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PROCEEDINGS OF THE CENTRAL RAILWAY AND ENGINEERING CLUB OF CANADA.

COURT ROOM NO. 2, TEMPLE BUILDING,

TORONTO, October 22nd, 1912.

The First Vice-president, Mr. A. Taylor, occupied the chair.

Chairman,—

We have had a long wait, but I suppose on account of the disagreeable weather it is not likely that many more will turn up. I might say that Mr. Bannon and Mr. Worth have gone away shooting, and possibly they have taken some of the other members with them.

The first order of business is the reading of minutes of previous meeting. As the minutes of the previous meeting appear in THE JOURNAL it will be in order for some one to move that they be adopted as read.

Moved by Mr. Baldwin, seconded by Mr. Herriot, that the minutes of the previous meeting be adopted as read. Carried.

Chairman,—

I understand you had a splendid meeting last month, between seventy and eighty members being present, and that the entertainment of Mr. Adams was very enjoyable. I am very sorry that there are not more here to-night and should any of those present run across any of the members during the next four weeks, I shall be pleased if you will kindly jog their memory to be on hand next meeting night.

I will now ask the Assistant Secretary, Mr. Hyde, to read the list of new members:—

NEW MEMBERS.

W. Brazier, Machinist Improver, G.T.R., Stratford.
F. Lane, Machinist, Gurney Foundry Co., Toronto.
C. Cox, Machinist, Gurney Foundry Co., Toronto.

MEMBERS PRESENT.

A. Taylor.
J. Herriot.
J. Bruce.
J. Wright.
W. E. David.
D. Cairns.
G. Baldwin.
W. Kirkwood.
R. H. Fish.
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J. Barker.
J. Battley.
W. H. Carruthers.
J. Dickson.
A. M. Wickens.
G. Davis.
G. Cooper.
L. S. Hyde.
J. McWater.
W. M. McRobert.
F. Smith.
W. W. Garton.
A. E. Patton.
E. A. Heden.
J. Bruce.
W. J. Jones.
J. Douglas.
J. Jones.
J. Anderson.
J. G. Broderick.
W. Doney.
W. Delaney.
H. G. Fletcher.
E. A. Wilkinson.
W. J. Lyons.
T. J. Ward.
R. Pearson.
G. H. Miler.
C. G. Herring.
C. F. Nield.
J. T. Fellows.
D. Campbell.
W. C. Sealy.
G. D. Bly.
J. W. McLintock.
Jas. Anderson.
J. Reid.
A. Hallamore.
G. Young.
W. H. N. Davis.
R. Miller.
H. Ellis.

Chairman,—

The next order of business is the reading of papers and discussion thereof.

We have with us to-night Mr. C. G. Herring, who will read us a paper on the "Application of Mechanical Methods in the Production of Coal Gas." I will now call on Mr. Herring.

APPLICATION OF MECHANICAL METHODS IN THE MANUFACTURE OF COAL GAS.

BY C. G. HERRING, CHIEF DRAUGHTSMAN, CONSUMERS' GAS COMPANY, TORONTO.

In dealing with the title of this paper, I will preface it with that eternal polemical subject, machinery and labour. It is useful to obtain something like an authoritative statement on the question, and as gas enters socially and industrially into our every day lives, I will endeavour to treat this subject in a general way.

Labour, of course, will have it that machinery has contracted, and is still contracting the field for employment, but labour is not the best guide in this matter, as labour only sees what to it appears to be the brutal curtailing of manual work by mechanical means in special cases that come under its observation. Take the gas industry, there has been displacement of labour by machinery in the retort house operations; but, given in the entirety of their operations, more direct employment as well as more employment to the allied industries than ever before. That very machinery in the retort house has had to be produced and installed, all giving fresh employment to labour. After installation the machinery has to be kept in repair. The machine shops on gas works are now much more elaborate, and necessarily so than they were formerly, and give much more employment. The machine tools with which they are, but were not previously, largely equipped, have to be made, delivered, installed and then maintained in repair. In other words the retort house machinery, while it has displaced labour in the retort house, has called into existence and distributed employment that did not previously exist. Men are indeed looking at the question from a broader standpoint, classes of machinery that have an absolute advantage, by the creation of entirely new fields of labour, and have opened up channels not hitherto exploited. Retort house machinery (which in one quarter has displaced and simultaneously in others, has produced labour) has assisted in economical working, and in cheapening the product. With the cheapening of the product the demand has increased, and provision giving employment has had to be made for this. Take any progressive gas undertaking in the country, and obtain the figures as to the total number of employees, and the wages paid now and a few years ago, and it will be found that though the number of hands directly employed say under the roof of the retort house may have diminished, in the total number of hands engaged by the undertaking, and in the total of the wages paid over the whole service, there has been an increase and not a decrease. This too does not include the work that the growth of one industry has made for others. Having prefaced this paper with these few words as to labour, I will now give you some idea as to the extent and the uses of the various machines, although at the same time this subject is far too large to be exhausted within the limited compass of a paper.

