PAGES

MISSING

artificial illumination

. . THE CENTRAL . . Railway and Engineering . . . . Club . . . . OF CANADA

OFFICIAL PROCEEDINGS

Vol. 2. No. 4. TORONTO, CAN., April 21, 1908. $1.00 per year 15c. per copy

OFFICERS, 1908.

President:
W. R. McRAE, Master Mechanic, T.R.Co.

Vice-President:
ACTON BURROWS, Managing Director, *Railway and Marine World*, Toronto.

Second Vice-President:
C. A. JEFFERIS, Master Mech., Con. Gas Co., Toronto.

Executive Committee:
J. J. FLETCHER, Supt. Boiler Dept., Canada Foundry Co., Toronto.
J. C. GARDEN, Gen'l Foreman, G.T.R. Shops, Toronto.
R. PATTERSON, Master Mechanic, G.T.R., Stratford.
J. BANNAN, Chief Engineer, City Hall, Toronto
H. G. FLETCHER, Rep. Garlock Packing Co., Toronto.
A. DIXON, Gen'l Foreman, C.P.R., Toronto Jct.
GEO. BLACK, Road Foreman, G.T.R., Stratford.

Secretary-Treasurer:
C. L. WORTH, Chief Clerk, M.M. Office, G.T.R

Auditors:
F. G. TUSHINGHAM, Chief Engineer, T.R.Co., Toronto.
GEO. BALDWIN, Yardmaster, Can. Foundry Co., Toronto.
R. N. CARD, Car Distributor, G.T.R., Toronto.

Reception Committee:
H. G. FLETCHER, G. BALDWIN, J. BANNAN
D. C. HALLOWELL, J. W. McLINTOCK, A. J. LEWKOWIEZ

Published every month, except June, July and August by the Central Railway and Engineering Club of Canada.
C. L. WORTH, Sec.-Treas., Room 409 Union Station, Toronto.

PROCEEDINGS OF THE CENTRAL RAILWAY AND ENGINEERING CLUB OF CANADA MEETING.

ROSSIN HOUSE, TORONTO, April 21st, 1908.

The Vice-President, Mr. Acton Burrows, in taking the chair, said:

If there is one thing which should be on time, it is a railway club, as, of course, trains always run on time.

I am sorry that the President cannot be here to-night. He telephoned me this afternoon and stated that one of his children was suffering from tonsilitis, and he could not be with us this evening. Therefore, it devolves upon me to take the chair.

The first order of business is the reading of the minutes of the previous meeting. The printed proceedings have been distributed to the members, and I would ask for a motion that they be taken as read.

Moved by Mr. Baldwin, seconded by Mr. Jefferis, that the minutes of previous meeting be taken as read.

Chairman,—The next order of business is the announcement of new members. I am glad to say that the Secretary has a good list, which he will now submit.

LIST OF NEW MEMBERS.

Thos. B. Wells, General Foreman, Dominion Bridge Co., Toronto.

A. J. Nixon, Assistant Superintendent, G.T.R., London.

J. B. McLaren, Representative Ingersoll Cheese Co.

Thos. J. Walsh, Engineer, Toronto.

E. B. Allen, Clerk, General Foreman's office, G.T.R., Toronto.

E. Kennedy, Engineer, G.T.R., Sarnia Tunnel.

Jas. Barker, Erecting Shop Inspector, G.T.R., Stratford.

Geo. E. Evans, Resident Engineer, Dominion Bridge Co., Toronto.

R. H. Frees, Manager Walkerville Malleable Iron Co., Windsor.

J. A. Straith, President and General Manager Standard Paint & Varnish Co., Windsor.

John Mathison, Charge Hand, G.T.R. car ferries, Windsor.

A. J. Wilson, Constructing Engineer, Linde Refrigerator Co., Toronto.

Wm. McKay, Constructing Engineer, Robb-Armstrong Co., Toronto.

F. W. Sangster, General Manager, Metal Hardening Solution Co., Rochester.

U. E. Gillen, Superintendent, G.T.R., Toronto.

Chas. Bugg, Foreman, Waterworks dept., G.T.R., London.

C. G. Bowker, Trainmaster, G.T.R., Stratford.

Chairman,—That is a very good list. I think it is the best we have had since the opening of the club, and it reflects great credit on the secretary and those who have brought in these members. The Executive has unanimously elected them.

MEMBERS PRESENT.

A. J. Lewkowiez.	W. Price.	John L. Richardson
J. Hay.	Geo. McIntosh.	Geo. Black.
C. A. Jefferis.	J. J. Fletcher.	A. M. Wickens.
R. M. Hunter.	J. O. B. Latour.	M. Walker.
G. D. Bly.	C. A. Jackson.	I. Jefferis.
G. Bernard.	J. Barker.	J. M. Clements.
Acton Burrows.	S. Turner, jr.	W. J. Bird.
J. Harriot.	G. Shand.	J. Dodds.
W. Evans.	W. E. Archer.	W. C. Tait.
H. Clifford.	D. Campbell.	J. C. Armer.
J. R. Armer	J. W. Griffin.	W. A. Hare.
T. T. Black.	G. Baldwin.	J. McWater.
R. Chisholm.	J. W. McLintock.	J. Haines.
J. Duguid.	J. C. Blanchflower.	J. H. Stortz.
R. Pearson.	W. Smith.	L. Salter.
H. G. Fletcher.	A. G. McLellan.	J. A. Mitchell.
H. P. Ellis.	C. L. Worth.	

Chairman,—The next order of business is the reading of papers and discussion thereon. I have very much pleasure in introducing Mr. A. E. Fleming, of the Canadian Westinghouse Co., Limited, Hamilton, who has consented to read a paper on "Illumination." I have had an opportunity of hurriedly glancing over the paper and I feel sure it will be very interesting. I will now call upon Mr. Fleming.

Mr. Fleming,—Applause is always appreciated. I am glad you gave me it first as I may not deserve it afterwards. Before entering upon the paper as it is written, as an introduction, I wish to state that the idea is to bring before you the importance of proper illumination, not only in connection with business, factories, home lighting, but almost any walk of business or pleasure, so that the paper, rather than bringing out any specific points, will be of specific information. It is a very difficult proposition to crowd a lot of general information into a small space.

A more correct title for this paper would have been "Artificial Illumination." It is not my intention to touch upon the subject of daylight, but rather deal exclusively with the illuminants at our disposal to carry on our work, business, or pleasure, after Nature's great source of light has left us to our own devices.

No one will question the great importance of artificial illumination when we consider what an important part it plays in our lives. We no longer retire with the setting of the sun, but our work or pleasure goes on long into the night.

