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

OFFICIAL PROCEEDINGS

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

ROSSIN HOUSE, TORONTO, Dec. 17th, 1907.

The Vice-President, Mr. McRae, occupied the chair.

Chairman,—

It is now considerably past the usual time for starting our meeting. We have waited to see if some of the later ones would arrive; however, what we lack in numbers I hope we will make up in enthusiasm.

The first order of business is the reading of minutes of previous meeting.

The members of the Club have all been supplied with our monthly magazine containing the proceedings of the last meeting, and it will only be necessary to have a mover and seconder for this order of business to be disposed with.

Moved by Mr. Acton Burrows and seconded by Mr. C. A. Jefferis that the minutes of last meeting be taken as read.

Chairman,—

The second order of business is the remarks from the chair. As chairman of the meeting I have nothing of any importance to say, except that to-night is the time for election of officers, and we will take it as our fourth order of business instead of the twelfth, so as to get through and leave the meeting open for the discussion of other subjects.

I may say we have a letter here from our President, Mr. Kennedy, which reads as follows:

ST. ALBANS, VT., December 11th, 1907.

MR. C. L. WORTH, Secretary and Treasurer,
Central Railway and Engineering Club,
409 Union Station, Toronto.

Dear sir,—I am in receipt of yours of December 7th. Providing I have not the pleasure of attending the next regular meeting, I shall be pleased if you will say to the members that I appreciate very much the remarks made by Mr. Burrows at the last meeting, and that I sincerely hope the Club the coming year will be as progressive as during the past year, and if there is anything in my power that I can do for the Club I shall do it with pleasure. I will, however, make special effort to attend your meeting for the election of officers.

Yours truly,

WM. KENNEDY.

Chairman,—

I am very sorry to have to inform you that Mr. Kennedy sent word he was unable to be with us to-night owing to the fact that his mother has met with a serious accident, having fallen down and broken her leg. I am sure we are all very sorry.

Chairman,—

The third order of business is the announcement of new members, and I will now call upon the Secretary to read same.

NEW MEMBERS.

Jno. S. Gray, Foreman Machinist, Polson Iron Works, Toronto.

Adam Taylor, Machinist, G.T.R. Shops.
W. J. George, Engineer, G.T.R., Mimico.
Murray Walker, Machinist, G.T.R., Toronto.
A. W. Shallcross, Machinist, Toronto.
J. R. Donnelley, Master Mechanic, G.T.R., Allandale.
S. Hall, General Foreman Machine Shop, Polson Iron Works.
W. Price, Locomotive Foreman, G.T.R., Lindsay.
W. A. Hare, Standard Engineering Co., Toronto.

MEMBERS PRESENT.

W. R. McRae.
H. W. Cook.
W. H. Chidley.
C. A. Jefferis.
M. W. Randall.
F. Wickson.
Acton Burrows.
S. M. Mathews.
Geo. Shand.
A. J. Lewkowiez.
Jno. Dodds.
Geo. Black.
Geo. McIntosh.
I. O. Frost.
W. H. Farrell.
J. J. Fletcher.
H. E. Rowell.
J. Duguid.
J. Moorhead.
E. D. Bly.
R. N. Card.
Jno. L. Richardson.
A. W. Shallcross.
J. V. Jackson.
D. C. Hallowell.
W. Evans.
Geo. Baldwin.
I. Jefferis.
J. E. Linehan.
C. L. Worth.
Hy. Pedwell.
A. G. McLellan.
J. F. Campbell.
J. McWater.
J. R. Armer.
W. H. Bowie.
T. J. Ward.
N. MacNicol.
A. M. Wickens.
Duncan Campbell.
R. Patterson.
J. Mooney.
F. Stortz.
H. M. Paton.

Chairman,—

The next order of business to-night will be the election of officers.

Now, gentlemen, you are all supplied with a list of candidates for positions which are at the disposal of the Club, and as you are all aware our by-laws authorize the nomination of any member of the Club for any of these positions irrespective of the recommendations of the Committee appointed to make same. In other words, if you wish to nominate some other member other than those shown on the list, you are at liberty to do so, by adding the person or persons' names at the bottom of the list, of course designating the position you desire to elect them for.

Mr. Burrows,—

Would it not be well if there is anybody on the list whom you do not wish to vote for, to mark that person out?

Chairman,—

The idea is, that you must put an "X" after the names of those you wish to vote for. There are seven nominees in all.

Mr. MacNicol,—

I recommend Mr. Patterson for the Executive.

Moved by Mr. MacNicol and seconded by Mr. Garden that Mr. Patterson, of Stratford, be nominated for the Executive.

Chairman,—

Is there any other member wishing to nominate any person else for a position?

Mr. H. G. Fletcher,—

I am inclined to think that most of the members are at sea as to how many members are to be elected on the Executive. I think possibly a few remarks from Mr. Worth would enlighten most of us. In fact I am speaking personally. I am rather at sea as to how many are necessary for the Executive.

Chairman,—

Seven members are necessary for the Executive.

Perhaps it would be well to have our Secretary, Mr. Worth, explain this more fully, as he has had the work of getting it out and would be more familiar with it.

Secretary,—

The names given on the lists distributed to each member are those nominated by the nominating Committee appointed at the last meeting. The Executive consists of seven members, in addition to the President, Vice-President, and Second Vice-President. There are also three Auditors to be elected and these nominees are the choice of the nominating Committee. All members have the liberty of nominating any person they see fit other than those chosen by the nominating Committee, but only seven members can be elected to the Executive and three Auditors. It is not even necessary to vote for all of the seven if you do not wish to do so.