The first machine of importance is the coal breaker, the capacity running anything from 25 to 75 tons per hour, and may be of the double or the single roll variety. The duty of this machine is to break the large lumps of coal to the required size before storing and its later use in the charging machines. The size of the lumps in run of mine to be broken are sometimes very large, 24 inches, 30 inches, 36 inches long by about 12 inches by 9 inches. These sizes appear rather formidable when they have to be broken to say 2 inches cube. Coal is not the only material that goes through the breakers. I have seen many interesting collections of articles other than coal that have gone through, such as pick-heads, chain-links, crow-bars, nuts and bolts, but in a well designed and strongly built breaker little damage will be done to the gear. The body of the breaker is made up of cast iron sides, $\frac{3}{4}$ inch, with flanges for bolting together 1 inch thick, the bearings are cast on to the body and supplied with iron renewable bushes, the shafts to carry the rolls are forged steel, machined at ends for bearings and gearing, the centre portions are left black and are of square section, on to this is threaded the rolls supplied with teeth. Different manufacturers employ different shape teeth, but I myself prefer the form shown, these "crab claw" shaped teeth crack the coal as it were, and tend to lessen the production of undue dust. These are made of good strong material preferably manganese cast steel. One method of fixing to shaft is by running up with white metal or suphur. The speed of the rolls is about 5 revolutions per minute for the top rolls, and 15 revolutions per minute for the bottom rolls. There are various types of feeds working in conjunction with these breakers, the most common being the Jigger feed, with adjustable stroke made to deliver fast or slow depending on the size of coal to be broken. This is usually driven from a sprocket wheel driving a shaft with an eccentric. This machine regulates the feed to the breaker to a nicety and prevents choking. The power to drive the breaker amounts to very little, a double roll breaker for say 50 tons per hour for instance, requires about 6 to 8 horse power.

Now as to the class of conveyor best fitted for filling coal stores of large capacity, undoubtedly to my mind, the bucket conveyor is the best, as the same conveyor lends itself to both filling and emptying the store.

The bucket is of steel plate about $\frac{1}{8}$ inch thick bent to the desired shape, in some types the sides are separate, on others the bucket is stamped out all in one piece, the links of the chain are secured to sides of the bucket, each bucket has a lip that engages with a similar projection on the next bucket to it, thereby forming a continuous conveyor and preventing leakage between buckets. Each bucket is carried on two rollers running on a track. In filling the store the coal is carried in the top curved part of bucket, and the dumping gear places the bucket in such a position as to empty it, either into the store or into the conveyor carrying the coal into the retort house. This conveyor is carried directly over the storage hopper that runs along the entire length of the retort bench and is usually of the swing bucket type running in a track similar to the other type. The movable tipper for the buckets is of a different form to the others previously mentioned owing to the restricted head room necessary as both the delivery and the return are on the top side of the hoppers.

You can quite see that all these mechanical applications have revolutionized the handling of material in the gas works. To look back at the old days of man handling of material seems very strange, the barrow and shovel played a large part then. The coal was stacked in the stores and taken out and distributed on the retort house floor ready for charging, by barrow, then charged into the retorts by hand. Judged from a purely commercial standpoint, if twenty-four good men can do a certain amount of work by simple hand labour, thirteen men selected from this number with the aid of machinery, will accomplish the task with less expenditure of energy and will return to work after say sixteen hours of rest, more fit than the hand stoker possibly can be. A further advantage accruing from the use of machinery is that the quality of the work does not vary with the individual skill of the men employed, the balance of efficiency is, therefore on the side of machinery. But what of the ultimate cost? The value of any system of work must be measured by its influence upon the cost of material and labour say per 1,000 cubic feet, after meeting repair and maintenance, renewals and interest.

