. Any kind of automatic regulation is more economical than hand regulation and gives a more uniform temperature. The regulators or valves can be set at any temperature desired and will automatically turn off or on the steam within a fixed range. Steam regulation is too often neglected, due to the lack of thermometers. The commonest of these automatic regulators are the ones that are placed in main feed lines or risers as the case may be, with a master thermometer located in a place or room where average temperatures exist. In connection with this equipment a "time-ostat" may be installed and set so that during the day period a temperature between seventy-two (72) degrees and seventy-four (74) degrees Fahrenheit may be maintained and during the night period a temperature of sixty (60) to sixty-five (65) degrees Fahrenheit or lower, or the steam may be shut off entirely, depending upon outside temperatures.

(j) Rates and Competition

Steam Rates — It must be understood that there can be only one way of charging, and that is so much for each thousand pounds of steam furnished, to be measured either by flow or condensate meters. Then with a fair rate charged per thousand pounds of steam furnished, and demand rate based on per square foot of radiation or cubical contents of the building or pounds per hour demand, the two combined should be such that no building could afford to own its own plant when it takes into account all proper factors.

Labor of running the plant, ash removal and coal costs are about all the costs the ordinary owner recognizes or admits. He has to be reminded of water bills, maintenance and replacement expense, depreciation, interest on investment, taxes, value of basement space, damage from ash or coal dust, consequently less cleaning labor, ease of operation and entire lack of worry about the heating problems. Methods of supply and operation should fit into the present scheme and develop from the present plant unless the prospective business justifies a new plant.
Indianapolis finds out that "Northeastern" means "Action"

Above — Starting the trench;
Left — 2½ days later — several hundred feet of line completely installed — ready for removal of trench supports and backfill.

2,000 feet of 20 inch steam line completely installed in 15 working days!

The Indianapolis Power and Light Company wanted action — but they also wanted a faultless installation. They made no experiments — took no chances. Northeastern was commissioned to handle the job.

It may be possible to beat this installation time — it may even have been excelled in the past; but the fact remains that in one of the most inclement Aprils on record, Northeastern again demonstrated its ability to give fast service — without sacrifice of efficiency.

No steam line in the country has been more carefully or critically handled than this new Indianapolis installation. Northeastern will give the same thorough, interested, experienced attention to your installation.

The cooperation of Northeastern Engineers is freely available on any major steam line work. Estimates of cost gladly prepared.

NORTHEASTERN PIPING AND CONSTRUCTION CORP.
NORTH TONAWANDA, N. Y.

CANADIAN DISTRICT STEAM COMPANY, LIMITED
TORONTO, ONTARIO

Subsidiaries of
AMERICAN DISTRICT STEAM COMPANY
NORTH TONAWANDA, N. Y.

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