Let us reflect for one moment upon the vast amount of

artificial light now in use and the numerous ways and means of obtaining it. Is not then this subject worthy of careful study and deepest thought? Can the problem of the most economical and satisfactory illuminant be decided upon in a happy-go-lucky hap-hazard way? Should it not be treated as an engineering proposition equally as important as heating and ventilating or any other branch of domestic engineering which has become a specialty?

Of how this important matter is neglected I will cite as an example, the usual method adopted in choosing the lighting for our homes. We decide to build a house. We go to an architect and with him think over the plans, the materials, the furnace, the paint, the color scheme for the different rooms, etc., but when it comes to the lighting, the common practice is to bring out in the centre of the ceiling one gas or electric outlet, with here and there an additional one in the side walls. The contracts are let. When the house is nearing completion, the husband and wife decide it is time to choose the fixtures. They go to the fixture house, and the conversation regarding the dining room is typical of each room. They request the salesman to show them a dining-room fixture in much the same manner as they would inquire for a chair or sideboard. They are shown two-light, three-light or four-light fixtures, ranging in price from ten dollars to a hundred. They decided that after paying for the carpets they can afford twenty-five dollars for the dining room fixture. The one chosen has the proper colored art glass. It is put up. Not one word has been said about the color of the walls or ceiling, the decorations, the carpets or other fittings. No one has determined the proper amount of light to be used, the correct number of units or candle power. When the light is used the electric light or gas company is called all kinds of bad names on account of the poorly lighted room.

Has not this same principal been carried out in our stores, office buildings and our churches? Is not the lighting of our mills, factories, shops and work rooms only too often left to the artisan whose knowledge of the subject consists of the tools and materials he uses?

Every detail of a modern factory is gone into with utmost precision. The choicest location is sought, architects are engaged, consulting engineers retained. The best machine tools and equipment are purchased. The merits of different tool drives are considered, and thousands of dollars are spent in labor saving devices in order to cut down the factory cost, or to increase the output. How much study or engineering ability is devoted to the artificial lighting of this "new plant" of which we are justly proud? Is not the lighting nearly always left until the last, when too frequently the appropriation is

nearly exhausted and economy is necessary; that means sacrifice the lighting.

It is an acknowledged fact that work cannot be performed as efficiently at night as in the day. Would not a trip at nine o'clock at night through our modern factory convince the most skeptical that the lighting had a great deal to do with the reduced output? Note the great expanse of gloom broken only here and there by patches of light from solitary little illuminants hidden by shades. Compare the general appearance of the interior with what it is in the daylight. Watch the man operating the machine tool which costs thousands of dollars. He moves from place to place and carries with him an incandescent lamp attached to the end of a cord in much the same manner as a farmer would a lantern. Is it just to expect this man to turn out as much or as good work as his companion whose entire surroundings are well illuminated?

If these are facts is it good policy to economize and save money when considering the lighting? It not only means a loss of output with a corresponding loss of dollars in the factory, but a loss of temper, eyesight and general health in our homes.

Why then has not this subject been given more attention in the past? One answer, no doubt, is that until recently the illuminants to choose from were too few. It took century after century for man to advance from the fax or torch to the candle, and five centuries more to reach the Argand burner. Soon after this gas followed; the introduction of which people fought as though it were a plague. The type of electric incandescent lamp in general use to-day is over thirty years old, and until recently, no decided improvement was made in it.

The scarcity of light sources can no longer be used as a reason for not going more thoroughly into this subject now and in the future.

We naturally look to the architect to keep in touch with the best methods of lighting all interiors, but is it not expecting too much of him? Can he be an expert in all branches? Is not his opinion sometimes biased? Does he not often use the light to show off his mural decorations to the disadvantage of the working or practical illumination?

Until quite recently "Illuminating engineering" was unheard of, but science schools are now taking it up and it will soon be as well known as any other department of applied arts and sciences. In this the colleges followed the manufacturer. When the new types of gas and electric lamps were ready for the market the makers were awake to the fact that to have them properly installed and to get best results, in many cases meant the upsetting of sacred hereditary ideas.

In order to do this they drilled men in the history, develop-

ment and manufacture of all kinds and classes of illuminants. The main subject of all instruction was proper and practical illumination. From this nucleus has developed the new art of Illuminating Engineering. The Society of Illuminating Engineers is now a well organized body and recognized as such by the older engineering associations.

This subject is so broad that to be properly treated it should be divided into a number of branches and each branch treated separately as examples—street lighting, commercial lighting, (which might include stores and factories), domestic or house lighting, special lighting such as churches, theatres and buildings or rooms of uncommonly large dimensions, spectacular lighting, (under this branch would come signs),—*outline* and purely decorative effects. It is not reasonable to assume that all buildings can be treated exactly alike. The system used in a cotton mill would prove very inadequate for a foundry. The same type of lamp which would meet all the requirements of street lighting would hardly be called ideal for a church and what would be highly satisfactory in one church could easily be a failure in another.

What then must we look for in a lamp to assist us in deciding which to use:

1. That the light is naturally given off in direction needed without the aid of reflectors. As ninety-five per cent. of cases need the light below the lamp, then the point of greatest intensity must be in a downward direction.
2. That the efficiency must be such that the cost of operation is not prohibitive.
3. The cost of upkeep shall not more than balance the saving due to high efficiency.
4. That the mechanical arrangement (if any) should be easily and quickly repaired.
5. The quality of the light should be as near daylight as possible.

Having decided upon the kind, type and make of lamp to be used, the next steps are:

1. How much illumination expressed in candle power per square foot is needed to perform the work?
2. Where shall the lamps be placed with relation to the work?
3. What candle power unit is best suited?
4. How many will be needed?
5. What sort of diffusing or concentrating shade shall be used?

The amount of illumination should always be figured at the point where it is needed. For interior lighting, this point is generally three feet above the floor, for street lighting naturally it is on the street or pavement. The amount required varies directly with the nature of the proposition with which

we are dealing. One-tenth to three-quarters candle power per square foot would be sufficient for street lighting, while for the lighting of drafting rooms, from two to three candle power per square foot will be needed. A fair average for all general purposes is one candle power per square foot.

The rated candle power of illuminants has very little direct bearing upon the light obtained at the work point. This is due to the fact that the light is given off in so many different directions. The arc lamp, the loop filament of the ordinary incandescent lamp, the flat flame gas burners, the common gas mantle and the tungsten lamps all have their point of greatest intensity in the horizontal. The Nernst lamp, the flaming arc, the inverted mantle, are examples of lamps whose point of greatest intensity is in the lower vertical.

"Where shall lamps be placed?" As daylight is without doubt the ideal, we cannot do better than copy Nature, even in a crude way. Nature has placed all her light sources far above the line of our vision, and even protected our eyes still further by giving us protruding eye-brows. That looking directly at a high candle power unit is hurtful to the eyes, only needs the experiment to prove it.