The capacity of the storage hoppers in retort house are as a rule arranged to give a forty-eight hours' supply, this is necessary to give time for renewing any broken or worn out parts and further, does away with running the coal plant at night and on Sundays. The life in a good and properly designed coal handling plant is very remarkable. Coal dust is considered lubricative, of course, compared with other material to be carried, but even then the rollers carrying the buckets should be supplied with a system of lubrication, usually the axle is surrounded with absorbent packing contained in a hollow of the boss of the roller, saturated with oil, a conveyor should travel at least 25,000 miles before needing overhauling of running parts, or replacing.

We now come to the machines for discharging the hot coke remaining in the retort after all the gas has been distilled out, also the machines for charging. The one I have chosen to describe is a combined charging and discharger. This is a very compact form or combination of machine and is so arranged that one man can operate the combined machine instead of two, the action of discharging the coke from the retorts is pushing it through the retorts by a ram, to which is connected an apparatus for simultaneous conveying the coal into the retort, at the same time the coke is being discharged, the coal being deposited, and left in the retort, the ram and charging apparatus is withdrawn for this purpose two or more scoops or rather troughs of a cross section suitable to the retort, are made to telescope into each other, the outer or first scoop being attached to the end of the telescopic ram, (the discharging and charging apparatus operates by a reversing motor controlled by a hand lever, the power being transmitted to the sprocket wheels by gearing). By this means when the telescopic ram enters the retort it carries with it the scoop to which it is attached. Each scoop is provided with cams, which engage with stops in its adjacent scoop, and thus carry it forward into the retort, coal being fed into them by a mechanical feeding arrangement before they enter the retort, at one end of the scoop, which last enters the retort a stop plate is attached, and this scoop, with its stop plate, is arranged to remain stationary, while the other scoops in turn are being withdrawn from the retort and telescoped into each other. The object of the stop plate being to prevent the coal returning with the scoops. The ram head attached to the foremost scoop is hinged to lift and allow the coal to leave the scoop when the latter are being withdrawn from the retort. Thus the coal, which was carried into the retort by the scoops is pushed out onto the floor of the retort as the scoops are withdrawn from it and telescoped into each other. When all the coal is deposited on the floor of the retort, the whole of the scoops (together with that to which the stop plate is attached) are withdrawn clear of the retort into the framework of the machine, and the machine is travelled along raised or lowered to the next retort to be operated on. The scoops of suitable section, telescope into each other as described, and it is arranged that, in extending for discharging the coke and carrying the coal into the retort and in closing up for depositing the coal in the floor of the retort, each of the sections is made to perform the operations in succession. To ensure this, stops and pawl catches are provided, the latter being arranged by rack and gearing to release the scoops in turn, when the coke is being discharged and the coal carried into the retorts. By an arrangement of pawls the scoops are also prevented from telescoping up out of their turn, the returning scoop, when nearly home, releasing a pawl and allowing the next scoop to return. This operation is continued until the whole of the coal is deposited on to the floor of the retort and the scoop housed in the machine framework. The machine is mounted on framework provided with travelling and hoisting gear for adjusting the machine to the different tiers of retorts, a coal supply hopper with automatic feeding gear for regulating the supply of coal into the machine is also provided. The motive power to work this machine can be either steam, compressed air or electric. In discussing the advantages of the three above systems require much space for discussion, transmitting power short distance gears are generally used, for greater distances belt or rope drives may be used, and for greater distances steam is employed, but it has several defects, the greatest of which is condensation, for even if a pipe is ever so well protected considerable condensation will occur, and the efficiency very much reduced. Electricity is by far the best and cheapest means of transmitting great power for long distances, especially when produced from town gas in gas engines. The great economy, convenience and reliability, especially the latter, of such engines cannot be seriously questioned, and the remarkable difference between steam plants and gas engines, is this, that while the economy of large steam engines is much higher than small ones, the small gas engine (of say 80 to 100 horse power) is quite as economical as the largest steam unit made. Speaking generally I might venture an opinion that the next five years will witness great advances in the use of town gas as a fuel for motive power. Compressed air when used in the place of steam for transmission in long pipes, shows marked superiority. It is always ready for use when wanted, and is not subject to any loss from condensation and is clean in its use. It is customary to employ a single stage compressor up to 75 pounds per square inch, above which two or three stage compressors are suitable, according to the pressure desired. A two stage compressor is like a compound engine, except of course, that the action is reversed. The air enters the larger cylinder in which it is compressed somewhat, and then goes to the intercooler in which the temperature is lowered, it is then conducted to a smaller cylinder, in which it is still further compressed then stored in a reciver where the moisture may drain from the air, which also takes care of the fluctuation in the air line, and of the pulsations of the compressor. Air when it is compressed rises in temperature, thus if air at 60 degrees F. is compressed to 100 pounds per square inch, the temperature will rise to about 485 degrees and so on. At this high temperature it has a great capacity for moisture, by water jacketing the cylinder the temperature is reduced. Another application of mechanics is in the exhausting plant, this for relieving the pressure in the retorts and drawing the gas away as fast as it is made and forcing it through the remainder of the plant and finally into the gas holder. The exhauster proper has been mentioned before in the paper I had the pleasure or reading before you in December, 1909. (See Vol. III, No. 9, of the Proceedings of the Central Railway and Engineering Club.) The methods of driving the exhauster are by steam, gas engine and electric motor, and all the methods employed are to suit the local or special condition.