Mr. Burrows,—

Of course the report of the Nominating Committee after all is only a suggestion. The election is entirely in the hands of the members and they can elect whom they wish. If anyone wants to nominate anyone else they need only write their name on the list and put a cross opposite. In other words, if anyone wants to vote, say, for Mr. Patterson, all he has to do is to put Mr. Patterson's name down and a cross after same. However, you cannot vote for more than seven.

Mr. H. G. Fletcher,—

If I may say a word I would thank you to withdraw my name from the Executive Committee, and insert instead Mr. Patterson's name. I would then recommend that the names given by the Nominating Committee be adopted unanimously.

Chairman,—

I would rather you would not withdraw your name from this list, Mr. Fletcher. We would rather it go to a vote. Regarding your recommendation to adopt the names given by the Nominating Committee, we would also rather it go to a vote, and let other men have a say, as it were. I wish you would, therefore, re-consider your decision to have your name withdrawn.

Mr. Fletcher,—

I think we should be allowed to withdraw from being nominated if we so desire.

Mr. Garden,—

I do not often criticize the action of any committee, but I think they have made a mistake when they ask any person who has already performed the arduous duties of a member of the Executive for a whole term of office, to fill another term. I think it would be well for others to fill these positions as I know they would do as well or better than I at least could do. Therefore, I would like very much to have my name struck off, and at the same time I would like to nominate some person else. If Mr. Fletcher is allowed to withdraw, I do not see why any person who has already filled a term, should not be allowed to do the same.

Mr. Burrows,—

Personally, I would be very glad if these gentlemen will let their names go before the Committee. Mr. Fletcher has, I know, done very good work on the Reception Committee, and as Mr. Garden has only filled one term, I do not see why he should not go another year.

Chairman,—

It would never do to have all the experienced ones taken off the Executive Committee, and if at all possible, I would ask that members nominated allow their names to stay on.

Mr. Burrows,—

When it comes to the third term you may object.

Chairman,—

I would much rather have the members of the Club accept the term of office they are nominated for. Personally, I do not like to see the Vice-President moved up to President, and so on. I would rather have had the names picked out indiscriminately.

Mr. Hallowell,—

I recommend that the nominations be closed.

Seconded by Mr.. Fletcher.

Chairman,—

I would ask Mr. Matthews and Mr. Richardson to be our scrutineers.

Chairman,—

We will get along with the other orders of business, the next being report of standing committees. Nil.

"Unfinished business."

GREY IRON VERSUS INSERT BRAKE SHOES.

Mr. Burrows,—

Before the last meeting I invited Mr. F. W. Sargeant, Chief Engineer of The American Brake Shoe & Foundry Co., of Mahwah, N.J., to attend the meeting, if possible, and take part in the discussion on grey iron versus insert brake shoes, or if he could not come, to send a communication on the subject. Owing to his absence from headquarters when my letter arrived, it was delayed in reaching him, so that his reply did not get into my hands until after the meeting. It is a very able and interesting contribution to the subject, and I beg to submit it as follows:—

Mr. F. W. Sargent,—

"'Does it pay to use the insert brake shoe, having regard to the extra tread wear on wheels, and at the same time considering the extra mileage of the more expensive insert brake shoe?'

"While the above question is raised evidently with particular reference to shoes applied to steel tired wheels, it may be well to discuss the action of brake shoes on both cast iron and steel tired wheels. In ordinary railway service we have usually: 1st, cast iron wheels under freight equipment; 2nd, steel tired wheels under passenger and tender equipment; 3rd, steel tired wheels under locomotives.

"It is a well recognized fact that the peculiar structure of cast iron renders it a particularly suitable material for the brake shoe. It is softer than the surface of the cast iron wheel and less tough than the face of the steel tire; hence the work is done at the expense of the shoe while the wheel survives.

"The softer the cast iron the greater the wear of the shoe for a given amount of retardation, and conversely, the harder the shoe the less it wears. But the cast iron shoe is never harder than the surface of a well made cast iron wheel, for the reason that the shoe is always heated to a greater temperature than the wheel tread, and heat reduces the hardness of the shoe metal to make it wear more rapidly.

"Inserts are placed in the face of a cast iron brake shoe to delay wear, rather than to increase the grip on the wheel, and the type of insert shoe in most common use on cast iron wheels is that in which the wearing face of the shoe is supplied with oblong blocks of wrought iron or mild steel disposed transversely at intervals along the wearing face. When these areas of tough wrought metal are properly proportioned and completely surrounded by cast iron which grinds away and flows over the inserts, the effect on the wheel tread is practically the same as if the wrought metal was not present, and there is no bad effect on the wheel.

"When, however, the areas of wrought metal are so extensive that they are not well coated with cast iron particles, there is liable to be a flowing of the wrought metal, which may pile up and form high spots which become highly heated and intensely hard, and in time groove the wheel; and in the case of an overlapping wrought insert shoe, the edges of the cast iron wheel where the chill is weak, are very often badly worn down; hence, shoes with large or continuous wrought metal inserts should not be used on the chilled wheel.

"Shoes with integral chilled areas or inserts of hard cast iron which do not retard the ground-off particles, show greatly reduced retarding effect, much less than is secured with shoes of the Congdon type.