The location of lights and the effect on our sight are both of sufficient importance, to each constitute a separate paper.

Best results are obtained by placing the units well above the line of vision, and where a strong local light is needed, have it helped out by a good general illumination. The use of a localized light is to a great extent in many cases, purely habit or a sort of hereditary taste. When our grandparents derived their light from candles, they were compelled to place them a few inches from their work, on account of the low illuminating power. The introduction of the oil lamp did not help matters much, but with the advent of gas, a step was made in the right direction, but this was on account of the necessity of pipes rather than any desire to depart from the old habit. Gas fixtures had to be placed at a point where they could be easily lighted or extinguished. Instead of changing the conditions, upon the arrival of the incandescent lamp, those who introduced it merely removed the gas tip and put on their new lamp, and even to-day we find the fixture in the same relative position.

In ninety-five per cent. of the lighting propositions, the best results can be obtained from an overhead system, not only from an illuminating standpoint, but also with regard to the cost of maintenance, and were this system in more general use, fewer of us would be wearing glasses or suffering from eye strain.

The candle power of the unit and how many, depends so on local conditions, that no general rule can be laid down. The higher the ceilings the larger the unit, and the fewer in

number. For the lighting of large interiors, we have in the past been greatly handicapped because we had no large unit and no small unit of the same color value. Observe the bad results obtained by trying to light a large departmental store with both arc and incandescent lamps.

The choice of shades or globes is as important as the selection of the proper lamp. The perfect reflector would be one which would combine maximum reflection or diffusion with minimum absorption. The glass used can kill the efficiency of the lamp. For our homes, offices and stores, do we not too often decide from the aesthetic and decorative point of view.

Naturally the local conditions must again be considered in deciding. A black ceiling in a factory would not be criticised, while it could not be tolerated in a dwelling or an up-to-date mercantile building. The light characteristic of the lamp under consideration decides the shape of the shade or reflector to be used for a given purpose. A very important point in choosing a globe or reflector is the ease with which it can be cleaned, also the part on which the dirt and dust would gather. This should be so that the accumulation could not obstruct the light to any marked degree. The size and shape of globes have a very marked effect upon the life of incandescent lamps and gas mantles. This is in itself a useless expenditure of money in renewals.

In choosing a lamp for ordinary commercial or domestic lighting go to your electric light or gas company for advice, which will always be cheerfully given. If you have a proposition out of the ordinary, consult the lamp manufacturers. In both cases you will obtain good, practical advice without cost. None of us are adverse to getting something for nothing. Remember it is their business and they are supposed to know. You cannot afford to make a study of it, they do. Your time is devoted to other pursuits.

The cost of upkeep of an illuminating system is as important as the selection of the lamp or the installation of it. What constitutes maintenance charges? All purchase prices of the lamps, transportation charges, breakage while in transit not made good by the manufacturing company or the common carrier, all breakage or loss in storage or in handling, breakage of glassware from any cause. Where mechanical repairs are needed, such as in the case of arc lamps, all labor and material must be charged against the system. I have purposely left the item, labor, until the last, for the reason that there is a tendency not to cover this properly. On many occasions I have had a manager say "we do not charge Jones' time because he does that while he has nothing else to do. It may be true Jones might have used his time on (in shop terms) "a govern-

ment job" but he would have been paid just the same. Therefore, an accurate record of all time must be kept.

How shall we arrive at a comparative cost for maintenance? The only fair basis for electric lamps is per kilowatt hour after having decided upon equivalent illumination. Where this is impossible, a lamp hour is a fair unit. The mere cost of labor and material means nothing more than an invoice price. It must be reduced to an unit basis of some sort.

For a number of years electric light has been considered the most dignified and convenient illuminant. Convenience and proper distribution of light together with cleanliness and artistic effects have all been talking points used to the detriment of gas. Whether or not these facts were true in the past, they can no longer be used to keep this form of illumination in the background. During the last three years much improvement has been made in gas mantles and so much thought has been given to the auxiliary apparatus such as burners, supports, chimneys and diffusing globes, that the gas user is now enabled to duplicate almost any form of bracket or fixture used in connection with electric incandescent lamps.

One of the latest steps in the right direction is the inverted mantle, which throws all the light below the horizontal. This type of mantle is made in sizes which range from twenty to one hundred candles when equipped with light opalescent globe. This mantle has made it possible for the gas user to obtain extremely economical illumination and combine with it artistic appearance of chandelier or fixture.

For high candle-power units, self-intensifying burners have worked out to great advantage, these being used extensively for large interiors.

One of the greatest objections to the use of gas as an illuminant is the rapid depreciation of candle power of the mantles, another, the extreme heat generated by the lamps. This heat causing dust and particles of dirt which are present in all atmospheres to accumulate above the lamps and be deposited on the ceilings, causing vexatious discolorations.

The cost of illumination by gas of course depends to a great extent upon the price paid for gas, which ranges from thirty cents per thousand cubic feet for natural gas in West Virginia and Ohio, to $1.75 per thousand cubic feet for manufactured in some of the smaller towns in the United States and Canada. While on the subject of gas for certain purposes we must not overlook acetylene, which, when properly installed, and when the generators are periodically carefully inspected and cleaned, gives a very satisfactory form of illumination where other gas or electric light are not available.

The ordinary form of electric incandescent lamp is too well known to need any description. This form of light, without

any assistance derived from reflectors, is an exceedingly expensive proposition. The standard sizes range from two candle power to fifty candle power, with efficiencies from five watts per candle power to three one-tenth watts per candle power. The size most commonly used is the sixteen candle power, whose average efficiency is about 3½ watts. A later type of the incandescent lamp is known as the Meridian. This is simply a standard filament made up in the form of a spiral whose axis is horizontal to the base of the lamp, thus giving and increased downward distribution. These lamps are never used without the aid of a reflector, which at the start was made of aluminum, but as the metal would not radiate the heat with sufficient rapidity, it caused a very short life of filament. The manufacturers then changed the reflector to one of glass of the prismatic type. The efficiency of this type of lamp is much better than the old. A forty candle power unit consumes approximately one hundred and twenty-five watts.

Closely following the development of the Meridian type the Metallized Carbon Filament Lamp was introduced. This lamp has been on the market about two years and has given more or less satisfactory results. This type of lamp is simply the ordinary carbon filament treated with a high temperature in the course of manufacture from which arises the term Metallized Filament. This treatment permits the filament to be operated at a higher temperature, which gives a lower watt consumption per candle power and enables the manufacturer to turn out larger units. The smallest unit which is twenty candle power, consumes fifty watts. The largest one hundred candle power, consumes two hundred and fifty watts. All these lamps are fitted with reflectors, which are made in three types, Distributing, concentrating and bowl. This type of lamp is known as the Gem.