The horse power required for dealing with a certain amount of gas may be found from the following formula:—Actual horse power $= \frac{V.H. \times 5.2}{33,000}$ in which V=number of cubic feet of gas pumped per minute. H = difference between inlet and outlet pressure in inches of water. Owing to the varying make or production of gas in the retorts the exhauster to show a steady vacuum in the inlet, must be governed. This is done by attaching a governor to the throttle of the engine, the whole being so arranged that as the bell in the governor rises (being connected to the inlet main of the exhauster), the throttle is opened admitting more steam to the engine, and as the production of the gas lessens the bell in governor falls, closing the throttle in engine and reducing the amount of steam to engine and consequently the speed of exhauster. Another apparatus, which is put to very similar use is the gas booster, which is used for taking large volumes of gas from gas making stations to distributing stations on the low pressure system, and also for direct high pressure systems. Gas distributions has developed according to the laws of evolution, that is, each system has been evolved as a modification of some existing system now in use as a whole or in part.

"A." Distribute with low pressure from holders from works and out stations.

"B." Distribute with low pressure mains being reinforced with medium high pressure lines, say (1 to 5 pounds).

"C." Same as above, but high pressure 20 to 40 pounds.

"D." Strictly high pressure throughout.

There are also many combinations of the above.

The type of blowers used for this description of work are Sturtevant high pressure positive or rotary type, Roots' positive, Duplex steam driven inlet valve and poppet discharge mechanically operated. Ingersoll Rand straight line compressors and many other types. Some turbine, belt, rope and electrically driven to suit various conditions.

The pumping plant on a large gas works is quite a large item. Tar has had to be pumped into the distilling apparatus, liquor has to be dealt with from various parts of the works and pumped up again over the concentrators, etc., and if a source of supply is handy water is required for nearly every part of the works. To give some idea of the quantity of water required per day for manufacturing every 1,000 cubic feet of gas made per twenty-four hours, requires 125 gallons approximately. For every ton of coal carbonized per day, 30 gallons of ammonical liquor is obtained, so that in a works carbonizing say 500 tons of coal per day about 15,000 gallons of liquor has to be dealt with. A special type of pump is made by most manufacturers for dealing with liquor, the pump end is made entirely of iron. The valve area especially for pumping tar should be very liberal and should be of the simplest form, and have but few joints, the pump pistons should be designed so as to prevent the slopping of the liquor on to the trays, which in the case of tar tends to make an unsightly mess. The single cylinder pump is much preferable to the duplex type for tar, as, if the pump is properly built there is no difficulty of short stroking. The water service pumps are usually compound duplex, but it would be much preferable if makers would build a small type of high duty pumping engines, say for a minimum capacity of one million gallons per twenty-four hours. It is generally necessary where a works has its own water pumping supply that some sort of filteration or purifying apparatus should be installed. The pressure filters made by quite a few makers seem to fill the bill for this class of works, the cost is not at all high (considering their duty); they take up little space, easy to operate and need no mechanical power to operate them. The back pressure is small, averaging about 5 pounds and can be easily cleaned. The steam raising plant is of great importance on a works of any size, as so many parts of the works and apparatus demand it during the twenty-four hours, such as furnaces under retorts, steaming out of stopped pipes, cleaning condensers, washers, etc., tanks and lutes of gas holders and purifiers have to be kept from freezing, and the warming of the houses containing the various apparatus and for the pumps. The average quantity of steam required on a well equipped works will be about 108 pounds per 1,000 cubic feet gas made. In a plant entirely steam driven the boiler capacity requires about 3.17 horse power per 1,000 cubic feet of maximum daily output. Now as to the type of boilers best suited to the conditions of a gas works, a great many larger works prefer some standard form of the water tube boiler, as the best steam generator to use. This is probably due to the great over load capacity of this type of boiler, and that it can be kept cleaner than most other types, this of course will depend largely on the quality of the feed water used. The desirability of using a low grade fuel produced in the works such as fine breeze (which in some locations is practically unsalable) may turn the scale in favour of some special type suitable.