"The comparative cost of the insert shoes is much less than that of the plain cast iron shoe, the saving on account of the extra durability may vary from 50 to 75 per cent., and there is no question but what, from the standpoint of durability, the insert shoes are cheaper, if it were not for the fact that the structural weakness of ordinary cast iron is greatly increased by the use of inserts, which reduce the effective cross section of the cast iron body. Hardness in the body metal is also an objection in the cast iron shoe, because such shoes are liable to fail when highly heated, while a soft cast iron shoe will hang together and give a greater proportion of its original weight in useful wear than the other shoes noted.

"Where the equipment is heavy and the breaking severe, as in mountainous country, it is a question if the loss of material due to broken insert shoes and the consequent injury to brake heads and brake efficiency, does not more than offset the extra advantage due to lower rate of wear of the soft cast iron shoe. It is a fact, however, that a large proportion of freight equipment in the United States is operated with insert brake shoes of the Congdon type.

"The brake shoe is the medium through which the stored up energy in the moving train is converted into heat, and heat is the agency which contributes more than anything else to the failure of both shoe and wheel.

"It is a well known fact that cast iron wheels fail in mountainous service to a far greater extent than in level country where there is a less continuous braking action.

"In the early days of railroading, it was clearly demonstrated that a wrought iron or wrought steel brake shoe was the wrong thing to apply on a cast iron wheel, and this fact I think will in a measure influence the selection of the brake shoe for freight equipment, even in the case where the percentage of wrought metal is reduced to a small proportion of the shoe face, more especially under conditions where the braking effect is excessive, as in the case of modern freight equipment.

"The proceedings of the M.C.B. Association for the year 1892 contains a report of wheel tests made by the Southern Pacific Railway Company at their Sacramento shops in 1891. The main idea of the test was to determine the cause of frequent cracking of cast iron wheels on grades. A machine was set up in the shop, where a brake shoe was continuously applied to a moving wheel until failure occurred. Cast iron and wrought iron shoes were used. The results indicate quite clearly that with the same retarding effect or rate of heat generation, the wheel temperature was higher under the wrought iron than under the cast iron shoe; for eleven out of twelve wheels cracked under the wrought iron shoe, while only nine out of twenty-four wheels failed under the cast iron shoe.

"An article in the American Manufacturer of April 24th, 1896, on the subject of Heat Conduction, gives a factor of .062 to .111 for steel as against a factor of .156 for cast iron.

"These will serve to indicate that there is less heat produced in the cast iron wheel under a cast iron shoe than with a wrought metal shoe for the same work done in the same time.

"In some shop tests made by the writer on the C.B. & Q. Railroad in 1899 with Congdon shoes applied to a chilled wheel, it was noticed that the shoe became red hot at one of the wrought inserts, due evidently to the accumulation of cast iron particles, carried around by the wheel, on the face of the insert, forming a high spot thereon, concentrating the heat to that point. After a short interval this red hot spot moved to the next insert as the accumulated metal fused or let go from the preceding one, to be caught at the next. No such intense heating was noted at any time on the face of the plain cast iron shoe.

"From the foregoing, it is reasonable to suppose that where there is excessive brake application the cast iron wheel will survive for a longer period of time under plain cast iron shoes than with insert shoes, and when this fact is taken into consideration, the greater economy in the use of the more durable shoe can well be questioned.

"The objection on account of structural weakness in both the plain cast iron and the insert shoe has been solved by the steel back reinforcement, which permits the body metal to crack without destroying the shoe. Many railroads are now using the steel back plain cast iron shoe on freight equipment because the steel back not only practically doubles the life of the plain cast iron shoe by continuing it that much longer in service, but also because the steel back stops the expense due to breakage of shoes and damage to brake heads and derangement of braking effect.

"The steel back permits the use of a harder body metal than can possibly be used without reinforcement, so that instead of comparative durability of four to one as compared with the Congdon shoe, the ratio in life is about two to one, which, with the better effect on the chilled wheel, places the cast iron shoe more nearly on an equality with the insert shoe, and this appears to be the solution of the brake shoe question for freight equipment where the maximum retarding effect on heavy equipment is desired.

"In this connection, the proceedings of the New York Railroad Club, of January 16th, 1903, containing a discussion on 'Cast Iron Wheels to Meet To-day's Requirements,' from the standpoint of the relation between the brake shoe and the wheel, should prove of interest to those investigating this subject.

"In regard to steel tired wheels under coaches and tenders, where the cast iron wheel has a hard inflexible tread, the steel tire is the reverse, being comparatively soft, ductile and tough, and subject to wear both by the rail and the shoe to a much more marked degree; so that even a plain cast iron shoe exercises some wearing action upon the tread of the steel tired wheel, to its advantage or disadvantage, as the action of the shoe tends to destroy or maintain the original tire outline.

"An ordinary unflanged brake shoe, when properly located over the outer tread and held there, will tend to help the wheel tread by delaying the grooving by the rail, because the shoe will wear the tire where it is not cold rolled and hardened by contact with the rail, while having practically no effect in wearing away the tire over the limits of rail contact. This same shoe also, if pulled up against the wheel flange, will tend to sharpen the flange for the same reason that it wears down the outer tread. The addition of inserts, chilled areas, or of hard iron in the body of the shoe which takes a sand chill, will add to the good or bad effect in proportion as they reduce the rate of wear of the brake shoe; hence, on general principles the soft cast iron shoe is to be recommended for the steel tired wheel on the score of effect on wheel tread.