The latest types of incandescent lamps which are now termed "High efficiency" lamps, are made from metallic wires, which are exceedingly refractory, such as tantalum and tungsten and at present, the outlook for very beneficial results from this type of lamp seems promising, though, however, there is at present no indication that these lamps will be made in small units (except for exceedingly low voltages) nor will they be operative on voltages above one hundred and twenty. The tantalum lamp does not appear to give good results on alternating current, while the manufacturers of the tungsten are apparently willing to guarantee equal life on alternating current or direct current. The disadvantages of this lamp seem to be that, though there has been a lot of advertising done in connection with it, deliveries in large quantities seem impossible. The cost of maintenance per kilowatt hour is exceedingly high. The thirty-two candle power size consuming

40 watts with a life of 900 hours at the usual retail price of $1.50 per unit would cost 4-17-100 cents per kilowatt hour. This does not include any charge for labor or shade renewals.

The first lamp to make any decided improvement in economy was the Nernst lamp which was introduced in 1901. This type of lamp was a radical departure, and is what might be called an incandescent lamp operating without a vacuum. In order to distinguish the light giving element from the carbon filament, it is termed a glower. The glower consists of rare earths such as magnesium and thorium, which are very similar to the earths used in the manufacture of the Welsbach mantle. These earths are made up into the form of a small rod which in its normal condition, is an absolute non-conductor. In order to get it to conduct, external heat must be applied. When brought to a proper temperature, the glower will conduct instantaneously. In the commercial lamp this heating is done automatically, and the heating device is automatically removed from the circuit as soon as it has performed its function. This lamp is made in six sizes, ranging in candle power from 50 to 550. It has the great advantage of having large and small units of light, all of the same color value, which fact lead to its adoption for the lighting of the large Pennsylvania Terminal in New York City, the main waiting room of which presented one of the largest lighting propositions ever undertaken. This room as planned is 300 feet long and 100 feet wide, the ceiling 167 feet from the floor line.

The color value of this lamp is without doubt the nearest approach to daylight of any artificial light on the market. This, taken into consideration in connection with its efficiency, of approximately one watt per candle, makes it well worthy of consideration for almost any commercial lighting proposition. For a few years this lamp was available only for alternating current circuits, but can now be obtained for either alternating or direct current.

The cost of maintenance, including all labor and material, varies from six-tenths of a cent to one cent per kilowatt hour, according to the local conditions, and the accessibility of the lamps.

In the arc lamp field, the original open arc is now obsolete and the enclosed arc lamp is too familiar to need any description. A new type of arc lamp has lately been introduced. This is what is known as the flaming arc. It derives its name from the fact that the light is produced in the flame of an arc, that is, established between special carbons, which when heated by the current, produces a vapor or gas, which emits light. These lamps are exceedingly high candle power, developing from 2,500 candle power to 3,000 candle power. On account of it being such a high candle power unit, the carbons have been

impregnated with salts, which cause it to give off an exceedingly yellow light so as not to be quite so injurious to the eyesight. Almost any colored light could be obtained by use of proper salts. There are places where this lamp could be used to advantage, but so far, its use seems to have been limited to the advertising field.

The cost of maintenance of this lamp is at present high, on account of the carbons being imported, the cost of trimming alone averages from twelve to fourteen cents, one trim lasting from ten to fifteen hours.

In connection with the standard enclosed arc lamp, a reflecting device known as a Concentric Diffuser is sometimes used to great advantage. This is occasionally worked up into a more artistic piece of apparatus which is known as the Light Balancing Ceiling Diffuser. The only lamp which has been used with this diffuser with any degree of satisfaction, consumes 715 watts.

A different type of lamp is now being pushed with a great degree of satisfaction for some classes of lighting. This is known as the Cooper Hewitt Mercury Vapor. The light is obtained from electrified gases given off by mercury used in a bulb in connection with a long tube. There is no question but that this lamp is the most efficient electric lamp on the market, but is greatly handicapped on account of the distortion of all color, it being entirely lacking in red rays, consequently anything red appears black or deep purple. This lamp is not made in small units, and as a result cannot be installed to advantage where the ceilings are low.

In closing, I feel that I have not done justice to this subject on account of limited time, and also my endeavor to cover so broad a subject in one paper. If you have been enabled to glean any information which will be of practical use, I will be entirely satisfied, but my chief desire was to impress upon you the importance of treating artificial illuminations as an engineering proposition.

Chairman,—I forgot at the beginning of the meeting to ask that you all sign the attendance cards so that the Secretary will have a complete record of everybody present. I am sure that we have all listened with a great deal of interest to Mr. Fleming's paper, and it may be said that he has thrown considerable light on a dark subject. The discussion which follows the reading of a paper like this should bring out many good points. The railway companies have certainly done their share in the improvement of lighting, especially in passenger coaches, people who travel much by train know this. I hope that we may have a good discussion on this paper and in the course of the discussion something may be brought out

which had not been mentioned in the paper, such as lighting from the railway standpoint, lighting of car shops, factories, etc. I hope none of you gentlemen will be backward in coming forward as far as the discussion is concerned, and that it will be a thoroughly interesting one.

Mr. G. D. Bly,—

There was one thing which perhaps Mr. Fleming did not take up, that is Moore tube lighting, which seems to be considerably mentioned in the journals, and I believe has been demonstrated a bit in New York. I do not know whether any here know about it, but perhaps some do. I believe the tubes are made in all lengths up to two and three hundred feet.

Mr. Fleming,—

The Moore tube is simply a glass tube which is exhausted to a point of vacuum, which enables the remaining air within the tube, to be brought to a point of conductivity, and is started by means of a high voltage from a kick or spark coil. When you start the lamp you cause a kick through the tube. The normal voltage then follows. I may say the Moore tube has been used in a number of places on Broadway, but from a commercial standpoint, it has not been placed on the market. This type of lamp is very difficult to ship any distance. The breakage on these tubes is very high and it does not pay to ship them any great distance. Then there are some other points in connection with the starting device which are not quite satisfactory. You might term this light electrified gas. We do not get ideal lighting from any illuminant which gives off an exceedingly bright light from a small surface, such light is too concentrated. With the Copper Hewitt lamp, the diffusion is very great because the tubes run from 24 up to 48 inches. The whole tube, which is about one inch diameter, is equally illuminated. With the Moore tube you can extend it any length or shape you want. For instance, you can have the tube mark the contour of this room if you wish.

The question of renewals on this lamp I do not know about. I do not believe there are any commercial figures on this. Where renewals are made in New York, I believe they are made by the manufacturers who say nothing about the expense.