We next turn to the coke conveying apparatus, first the taking away of the hot coke drawn straight from the retorts, quenching and breaking it, distributing to the storage shed for sale, to the boilers and water gas apparatus if used. The conveyors dealing with the hot coke have a difficult duty to perform, the heat warps the chains causing alterations in their pitch, consequently a lot of wear on the driving sprockets besides the gritty nature of the coke tends to shorten the life by getting into the wearing parts. This is especially the case with conveyors which use a water trough as the water washes the finer particles of grit into the small spaces of link bearing clearances. It is on account of this grit that you will hear of mechanics on gas works speak of the "Gas works fit." This is only too true when dealing with gritty material like coke. The most common, and to my mind, the best is the drag bar type. This consists usually of two strands of chain about 2 feet apart joined together with flat bars pitched about 2 feet 6 inches centres, the trough or channel is about 2 feet 6 inches wide and 6 to 8 inches deep built up of angles, and mild steel plate, to prevent wear in this trough. A cast iron liner is provided along the whole length and width of the trough. This liner is not bolted in, but is kept in position by a strip either side of trough, which is easily renewable when desired. The chain is also provided with a wearing shoe of a hard material. The return chain is usually carried underneath the retort house floor on angle iron guides. This is a most simple class of conveyor easily renewed and low in first cost with very few wearing parts to get out of order, 5,000 miles without any serious trouble is quite usual, so that the cost of upkeep would be very little. Again the power to drive this conveyor is small.

The coke as it leaves the retort, in some classes of coal fluxes or runs into more or less large masses so that when cool it is passed through a coke breaking machine that breaks or rather the aim of the machine should be to cut it, and thus affect a minimum of waste in breeze and dust. The coke is fed into a hopper over the machine and passes through a pair of revolving drums, one of these has steel discs with serrated teeth, and the other is fitted with spiral steel cutters on the same principle as lawn mowers. The rolls or drums are made adjustable so as to break to different sizes to suit the call of the market.

The conveyors receiving the coke are of various types similar to the coal conveyors and need not be mentioned here. The screens for sorting and grading the coke preparatory to storing are of two kinds, jigging or reciprocating and rotary, There is nothing special in construction so no mention need be made any further. During the clinkering of the furnaces under the retorts every twenty-four hours quite a lot of unburnt fuel is dropped down into the ash pans. This is taken out in barrows and usually hand picked. Some works have put down plants for recovering and washing this good fuel so that it can be used to good account.

Another machine is the briquette fuel making plant, where a mixture of tar and pea breeze is compressed together, allowed to harden and sold as a fuel for stoves. This makes a very clear and efficient fuel and very cheap.

Works that use lime for purification usually have a difficulty in getting rid of the spent lime. Machinery and appliances have been patented for the utilization of this spent lime and the clinker from furnaces and boilers. In the manufacture of concrete building bricks and paving, this machine is fitted with automatic feeding pan to feed the moulds, the amount of feed being adjustable, the moulds are arranged in a revolving table, each mould receives two pressings, as in a non-plastic material, one pressing would result in the centre being densely pressed, the outsides and corners would have weak arrises and would readily crumble. The first pressing squeezes the material from the centre into the corners, the final pressure finishing the brick: the material to be made into bricks is first passed into a steam heated mixer while an edge runner mill kneads and tempers the heated and moist material: the bricks made from this mixture, clinkers and spent gas lime have been tested and proved to have a high crushing strength and absorb less moisture than most ordinary clay bricks.