"But it is impossible to maintain an unflanged shoe in its proper position on the wheel, and any way you look at the question it is, from the standpoint of effect on wheel, unsuited for use on the steel tire, especially with heavy equipment operated at high speeds with modern brake mechanism.

"From the standpoint of durability, there is no question but that the insert and hard iron shoe is cheaper than the plain cast iron, if they are properly made and applied in their proper position on the wheel, but as this last is a very difficult thing to do it is probable that in the long run the plain cast iron is the more satisfactory shoe to use.

"The same argument as regards the structural weakness of unflanged shoes without reinforcement, applies with even greater force to shoes for passenger equipment, on account of the increased braking effort. The steel back will prevent failure by breakage, and permits the use of a harder body iron, providing a shoe which will give double the life of the ordinary plain cast iron shoe; and since a cast iron shoe does not seriously effect the wheel tread, as may be the case with the insert shoe, the ultimate cost of the steel back cast iron shoe may not greatly exceed that of the unreinforced insert shoe.

"Chilled areas integral with the body of the shoe will not cut the wheel tread unless there are blow holes or fractures which expose a cutting edge, when tire metal may accumulate on the face of the shoe and the wheels will suffer.

"Any tough ductile material which exists in continuous lines or in large areas along the face of the shoe, is liable to flow, pick up tire metal, and form high spots to groove the wheel tread. Wrought steel or iron, or malleable iron, cannot be considered in the makeup of the wearing face of the shoe for steel tired wheels unless in very small areas intimately distributed over the face of the shoe, each area being insulated, so to speak, and prevented from welding with its neighbor by the cast iron body metal. All unflanged insert shoes, however, effect to a greater or less extent the steel tire, and because of the high cost of the tire, reduce correspondingly the advantages due to the longer life of this shoe.

"The proper shoe for use on steel tired coach and tender wheels is one which bears over the tread and flange, with the braking area concentrated over the outer tread and flange. Such a shoe located in brake heads properly spaced so as to hold the shoe in the plane of the wheel, will maintain to a large extent the proper tire outline, and delay the time when the wheels will need to be removed for tire turning.

"A flanged brake shoe means more uniform braking, trucks kept square, and consequently less sharp flanges.

The strains on the brake head and beam are equalized and repairs to brake mechanism reduced.

"The flanged shoe permits the use of inserts in the wearing face of the shoe in such a manner as to utilize to the fullest extent their many advantages in increasing the life of the shoe, and in maintaining the proper tire outline, by wearing down the tire where it is unworn by the rail, thus enabling a greater mileage to be obtained from the tire than is possible to be realized with the unflanged shoe.

"Sharp flanges are reduced in height and delayed, if not entirely avoided, grooved wheels are prevented to a considerable extent, and when it finally becomes necessary to turn the tires, there is less metal to be removed and less waste of good metal to restore the original outline.

"A flanged coach shoe should have no inserts over the middle tread or against the throat of the flange; they should contact only over the outer tread and top of flange, although the inserts can extend as the shoe wears down, part way down the flange to maintain its rounded shape. Such shoes are a positive benefit to the steel tire, where an unflanged shoe by its shifting position across the wheel tread, is exactly the reverse.

"With a properly designed flange shoe there should be practically no wear of tire by the shoe tending to groove the wheel. It is almost impossible to use an insert unflanged shoe which will not assist the rail in grooving the wheel tread. Moreover, the greater area of the flanged brake shoe means greater conducting and radiating surface for the heat generated and less heat in the wheel. There is a limit, however, to the amount of tire dressing effect desired in the coach shoe for the reason that coach and tender wheels are simply rolling wheels which are not seriously worn into by the rail, the flange sharpening being the most prominent cause of removal for re-turning.

"It is the general opinion of railroad officials using flanged coach shoes, that they are a good investment in reducing the cost of maintaining tires, securing greater mileage from tires, as well as reducing the cost of repairs to brake mechanism and general expense of brake maintenance.

"It goes without saying, almost, that the advantages of reinforcement previously noted apply to the flanged shoe as well as to the unflanged shoe, and that a steel back flanged brake shoe properly designed to apply a moderate wearing effect on the steel tired coach and tender wheel represents the highest development of this part of the brake mechanism.

"Steel tires under locomotives are subject to a much harder service than those under tender truck or coaches, because they are power driven against the rail, in addition to carrying much heavier loads; for these reasons the tire wear by the rail is excessive.

"The greatest necessity exists under these conditions for a driver brake shoe which will act on the wheel and cut down the outer tread and flange of the tire in such a manner as to neutralize the grooving by the rail and delay the time when the engine must be shopped for tire turning. Driver brake shoes, therefore, are designed with special reference to wearing the tire where the rail does not.

"The most efficient brake shoes for the purpose are those made up with the cast iron body extending over the flange and tread, either partially or wholly recessed over the limits of rail wear on the inner tread, but having inserts of hard metal disposed at intervals along the outer tread and in the flange bearing portions of the brake shoe.

"Shoes of cast steel are in use to a limited extent, the tough metal exercising a strong dressing action on the tire. But these shoes do not act uniformly, the area of contact is continually changing because of the metal flowing and bunching up, and the tires are often badly scored. Furthermore, flowed metal from the face of the shoe extends over the limits of rail wear, and the grooving of the tire is increased, while the bearing of the steel over the flange has a strong cutting action.

"The value of the insert shoe depends upon the texture and uniform hardness of the cutting inserts, the edges of which act like a milling tool in wearing the tire where the rail does not.