Regarding factory lighting, in order to go into this properly you must give a specific proposition just the same as though you were buying an engine. In engines there are the compound, simple, vertical, horizontal, different makes of valve gears, etc. In choosing an engine you choose it for the purpose in hand and similarly with lighting. I wish you would put up some specific proposition.

Mr. A. M. Wickens,—

I am sure we are all very much pleased with the efficient lecture we heard. There are some points which we are not quite clear on. One of the statements Mr. Fleming made with reference to lighting a hall or large room, he stated you need a larger amount of light in larger units. Of course you take the idea that you are going to light the room with incandescent lamps. I have seen a case or two where lighting such a hall as the legislative hall in the Parliament Buildings, considerable experimenting was done, and the results were very startling to the experimentors. In the Parliament buildings in Toronto where the ceiling is fifty-seven feet high and the room is eighty feet wide by ninety-five feet long, there are two galleries in the room, and they light it with four large chandeliers having thirty-six incandescent lamps in each, with some brackets on the sides. The architect in the beginning planned that only sixteen candle power lamps were needed, but before they were done they used thirty-two candle power lamps. They were suspended a little more than half way between the floor and the ceiling. They were hung a little higher than many of us thought they ought to be, however, this was on account of the galleries. If the lamps were hung lower down they would be all right for those on the floor but would be shining directly in the eyes of those in the gallery. The lighting has never succeeded very well in that place.

In the Dominion House they undertook to light the room through the ceiling. I believe this is an ideal way of lighting if you do not consider the cost to get light. They put up a glass ceiling and put the lights above with reflectors above them again. The ceiling was made of prismatic glass. I happened to be there and was interested in lighting at that time. When the lights were first turned on they had a funny shadow about eight feet from the wall and extended all the way down the floor of the room. We know the proper light should be as near daylight as possible. This glass ceiling had been put up by glass men who had figured out the angles of the bars in each piece of glass to get the reflection exactly right on the floor, it did not pan out well. However, the people who were experimenting took this glass with the corrugated bars and broke up the angles and reflected the rays the opposite directions. This made a better success of it. It took 900 16-candle power lamps to light that room in the end, but it was beautifully lighted, and fairly successful. If you do not care about the cost, it made very good lighting.

From my experience along these lines I found it was better to diffuse the mass of lighting unless you do not wish to go minutely into the cost.

Mr. Fleming,—

There is a point in connection with the lighting of large rooms with exceedingly high ceilings which is sometimes overlooked. If you attempt to light a room where the walls are so far distant from the objects to be illuminated that you get no help from the walls by reflection, you get a flat effect, which causes disagreeable shadows on the faces of people assembled under it. The reason of that is that all the light is coming from above and that there are no side lights and no reflection.

Regarding the lighting of the room at the Parliament Buildings in Ottawa. In the original layout of this room the ceiling was divided into large sections and then again into four small sections. The idea was to put four incandescent lamps over each of these four small sections. The original load as installed with the incandescent lamps was over 36 k.w. Even the Government will sometimes kick at the current and price of apparatus. We took up the subject of lighting that room more efficiently and to cut down the current consumption. We replaced four of these incandescent lamps with one lamp, using two glowers, with the result that the total consumption of 36 k.w. with the incandescent lights was reduced to 20 k.w. with the Nernst. If any of you gentlemen have seen the room since you will be able to give an opinion on it. I will not say anything further regarding this matter. That room is one of the most difficult rooms to light that I have ever seen. You have a crimson color to deal with. There is only one color worse than crimson and that is black. You have no reflection from it. On figuring the reflection from a white surface you can count on the drop in candle power per unit due to age being compensated for by reflection, but where you have got a crimson wall, you get absolutely no help on the proposition. It has all got to be direct light.

Regarding the prisms which Mr. Wickens spoke about, they were cut for daylight. The light in that room is all taken in from the south side, but these prisms were placed as though the light came from the north side. They were later changed around. Of course you understand this is a Government job. Now we were up against a proposition in that these prisms were designed to take light at a certain angle and so that the light would be sent down straight. We had a light which was going down straight and we were trying to force it straight through. A better result would have been obtained if the ceiling had been ordinary ground glass and had some strong reflecting surface at one side of the skylight instead of having these prisms. You would have had far better results in the daytime and much better results at night.

Chairman,—

We are very much indebted to Mr. Wickens for bringing up this point. Of course it must be remembered that what he has spoken of is a government work and the poor railways could not afford to spend so much money on such matters. It has been said that all the Government has to say is "Let there be money" and "there is money," but the railway companies cannot do this. Perhaps by the time the Toronto Union Station is built they may have accumulated enough money to indulge in a few luxuries.

Mr. Fleming,—That is rubbing the railroads a little hard. I might say, however, that there was one railroad that had sufficient money to have their station lighted with overhead light. In the Pennsylvania Depot at Pittsburg the same idea was carried out. Their original installation was massive chandeliers and massive side brackets. The illumination in that room at that time was abominable. They had a beautifully decorated ceiling and spent thousands of dollars in decoration, but this was all lost at night as you could hardly see these decorations. They threw out all these fixtures and put in lighting from the skylight. Now the flat effect I spoke of is very apparent here. If you looked at the people in the waiting room they appeared as though they had goggles on. Lighting like that should be helped out by slight side illumination.

Chairman,—We would be glad to hear from Mr. Smith on this subject.

Mr. Smith,—I think I would sooner listen to Mr. Fleming, as I am only a student in this line, and in fact if I want to ask a question I go to Mr. Fleming for an answer. I think Mr. Fleming should give us some valuable information regarding Marshall Field's lighting in Chicago.

Mr. Fleming,—Mr. Smith evidently takes a point which he is most interested in. Yet at the same time if you will apply some of the rules which Marshall Field applied, you will find them of great assistance. I happen to have some of the figures on the results of tests. I will just run them over.

Marshall Field & Co. about three years ago, decided that the lighting of their store was too expensive a proposition. They had massive brass fixtures throughout the entire store ranging from two to seven lights each. They were decorated with artistic glass. The bills for current were enormous and they decided to look around and make a change. At the time they started to make these tests they invited all lamp manufacturers in the United States and Europe to send to them

lamps for test, and if they cared to go to the trouble, they could send a man and have the lamps installed under their ideal conditions. In fact all the American manufacturers of lamps sent samples and also did some of the European firms. About 25 or 30 different lamps were sent for trial, but the final test came down to about four lamps, viz.; Gem, Tantalum, Tungsten, ordinary carbon lamp, and the Nernst lamp.