Now all this machinery I have spoken of requires to be kept in repair and working order, tools are required for clinkering both retort furnaces and boiler fires and cleaning any stopped foul gas pipes, steam, gas and water pipes and valves are liable to break down and require renewal, stocks should be kept of the parts of various machines most likely to give way under any unforseen strain thrown upon them, so that when the time comes everything should be in readinesss for the repair or renewal in the shortest possible time; in a gas works everything has its special duty to perform and unless duplication is carried out where necessary, grave complications are likely to easily occur.

The equipment of a machine shop on a modern large gas works usually includes, lathes, planes, drills, slotters and shapers, pipe screwing machines, etc., a power hammer and two or three smith's fires, also travelling crane or overhead runway is provided for picking up heavy pieces and transporting them from railway cars or lorries. The shop, by the way, should be situated near to the works switch; besides this shop there is the carpenters, tinsmith, and paint shop and last but not the least is the general stores, that even in a gas works takes quite a lot of care and skilled attention in its daily routine and management.

Chairman,—

You have all heard Mr. Herring's paper and I have no doubt that you are all wondering, like myself, how it is that with all these mechanical labour saving devices gas still costs so much money. Perhaps Mr. Herring will be able to enlighten us. If any one wishes to ask Mr. Herring any questions I am sure he will be pleased to answer them.

Mr. Baldwin,—

I did not quite follow Mr. Herring in his description of the ram, which pushes the coke out of the retort and the method of placing the coal in.

Mr. Herring,—

The coal for the retorts is stored in an overhead hopper and is fed into the scoops through a chute by an automatic feeding gear, which is controlled by hand. This feeding arrangement is in section cross shaped and carried on a spindle rotated by hand. Just so many turns will feed the desired quantity of coal on to the scoops before they are subsequently pushed into the retort. The ram, as I have said before, is telescopic, the head made to hinge so that in the return stroke, the hinged head acts as a levelling rake to level the coal charged into the retort.

Mr. David,—

I would like to ask Mr. Herring a question in regard to the mechanical stoker. How long will a retort last charged by a mechanical stoker as compared with a retort charged by hand and if they get the same quantity of gas per pound of coal from the mechanical stoker as from hand charged retort.

Mr. Herring,—

In regard to the life of the retorts. There are two ways of looking at this. In the hand fired retort the retort is necessarily open for a longer period than when the retort is charged by machine. This tends to shorten the life of the retort because the material of which the retort is made being of fire clay, which as you all know will not stand much expansion and contraction and when you come to reduce the temperature of a retort which is about 1,600 to 1,800 degrees F. to any extent before very long the material in the firebricks become disentegrated. In the machine fired retort the period the retort is open is very small. Then again some of you might think that the machine fired retort would wear out quicker on account of the heavy scoop being rammed into the retort. This is not detrimental to the retort as it does not wear the retort away any quicker, in fact combined with the through retort, it has the effect of keeping the retort cleaner from carbon and you will find the machine fired retorts do not require scurfing as often as the hand fired retorts.

There is no reason and it has been proved conclusively on this continent and Europe that more gas can be obtained per pound of coal with the use of the mechanical stoker over hand charging, but there are two ways of doing everything, wrong and right, and the way this is done depends upon success or failure.

Mr. David,—

I think you are wrong. You have a retort say 26 inches by 16 inches, and 20 feet long, and when the scoop is rammed in there with about 1½ inch clearance at each side and you have 1,200 to 1,300 pounds of coal in the retort there is a very great resistance and I think must necessarily wear the retort out much quicker than when done by hand.

I have stoked myself, by hand, and I know a little about this work and I have also seen this work done by machinery, and I shall be pleased if you could give me a few figures making a comparison of the renewals required to the hand charged retort and the machine charged retort.

Mr. Herring,—

Our friend is still hammering at the retort. Now at a recent test to find out some particulars in regard to this it was found that the actual power required to push the coke out of a 20 foot retort was 10⅓ horse power initial, and of course after the coke got started the power required was greatly decreased.

It took just 40 seconds to put a charge into a 20 foot retort and push the coke out. That is the complete operation from the time the retort was opened until closed.