"These hard inserts generate friction by their cutting action and prolong the life of the shoe by reason of being harder and tougher than the tire metal, and are not appreciably annealed by the heat of friction.

"When reinforced with a steel back, this insert shoe is by long odds the cheapest and best shoe for locomotive service, which is the reason for the almost universal adoption of this type on locomotive equipment in the United States.

"Coming back to the original question—'Does it pay to use the insert brake shoe, considering wear of wheel and the extra mileage secured with the higher priced shoes?' I would summarize my answers as follows:

"On chilled wheels under modern freight equipment operated in the hilly country with long grades, the steel back plain cast iron shoe will in the long run prove more economical than an insert shoe, on account of less damage to wheels.

"On chilled wheels under light freight equipment on level countries, the steel back insert shoe may prove more economical than a plain cast iron shoe.

"On steel tired wheels under tenders and coaches, an unflanged shoe is not good practice. But if it is determined to use an unflanged shoe, a steel back shoe with a hard cast iron body, either chilled or unchilled, will prove in the long un more economical than an insert shoe.

"On steel tired wheels under coaches or tenders, a flanged steel back shoe, with inserts or chilled areas in the outer tread and flange, exercising a moderate tire dressing effect, will prove more economical than a plain cast iron shoe.

"For locomotive driving wheels, a steel back flanged brake shoe with hard cutting inserts in the flange way and outer tread will prove far more economical than the plain cast iron shoe.

"Heavy and high speed brake service make a steel back shoe absolutely necessary on the score of economy and safety."

Chairman,—

"New business." Nil.

"Reports of special committees." Nil.

Chairman,—

We have two subjects for discussion this evening: Subject No. 1, Compound vs. Simple Engine.

(a) Cost of maintaining consumption of fuel and water considered in conjunction with ton mileage, is the compound as economical as the simple engine?

Subject No. 2: Cause of Boiler Explosion.

(a) Allowing that a Crown Sheet has become dry and overheated, is the liability of explosion increased by the injection of cold water?

I shall be glad to hear from Mr. MacNicol.

Mr. MacNicol,—

In the year 1848 Mr. T. Cardock, of England, designed a twin cylinder compound locomotive engine, which has a single valve governing steam admission and exhaust. Two years later, in 1850, a Mr. J. Nicholson, of England, designed a compound locomotive engine that showed a saving of 20 per cent. in fuel consumption, ever since new designs of this class of engines have continued to be brought forward. The first possibly to appear in America was on the Erie Railroad, where in 1867 a simple switch engine was converted into a four cylinder tandem compound.

The Remingtons of New York State in 1870 produced a two cylinder locomotive compound with a controllable intercepting valve, but no reducing valve. Good results were obtained when working compound, but jerked badly when working simple.

In 1887 an automatic intercepting valve was in use in England and France. The principle features of this design was that, when receiver pressure attained a certain point engine went into compound.

This shows the compound locomotive engine advancing slowly step by step to a more perfect machine which in 1899 commenced to receive special attention and from that date has improved very rapidly. To-day we have several types which can be divided into four classes, namely, "the balance compound of the Vauclain type," the "De Glen," the "two cylinder," and the "articulate compound." The most popular in Europe is the De Glen, which is the four cylinder balance type, both low pressure cylinders are inside the frame and are connected to a cranked axle on the leading wheels and the high pressure cylinder on the outside connected to crank pin on second pair of driving wheels. In Canadâ the two cylinder compound is the most common and it is claimed to be superior to four cylinder compound because of a lesser exposed area, which would reduce condensation, less parts to get out of order, a better arrangement of steam passages, the re-heating of high pressure exhaust. The balance compound claims, less damage to track, more even motion, which tend to reduce cost of repairs, a permissible increase of weight on axle through elimination of hammer blows, an increase in sustained horse power at high speed without modification of the boiler, and a sub-division of power which lessen the bending stress on axles.

The compound has its failings and its virtues. The two cylinder is hard to counterbalance due to weight of low pressure cylinder and piston, and when drifting the compression of air by different size piston. It also burns more coal when going down hill shut off than simple engine. The two cylinder type wear long flat spots on drivers due to a quarter slip; this flat spot, loosens nuts, causes bearings to heat, and is hard riding engines; more opportunity for blows among different valves, which are not so easily discovered as in simple engine, and are due to the numerous parts, some of which give similar sounds when blowing through due to some defect. Its virtues are less coal and water consumed than a simple engine of same class if kept in service to which it belongs, lessen the work of firemen and makes for greater possibilities.

So far I have not discussed the questions as submitted to this meeting, but rather have stuck more to an historical account of compound because in my opinion the length of time compound has been with us does not justify a comparison on cost results of maintenance, the engines have to be handled by different engineers, firemen, shopmen and transportation department officials, who do not yet thoroughly understand these engines and consequently cannot get best results. The cost per engine despatched from round houses is greater and is likely to increase. The reason is, much heavier engines to handle, a greater number of parts to care for, and much more wear of working parts; but, taking the motive power department as a whole, I believe the expenditure will be no greater for the combining of two or three small engines in one large engine lessens the cost of repairs in main shops, and as the size of engine is largely controlled by the amount of coal and water consumed per hour. The compound has the advantage over the simple engine in fuel economy. A properly designed compound locomotive properly handled and loaded to its correct capacity, will, as has been proven in repeated tests, and trials, save from fifteen to thirty-one per cent. in fuel over a simple engine of equal capacity or tractive power and when you find that on an average a simple engine with train of freight will not burn less than seven tons in one hundred miles' run and the compound over same run under similar conditions not burn five tons you will say the compound engine has a long lead over the simple so far as economy in fuel is concerned.