Lamp.	*Watts per sq. ft.*	*Average candle Ft at counter Height.*
Gem.....	1.42.....	3.96
Tantalum.....	1.12.....	3.15
Diffusing Arc.....	1.23.....	2.95
Nernst.....	1.09.....	3.42

The test was gone into very thoroughly and there is no lamp manufacturer who can point to the Marshall Field and say they were not given a fair show. One of the manufacturers said so, but Mr. Pearson of the Marshall Field Co. said, "Gentlemen, you sent your best lamp here and put it up and was it not taken care of under the best conditions as you recommended?" That firm had to admit that this was true. The instruments for testing were approved by the University of Chicago.

Marshall Field replaced in their store in the neighborhood of 40,000 incandescent lamps with the corresponding number of fixtures, and went to the large unit system. I do not know whether they scrapped the fixtures or sold them. In the Marshall Field Store they put the lights within a very short distance of the ceiling. That has this effect; that when you go into a room so lighted it gives height to the ceiling. Now if you go into a church at night where the gas jets are supported from the pews, as is often the case, the height of the church is entirely lost. The eye will not go above the lamp.

All high efficiency lamps are being frosted on the bottom now. Mr. Smith can probably give you some accurate data regarding frosted lights. It will reduce the life of the lamp nearly 25%, but it is easier on the eyes. It will probably reduce the actual candle power about 20%. However, I am of the belief that you can get better illumination from a frosted lamp than a bare lamp. There is a great deal in getting proper shades or reflectors for lamps. Take, for instance the lamps hanging in the chandelier in this room. There is no doubt to us why these lamps were put up there, of course for decoration and not to give light. Such fixtures should be purchased by the pound, at least that is the way you would have to sell them.

There was another proposition which came up in the Marshall Field tests, that is, what is the proper light for a depart-

mental store, where carpets, dress goods, etc., are sold. Where these articles are sold, it is necessary to have a good light to show up the proper colors, as these stores pay out annually a large amount of money in refunds due to customers claiming the goods are not the same as they saw when purchasing. The arc light did not prove satisfactory on account of this. I will grant it is a good light for some colors. The best light is one that shows the greatest percentage of colors to the same advantage which would be shown in daylight. Now the arc light will make certain colors stand out beautifully, but with others it will not, therefore, the Marshall Field Co. turned down the arc lamp proposition at the start. They came then to the filament lamp.

With reference to the Moore Tube lamp as mentioned in the early part of the evening, I might say there was no mention made of it at all at these tests.

Mr. G. D. Bly,—Mr. Fleming was speaking about a sand blasted lamp. I wish to know whether he considers the frosted lamp better than the painted lamp. I think the sand blast beats the frosted lamp. I find reflectors with a satin finish better than those with a bright finish. I find that reflectors with a bright finish throw the rays of light on the tables and counters. I should like to know the reason of this.

Mr. Fleming,—The objection to the painted lamp is that the heat cracks the paint and it falls off.

In the lighting business you meet all kinds of people and many the proposition I have been up against in trying to convince almost all kinds and conditions of people that a certain lamp now established on the market, was a sure proposition. I have gone into a store where a lamp would be hanging over the counter. I would explain that I had a lamp that was cheaper and better but it would be almost impossible to convince that person. He would reply that his lamp had been used for four years and has burned ten hours a day and has not burned out yet. I ran up against another man whom I talked reflector to, and I tried to convince him that he could get better illumination from a reflector I had than from a mirror reflector. He said, "Look at that lamp; there is a mirror reflector and a 16 candle power lamp. That gives me double the light." I asked him whether he shaved himself in the morning. He said, "What has that got to do with it?" I replied, "By having a mirror to shave by, were there two men shaving?" There is a lamp reflector in the market which gives very good results. It has a satin finish. You will not get more candle power per square foot by using such a reflector but will get a more even illumination without seeing those spots which were

spoken of. My advice is and always has been, to try and get even illumination, as there is nothing more trying and more injurious than an incontinuous light, or having an electric light shade which throws the light on the surface and it in turn throws it backwards into your face. I think I am right in saying that in nearly every office in the country people sit with a reflector at their nose which throws the light on their work, while the room is dimly lighted. Watch some gentleman sitting at his desk and working away with one of those so-called desk lamps. Now supposing the rest of the room is ordinarily lighted, and you attract his attention from his work, he will immediately look up and close his eyes. This has caused the pupil of his eye to contract to accommodate the change in light. In working under these conditions you have a continuous contraction and expansion of the pupil of the eye and this gentleman reaches a time when he complains that there is not enough light, and that the generator is not throwing out enough power at the station. He gets a higher candle power lamp and finally ends up in getting glasses. If he had had that lamp four or five feet above his work in the beginning, he would not have had to change the unit of light. He would have had an even illumination and would never have had to change it. As a test, any of you gentlemen try it—it may be a little hard at first, but you will soon get accustomed to it.

In office lighting there comes an hour each day when it is extremely hard to see with the desk light. The color value of the paper is not the same. This is caused by the red or yellow light of the setting sun and some other light which does not mix. If you will pull down the blind at the nearest point you will remedy it and get a far better light for that period of the day.

Mr. J. C. Armour,—You say the frosting on a globe shortens the life of the film.

Mr. Fleming,—The frosting of the globe retains the heat. It does not permit the glass to radiate the heat as rapidly as ordinary clear glass. That causes the filament of the lamp to operate at a higher temperature than it was intended and therefore shortens its life. You will notice on the frosted lamps that the blackening is very much more rapid than on a clear glass. I would rather have a frosted glass than a clear one, even if it burned out a little sooner. There is the greatest tendency everywhere to over-burn the lamps and burn them far too long.

A rough and ready test is to take your incandescent lamp and put a piece of white blotting paper or any other white paper behind it and if the lamp shows black and smoky, then you

had better throw it away. The cost of throwing the lamp away may be somewhat expensive, yet taking into consideration the efficiency with which you are able to work with a better light it fully balances the expense.

Mr. G. D. Bly,—I seem to be asking a considerable number of questions. I notice in the Electric Review of September issue there is mention of a Thomson Houston lamp by Mr. Wilcox surpassing the Nernst lamp. As Mr. Fleming is representing the Nernst lamp, we should like to know whether this statement is true.

There is another lamp about which Mr. Fleming did not speak. I believe it is Osmium lamp. I believe it is made in Germany and they turn out about 10,000 per day. I would like to know if that lamp was represented at Marshall Field's.

Mr. Fleming,—I believe it was. The main question about these high efficiency lamps is cost of maintenance, and it is peculiar that any improvement which is made in lamps comes from Germany. Whether this particular type of lamp originated in Germany I do not know, however, I know there was a number of foreign film cut lamps represented at Marshall Field's test, but the question of maintenance after burning a certain number of hours made them prohibitive. I may state that at the present time there are about thirty so-called new lamps on the market, and which may be termed, "Not yet but soons."