Mr. Baldwin,—

Mr. Herring was speaking about making bricks in a gas works. Do I understand these bricks to be made from a by-product?

Mr. Herring,—

Yes, this was done at the Dewsbury Road Station of the Leeds Corporation Gas works. These bricks were used for a retaining wall for a large gas holder of about eight million cubic feet capacity.

Mr. Baldwin,—

Is the life of these bricks equal to the clay bricks.

Mr. Herring,—

The crushing strength was even greater than the clay brick and they did not absorb moisture so readily like a clay brick.

Chairman,—

I would like to know if all the mechanical stokers went out of business at the same time would it be possible to keep the plant going by hand and supply sufficient gas to meet the requirements.

Mr. Herring,—

I have seen that occur. A company I know of in England had an experience very similar to that. It was Christmas eve when all the gas that could be made was wanted and about eleven o'clock in the morning the large sprocket wheel of the overhead conveyors which supplied coal to the overhead hoppers broke. The mechanics were on the ground at once and a new wheel which was kept for emergency was put in place in a short time and the machinery started up again. No sooner was the machinery started than the wheel burst all to pieces and it was then necessary to telegraph to Derby where these wheels were made and get them to send one up. In the meantime by the aid of the water gas plant and hand firing they managed to keep about six or seven sheets filled in the large holder which was sufficient to meet the pressure requirements throughout the crisis, and they were without machinery all Christmas day.

Mr. Baldwin,—

I am sure we are all very pleased to have heard Mr. Herring and I have no doubt had there been more here to-night to hear this paper we would have had a longer discussion and I think Mr. Herring deserves great credit for giving us this paper, as you are all aware this is the second paper he has given us. I have great pleasure in moving a hearty vote of thanks to Mr. Herring.

Mr. Cairns,—

I second that.

Chairman,—

It has been regularly moved and seconded that a hearty vote of thanks be tendered to Mr. Herring for the excellent paper he has given us to-night. What is your pleasure? Carried.

Mr. Herring,—

I am very pleased to have been able to interest you. Before closing I would like to say that I do not think that many of you have any idea of the magnitude of the Consumers' Gas Company in this city. This is one of the most up-to-date gas plants in the world, in it is machinery built in all parts, including the United States, Great Britain, and other foreign countries. One outstanding feature is the conveying apparatus, which is undoubtedly the most up-to-date in the world, the coal and coke being carried probably over a mile without being handled by hand. The coal comes from the cars and is then elevated and taken from there to the different hoppers and when it is discharged from the retorts as coke it is handled in a similar manner and is never touched by hand.

I think this would be a great study for a man interested in these matters to drop down to the Gas Works and see for himself the wonderful improvements that have been made in the matter of mechanical machinery.

Mr. Baldwin,—

The plant is working Saturday afternoons and I think we could arrange with Mr. Jefferis some Saturday afternoon for the members to go down and look over the plant. I will bring this up before the Executive.

Mr. Herring,—

That is a very good suggestion. I think our General Superintendent, Mr. Jefferis, would be highly delighted to be approached in the matter, and I think if the Executive Committee got busy and made application to Mr. Jefferis he would be delighted to do everything in his power to make your visit one to be remembered.

Although I work for the company, I want to say that there is only one works that I have seen, and that is the South Metropolitan Gas Company, of London, to be compared with the Consumers' Gas Company. There is nothing like it on this continent, in Germany or in France, where I have visited some of the largest plants.

Mr. Baldwin,—

This is a matter which should be handled by the Executive at once and we should get a list of the names of those who wish to go so that they can be notified when arrangements have been made.

Mr. Herring,—

I am sorry to say that Mr. Jefferis is seriously ill at his house and that he has been away for about ten days, so that he will not be able to do anything for the next week or two.

Chairman,—

I might say that we are very short of papers. One of the gentlemen who promised to give us a paper is so very busy and pushed for time that he finds he cannot get out a paper. I shall be pleased if you will kindly keep this matter in mind as we want papers badly. It need not necessarily be a member of the Club, if you have a friend who will give us a paper on some relevant subject, let us have his name.

Moved by Mr. Herriot, seconded by Mr. Cairns, that the meeting be adjourned. Carried.

A. Lichtenhein

Died

October 31st 1912