Chairman,—

We would like to hear a few remarks from Mr. Duguid.

Mr. Duguid,—

I have no remarks to make, but Mr. Patterson has written out a few remarks on the subject, and asked me to read them, and in my opinion they come very close to the mark.

I know in the shop, while there are a few extra parts on the compound locomotive to maintain, yet it does not amount to much.

Regarding what Mr. MacNicol said about long flat spots on the wheels on compound locomotives, this is a new feature to me, although I am closely connected with the driving wheel question. A few months ago a number of wheels were turned and we were asked to measure these with a micrometer gauge, and make records of same on blueprint. If you could find any trace of these prints now you will find uniformity in these wheels. The long flat spots, which were expected to show up, did not, however, materialize.

Mr. Patterson,—

Compound locomotives have been in use in America for some years, I mean successfully used. In its earlier stage, difficulties were encountered, both in design and in educating engineers how to handle them and removing prejudices of mechanical men who were reluctant to give up the simple engine that all were well acquainted with and were getting satisfaction from, even if the coal bills were a little higher.

To Canadian railways, the consumption of fuel is a serious matter with its first high cost and 50 per cent. duty added so that it is not surprising that recent new power purchased has been of the compound design. I believe the saving of fuel and water are its principal merits and very important ones. I also believe that a larger mileage between repairs can be obtained from tubes and fireboxes of compounds and less danger from throwing of sparks and setting fire in dry weather. With regard to cost of repairs as far as general shop repairs go, I am satisfied the compound can be repaired as cheaply as the simple engine, plus the few extra parts that are to be maintained.

Statements have been made that the compounds pound more readily than the simple engine. I think this can be accounted for by incompetent handling, simpling the engines unnecessarily or their being overloaded.

In some respects the compound has disadvantages which simple engines have not and these disadvantages tend to make them unpopular in comparison with the simple engine in as much as they are not as flexible. The compound is in its proper place when hauling slow heavy freight trains on long runs and will give best results in the class of service where the reverse lever is necessarily kept down nearer the corner. They may be useful on heavy passenger trains that are not fast scheduled but for fast passenger service or switching, there is no economy over the simple engine nor will they give as efficient service and it is for this reason that simple engines are more popular with officials handling them. If the Transportation Department sends a hurry up order for an engine for passenger train, fast freight or extra switcher, the simple engine can be immediately turned out for any of these services, but not so with the compound if you expect to get service required.

With regard to round house repairs, I do not see why they should be heavier than for simple engines except from causes before mentioned (improper handling), but it is their inflexibility that makes them unpopular with round house people.

From actual tests made with the Richmond compound of which we have a large number, a saving in fuel was demonstrated equal to about 20 per cent., and in water, 15 per cent. over the simple engine, under similar conditions. Our firemen all know they shovel less coal and do not visit the stand pipes as often with the compounds as with simple engines of similar capacity.

Compound engines can be placed in pooling service just as readily as simple engines, providing engineers are acquainted with their management. I think the compound works to better advantage and shows better results when not overloaded. The cost of lubrication is about the same for compound as simple engines. Compounds also have advantage over simple engines in starting trains from yard, etc.

Mr. Garden,—

I have listened with a great deal of pleasure to the discussion on the compound vs. simple engines, but before making any remarks on the subject I would like to correct an error of history in Mr. MacNicol's statement. Mr. MacNicol states that the compound engine came into favor in 1899, whereas these engines were being built by the Baldwin & Richmond Locomotive Works, some years before this. The Canadian Pacific Railway were operating both of these types of engines quite extensively in 1897.

I believe a good deal of the trouble experienced with compound engines has been due to the method of loading. If an engine is compounded it seems to mean to a great many people, a vast increase in power, whereas to the initiated the compound engine with the high pressure cylinder the same size as the simple engine, has only the advantage of carrying the steam further in the stroke, which advantage is partially lost by the back pressure. In taking into account the economy of the compound over the simple engine, outside of the reduced cost of maintenance of a compound engine, we have the reduced consumption of fuel, which is very considerable, and the reduced consumption of water, and I may say this is a point which is very much underestimated. When the consumption of water is reduced the load necessary to be hauled by the engine is consequently reduced, and reduction of consumption of water means reduction in cost of pumping, pumpman's wages and fuel and of course the less water you have to evaporate the less coal it takes to do it with. There is no doubt that we have had considerable trouble with the compound engine, which we do not have with the simple engine, but on the other hand we have in the primary days of the simple engine troubles which on the compound engine are not known. One of the previous speakers has stated that the compound engine is only built for freight service. While I admit that economy in a compound engine is very much greater in freight service, I would respectfully call the attention of the speaker to the Baldwin four cylinder compound Atlantic type engine, which are to-day as fast if not faster than any other type of engine on this continent. Personally, I am of the opinion that we have not reached perfection in Richmond compound engines. There are so many adjustments necessary due to condensation and other inequalities necessary to balance the two sides of the engine and these conditions are of course changed when the engine is worked simple, that I believe we will eventually revert to the four cylinder compound. The compound engine has proved so successful in marine and land service, stationary engines, both for economy of repairs and economy in cost of operation. I think there is no question the compound has come to stay and will eventually supersede all classes of steam engines for locomotive service.

Chairman,—

About long flat spots which are complained of by the engineers. How do they know that there are flat spots?