Now as regards Mr. Wilcox's statement, you put me right up against it, but to get over this difficulty I will state a little anecdote which occurred between Mr. Wilcox and myself. It occurred in 1902 at the American Street Railway Convention in Detroit. There were all kinds of electric exhibits in the Armories, and among them was a Nernst lamp. I was delegated to represent that lamp on that occasion. Mr. Wilcox came along and I was explaining the lamp to a customer who seemed very much interested in the proposition. Mr. Wilcox said that he could take their standard 16 candle power light and put a tin pan over it and get better efficiency than with a Nernst. I said, "Mr. Wilcox, if you can do that, why don't you go home and try." It seems to be a much better proposition than the Nernst. The next year I was very much surprised when I went into the General Electric Company's exhibit at Chicago. My little girl was with me and she called my attention to some lights which looked like the Nernst. I looked around and saw an incandescent lamp with a spiral filament and with a reflector above it, making it look very much like the Nernst lamp. I said to Mr. Wilcox who was there, "I see you have your incandescent lamp with a tin pan on the market."

Now to come back to the question as to whether the Tungsten lamp is ahead of the Nernst lamp. Place an order for Tungsten, one for a Cooper Hewitt and one for a Nernst, and you will see which you will get first.

Now that brings me up to a point which is worthy of consideration. Supposing some of you gentlemen had some large lighting proposition under consideration. The Westinghouse Co. would no doubt send a representative to you and tell you all about the Nernst lamp. Some other gentleman would come along and tell you all about the good qualities of another lamp. You have every reason for good faith in these companies and you believe what their representatives say is so. Now it may be a question whether the Tantalum or Tungsten or Nernst lamp is best. You consider it a hard matter to decide, as you may find in a couple of years there may be another light out which will beat what you decide upon now is the best. Now we will take the Marshall Field proposition for instance. They tested the different lamps and finally decided that they could save enough money on the investment in a certain time to allow them to throw out the other lamps they had and put in the Nernst, even with Tungsten and others in sight. I say this entirely without any reference to business. You must make these people who come to you and talk a high efficiency proposition, show you the goods. The best way is to hold them down to a point. When it comes to maintenance, put it right up to them and say, "I take your word for what it is going to cost. Now, will you do it at some fixed figure?" When a man comes along and tells you that a certain lamp will burn 2,000 hours, you must remember that that gentleman is not in business for his health.

Mr. H. G. Fletcher,—Recently we have been hearing something about tests on different lamps at the market buildings. I believe there were three different lamps on test; the flaming arc lamp, Nernst and Standard enclosed arc lamp. I believe the flaming arc lamp was installed.

Mr. Fleming,—I do not mind stating here, but of course would not have stated there, that there was a place where the Nernst lamp was not the best thing. I think they did the proper thing in installing the flaming arc lamp. The Nernst lamp is not as efficient as the flaming arc lamp, for that particular place.

Mr. Bly,—The Helion lamp was exhibited at the Exhibition. Perhaps some of you have seen it. We were told at the time that there was to be a factory started up in a short time. No doubt some of you took stock in it and know something about it.

Mr. Fleming,—We had an exhibit of the Nernst lamp at the Toronto Exhibition. People would come along and say is this the new light, and of course I would not deny it. However, after they talked a while I would find out they were looking for the new Helion light. The Helion light was a departure from the filament proposition. Of what it is made I am not familiar; when they can make enough of them I think it may be a fair proposition, however, it is not a commercial proposition at present. Mr. Potter, the man who has had most to do with the developing of it, is very skeptical himself of it.

With regard to the exhibit, you saw that for yourself. You again put me in a hole to be critical. I will give you the facts. You would come up there and see a beautiful light and the gentleman in charge, who was a very nice young man, would tell you all about the light. You asked him for some descriptive matter and he gave you a booklet which had a blank form to fill in at the back. How far the factory is progressing I do not know, however, I do not think they are going to light it with Nernst lamps.

The gentlemen representing this new light, came over to our exhibit one day and after asking me some questions, I in turn asked him some about his light. He said that it would last about 2,000 hours. I asked what was the depreciation in candle power. He said none. I asked him how many lamps were in operation to determine the life. He said about forty. I then stated that probably if he had eighty it might get down to 1,000 hours instead of 2,000. It is not a commercial proposition and is only in the laboratory stage.

Chairman,—We certainly have had an interesting discussion, but there has not been much said about train lighting. The C.P.R. have been making a change in lighting its passenger coaches. Perhaps some C.P.R. man is here who might give us some information on this. The C.P.R. have been changing from acetylene gas to Pintsch gas.

Mr. Fleming,—There is one point in connection with the new system of train lighting that I wish to call your attention to, the kind of globe used. It is used with the acetylene and Pintsch system. They give very excellent results. I call that good lighting as you can look at the source of lighting and it does not injure the eyes.

With regard to train lighting, I think in the near future you will see a decided change, and there is a tendency for the universal adoption of electricity for train lighting. The Tungsten light could be used there satisfactorily with low voltage. The weight of the generator or batteries could be reduced about one-half, due to the low consumption of the Tungsten lamp.

Chairman,—The reason for change on the C.P.R. is with a view to safety. In some accidents on that line there was considerable loss of life owing to the acetylene in the tanks taking fire. The acetylene was a splendid light in the coaches, and the Pintsch gas is also highly satisfactory. It is being used with a special mantle installed by the Safety Car Heating & Lighting Co.

There is also the question of lighting railway shops. Can we get any information about the lighting of the C.P.R. Angus shops or the G.T.R. Stratford shops?

Mr. J. Duguid,—I do not believe they have reached that point at Stratford, but perhaps Mr. Fleming is better informed of what lighting they intend to adopt.

Mr. Fleming,—In the Angus shops at Montreal they used direct current open arc lamps in the high bays. Now in nearly all your factory construction you have a high bay with a clear storey and windows on either side. You have also running below this clear storey, cranes. That, of course, prevents the lamps being dropped to any degree. Therefore you have to put them up in the clear storey. Now let us consider a moment the character of the arc lamps which they had already installed. You have two carbons. The light comes in a horizontal direction. There is a reflector on your arc which throws some of the rays down but the majority of your light goes right out the windows in your clear storey and does not go below where you need it. Now that, together with the low efficiency of the arc lamp, lead the Angus shops to make some change. A 69 blower Nernst lamp with metal reflector (dome in shape), replaced the others. The light was more satisfactory and the current consumption was reduced about 25 or 30%. The cost of maintenance remained about the same, leaving out the mechanical cost of repairs to the arc lamps.