Mr. Garden,—
By the pounding of the engine.

Chairman,—
May that not be due to engine being improperly balanced?

Mr. Garden,—
Yes. It seems to me a very easy matter to balance an engine in order to give the same balance on the high pressure side as on the low pressure side.

I believe the compound engine is the thing. It seems to me that there is no reason why the compound in locomotive service should not be as practicable as the compound in marine service. There is no person who will dispute the fact to-day that compound engine in marine service is the only thing.

Chairman,—
Do you make any exceptions regarding the turbine engines in marine service?

Mr. Garden,—
Yes, of course; I am only speaking about comparisons in compounds in marine and railroad service.

Chairman,—
Shall be glad to hear from Mr. Wickens in connection with the next question to be discussed,—"Boiler Explosions." However, perhaps Mr. Wickens would like to say a word first concerning compound vs. simple engines.

Mr. A. M. Wickens,—
If you have no objections I will have a few words to say regarding the compound engines. I have to say first, that my experience with compound engines was not in railroad service, consequently I cannot enlighten or say anything regarding the locomotive.

There is one thing which should be remembered; that is, compound engines for marine and land purposes went through a great evolution before they got to the state they are to-day, and therefore we must certainly expect that when we are going to compound the engines on a locomotive, to meet with similar troubles and difficulties; especially when these have to be set on wheels. It cannot be done quickly and it has to go through a sort of evolution to find its proper place and get everything in connection with it, in good form.

There is no question that the cost of maintenance and fuel is less on the compound engine in land and marine service. It also makes a saving in water, and in the apparatus for handling the water. Consequently fuel used for this purpose.

In our land and marine engines we have the triple and quadruple, and even the five cylinder engines. The idea is, whether they have a large number of cylinders or not, to get an even tortion on the cranks. One of the defects of the compound to-day it seems it is harder to balance. Now, gentlemen, if the proportions of these two cylinders are made so that the turning moment of one was equal to the turning moment of the other with the higher pressure, there would be no trouble. The trouble is in not getting the heat distribution of both cylinders exactly alike.

Now the little minor defects about valves, etc., are only natural defects. They are not things which should be difficult to overcome. They had to overcome them on the land and marine engines, and they did it.

I did not mean to say anything on this matter, as I know so little about it, but I feel sure that the compound locomotive has come to stay. I fully believe they will compound on both sides, or tandem compound, and I think it will work out the same as the marine engines and give success.

As the locomotive repair men work on the compounds, it will not be long before they will think the cost of repairs is no greater on the compound than on the simple engine. I believe the time will come before long when the use of compounds will be universal on our engines.

Chairman,—

Mr. Wickens, will you lead the discussion on the question of cause of boiler explosions?

Mr. Wickens,—

I did not prepare myself in any way for this and if you want it in that way I will try and say something.

Mr. MacNicol,—

I would like to say a word or so before this question is closed. Mr. Garden raises the question whether flat spots did exist. On the Richmond compound the speed must not exceed eight miles per hour while working simple. The reason for flat spots existing is that the steam passages are so small that they admit steam slowly to the big cylinder and accumulates there and develops sufficient pressure causing engine to slip and work a quarter revolution. The reason that we have not had many flat spots on our engines is due to the management insisting on our engineers starting their engines in the compound. Our train tonnage is about sixty cars, and our engines can generally lift these trains, and on heavy grades they generally run at them.

Mr. Garden raises the question also that compounds did not come into use until 1899. I wish to say that the first compound came into use on the Erie Railroad in 1867 in America.

Chairman,—

Will Mr. Wickens now lead the discussion on boiler explosions?

Mr. Wickens,—

I see that the first part of this question is a straight question,—"What is the cause of boiler explosions?" In my mind a boiler explosion is the simplest thing on earth. It is the question of having too much pressure for the strength of the metal. Of course as a boiler is used day after day, week after week, and month after month, like other apparatus, it gets worn out and weaker, and eventually when the pressure gets rather high, it explodes.

The next question on the paper needs a little thought. The question as I read it, if the crown sheet becomes dry and overheated, is the liability of explosion increased by the injection of cold water. I do not think it is. A crown sheet does not overheat when it is covered with water, but when the water is gone it overheats, or has got low, and the metal becomes so hot that the pressure pushes it down, making a bulge. Of course you all know if when metal gets hot you cannot pump water on to it fast enough to make an explosion. There are crown sheets which get dry and water is pumped on to them thousands and thousands of times before any explosion takes place.

When you talk about an explosion it does not cover such a thing as a crack which opens up and makes a leak, this should be classed as a rupture or simply a crack. There is no explosion unless it tears everything to pieces, and then you may say you have had a wreck.

Now the most conservative boiler inspection insurance company on earth is the English Manchester Boiler Insurance Company. They went to the trouble some years ago to build a boiler to explode. They went to a great amount of trouble to do this. They made a boiler to be fitted internally and set it behind a bank, putting an 8 foot stone wall near it, and put the pumps and gauges outside of the wall. They had a good steam pressure and let the water get down to 10 inches from the top of the flue. The person tending the boiler was there and he finally pronounced that the flue was red hot. They then turned in the water, and after doing this seven times they did not get it to explode. They kept on but could not get it to explode. In fact they spent thousands of dollars trying to get this boiler to explode. And at last the flue got some metal cracks in it. From their experience they found that the circular crown sheet would not explode if the boiler was short of water. I do not think that would obtain as well with the flat crown sheet. My honest opinion is that we would not make an explosion by pouring cold water on a hot crown sheet. You might make a crack and by that way relieve the pressure without causing an explosion.