At Stratford shops it is a little too soon to talk about the proposition. The consulting engineers connected with the shops have recommended to Mr. Patterson that he use the Cooper-Hewitt lamps. The Nernst lamps have been considered and some of the gentlemen directly connected with the work are in favor of Nernst lamps. I think, however, if a Cooper-Hewitt lamp can be obtained, which will start automatically, and the price is satisfactory, it will be the best proposition for factory lighting where you have those extremely high bays and where you have two tiers of crane bays from 55 to 60 feet. Now, however, where you have smaller bays and a lower ceiling, there is no question about it that the Nernst lamp is the better proposition. But if you happen to have, as some companies do, girls working for you and install the Cooper-Hewitt light,

you had better look out for a strike. There are no red rays in this light. They make your lips look as though you have been eating huckleberry pie. Your hands look as though you had black marks all over them. There is no doubt that the Cooper-Hewitt lamp is the most efficient as far as current consumption is concerned. It is the best proposition for foundry and machine shop lighting. It is also a good proposition where color value does not enter into consideration such as in a newspaper office where black and white are dealt with.

Chairman,—What about yellow journals?

Mr. Fleming,—It would turn them green. A sheet of printed paper under the Cooper-Hewitt light would make it look as though it was embossed. It is one of the best lights to read or write by that there is.

Chairman,—Do you know anything about the installation of lights at the I.C.R. shops at Moncton.

Mr. Fleming,—There are two propositions there. It practically comes down to a direct current proposition. That is the point which is being brought up in connection with the Moncton shops. The proposition as it stands now is whether it is better to install direct machinery and Cooper-Hewitt lamps or use the present capacity which they have to spare for lighting with alternating current and Nernst lamps. It is now being considered.

Mr. J. Duguid,—Regarding the placing of lamps above the traveling cranes. I do not think there is any better place in the shop where the lamps could be placed. In the Hornell shops of the Erie railway they have the Cooper Hewitt lamps with reflectors which throw the light on each side of the locomotive and it has a tendency to reflect underneath it. What I have seen of the Cooper-Hewitt lamp, and I have seen considerable of them, I have never been in favor of it even if I have never used it at all. It makes things look as though you were working in a cemetery and the corpses are along with you. They claim the men will get used to them, but I do not think it will be in their life time. Now with those lights. if you take a piece of brass, you do not know whether it is steel or babbit. I think the Nernst lamp is the only lamp, and even if it does not give proper illumination from high bays, you can put it in a greater number of them.

Mr. Fleming,—That last remark is certainly the way to look at the proposition. You should not look at it altogether

as to the cost but should consider it as to the best light you can get. Other things are secondary.

Speaking about not knowing brass from babbitt, brings up a story of a large wholesale place where they installed Cooper-Hewitt lamps. The men were making some shipments from stock and they used to do the work by going by the color of the metal. On the first night of the installation of these lights they found they had shipped about half a carload of copper and thought it was brass.

One night, while in Chicago, when passing a large shoe store window lighted with Cooper-Hewitt lamps, I noticed among the crowd a negro. I particularly noticed that his face looked like a dark green.

Chairman,—There is one point which we might take up, namely, the question of locomotive headlights. The Board of Railway Commissioners have issued a circular stating that they contemplate issuing an order compelling all railways to use electric headlights on locomotives and asking the various railway companies to state any objections they may have. Perhaps some of our mechanical members would like to say a word or two on the subject. We would be glad to hear from Mr. McLellan.

Mr. A. G. McLellan.—I do not know that I have anything to say on the subject. I have never handled anything other than the ordinary reflector. I notice the C.P.R. have electric head lights on their engines, but I have not had any experience with them as yet.

Chairman,—I suppose the G.T.R. are considering the use of electric headlights in consequence of the Board's circular.

Mr. A. G. McLellan,—I think they are.

Chairman,—I think we have had a very interesting discussion. It is very good of Mr. Fleming to come here and give so much of his time. He read a very valuable paper, and as often is the case, many other good points came out in the discussion afterwards. We are very much indebted to Mr. Fleming for his trouble in coming here, and I would like some gentleman to move a vote of thanks.

Moved by Mr. H. G. Fletcher and seconded by Mr. C. A. Jefferis, that a vote of thanks be tendered Mr. Fleming. Carried.

Chairman,—I would like to remind you that the next meeting of the Club will be on May 19th, when we expect to have

Mr. Clarkson James, Secretary to Department of Education, with us, to give a paper on education.

There is another matter to be taken up to-night, which we will have the pleasure of participating in. I will call upon Mr. Baldwin to introduce the subject.

Mr. Geo. Baldwin,—Mr. Chairman and gentlemen: On behalf of the representatives of the Canada Foundry Co. Limited, I have a pleasant duty to perform and thank the Engineering Club for granting me that privilege.

Until recently Mr. J. J. Fletcher was the superintendent of the Canada Foundry Boiler Dept. His connections with the Foundry have been severed, and on that account, several of his fellow foremen thought they could not allow him to leave without showing, in some tangible form, the esteem in which he was held by them.

For several years it has been our pleasure to know him in genial friendship, and recollecting those pleasant years made agreeable through his acquaintance, his fellow foremen have requested me, on their behalf, to present to him this diamond ring, and in doing so, Mr. Fletcher, we, one and all, wish you long life and happiness.

Mr. J. J. Fletcher,—Mr. Chairman and gentlemen, this has kind of taken the wind out of my sails. I am sure it is gratifying to me to think that during my term of office at the Canada Foundry that I was held in such esteem by the employees. We have always had good fellowship among ourselves, always tried to help one another, and always tried to work to the interests of the company. I have always tried to do as near right as I possibly could with my fellow men.

You all know that I am not much of a speaker, but if I came to boiler matters I would say more. I wish to thank the foreman of the Canada Foundry for this valuable gift. I shall wear it and be proud of it, and I hope that our friendship will not cease whether I am in your midst or away. I do not know, but from the way things look at present, it seems as though I will have to become a Yank, as there is nothing doing in Toronto, but should I cross the line I shall always have the sweet memories of the Canada Foundry and its associates. I thank you gentlemen again. Applause.

Chairman,—I am sure that it has been a great pleasure to us to have a meeting of the club made an occasion for a presentation to one of our members. Mr. Fletcher has taken an active interest in the Club from the start and has served throughout on the Executive, and I am sure that I am only voicing the feelings of all the members of the Club as well as those of the

Canada Foundry representatives, in hoping that Mr. Fletcher will not have to leave Toronto, but if he does he will take with him the good wishes of every member of the Club. Before we adjourn, I would urge on you to bring as many new members as possible, and above all do try and let us be here punctually. It is very dispiriting to a speaker to see delinquent members dropping in late.

Moved by Mr. C. A. Jefferis, seconded by Mr. H. G. Fletcher, that meeting adjourn.