When I was a boy they would tell me not to put water on a hot stove as I would break the lids. That may be so, as if you keep putting water on the stove you might possibly break it, but it would not explode. Expansion and contraction in a crown sheet is not sudden enough to make it explode with cold water. This is a pretty bold statement to make, and I expect to be attacked severely.

Mr. Bly,—

My experience is something like Mr. Wickens, that is with the marine and not with the locomotive boiler. In reference to Mr. Wicken's statement where he says that a boiler explosion is only due to a rupture, I would state that would depend upon how big it was to make an explosion. A short time ago we had an explosion at Sunnyside. That was due, I suppose, to a rupture, as Mr. Wickens says. That was a boiler explosion as you all know, there being some two or three men killed and injured. The boiler was lifted off its foundation and turned right around; just as though you put it on a waggon and turned it around. You could not have done it nicer. The crown sheet had drawn out where it was overheated, until it was quite thin, almost like a a knife edge.

I have seen myself in pumping cold water in a marine boiler to cool it off, it would put a crack 6 inches long in the back leg plate. Another time in my experience with the marine boiler, which is similar to the locomotive type, the crown sheet went down about 4 inches. That was due to the scale and sediment getting between the staybolts and forming on top of the crown sheet.

I have a little data which I picked up from different authorities. Perhaps it might be of interest to some of the members here. I, myself, believe a boiler explosion is due, as Mr. Wickens has said, to over working of material, or that the pressure is too high for the material to stand.

In the United States in the year 1880, 170 boiler explosions were reported with a loss of 555 lives.

In 1887 there were 198 explosions and 652 persons killed or injured.

In 1900 there were 268 explosions and 785 persons either killed or injured.

In 1901 there were 423 explosions with a loss of 312 lives and 646 persons injured.

The Hartford Steam Boiler & Inspection Co. reported up to January 1st, 1902, had inspected in all 3,304,130 boilers and had discovered 2,414,103 defects, of which 257,824 were considered dangerous.

Now if the above were a fair average of the boilers in use, we have the startling fact that more than one boiler in every nine is in a dangerous condition.

In the boilers examined by the Hartford Boiler Insurance Co. up to 1901, 66,615 fractures in plates were found in, at or near the seams, or through the line of rivets, 19,520 of which had arrived at a dangerous state before discovery.

There is no need to resort to mysterious causes for the destructive energy displayed in a boiler explosion. The damage done by explosions is due to the energy stored in the hot water. The energy in one pound of hot water at 150 pounds pressure and 358°F. is about 10,500 foot pounds; that is, it is sufficient to raise one pound to a height of nearly two miles, and at 250 pounds' pressure it has sufficient energy to raise it nearly three miles.

The energy stored in a Lancashire boiler 30 feet long and 8 feet in diameter, with 150 pounds' pressure, has been calculated to be about 207,600 foot tons, which is sufficient to raise the whole boiler 12,500 feet, or more than two miles. It takes 1,730 pounds of gun powder to give an equivalent energy. The energy in a marine boiler 15 feet long, 13 feet in diameter, and with a pressure of 150 pounds is equal to 2,464 pounds of gun powder.

An ordinary return tubular boiler under 75 pounds' pressure has within it sufficient energy to blow it over a mile into the air.

The above figures give some idea of the enormous energy in a boiler, and the destruction caused by its explosion.

There is energy enough stored up in a locomotive boiler with 150 pounds' pressure to project it over one mile high.

Thanking you, gentlemen, for your attention to these few remarks.

Mr. A. M. Wickens,—

I would like to say a few words before we close concerning the explosion at Sunnyside. That was a low water explosion, but they were not pumping any cold water when it blew up. I went to the place as quickly as possible and we found there were 11 inches of water in the boiler. There should have been 34 inches. The boiler had been standing from early morning and there had not been any water put in it. The fire had the boiler entirely red hot, right down to where the brickwork closed in against the boiler to the surface of the water.

The pressure was never above 75 pounds according to the evidence given in court. The sheet was so hot that it bulged. It started at $\frac{3}{4}$ inches in thickness and got as thin as

$\frac{3}{32}$ inches. It was simply a case where the heating had continued so long that the crown sheet became so soft that it was not strong enough to stand the pressure.

Regarding defects in boilers. I wish I had brought some data on this subject. The locomotives running on this continent have a very much lower average for explosions than any other record we have. This is due largely to the fact that the locomotive runs so many miles and is then taken into the shop and looked after properly. It is a matter of inspection at the proper time. Our ordinary stationary boilers do not get this, and generally not more than once a year, and sometimes not that often. I am getting out a schedule of the defects found on inspection in the last year in boilers. Such things as water gauges, safety valves, etc., and each one of these defects went about five to seven per cent. of our inspections. The greatest difficulty was found due to bad boiler setting. We often find where people have set the boiler so low that they were wasting fuel.

The locomotive boiler running from 160 to 200 pounds' pressure is far safer than the average stationary boiler as it is better taken care of.

Mr. Richardson,—

In reference to the blowing out of the crown sheets. You say this is due to extreme pressure on the crown sheets. Would this be prevented by the safety valve being opened?

Mr. A. M. Wickens,—

It would not make any difference whether the safety valve was open or not, excepting this way: if we had a piece of metal hot so that 500 pounds would bend it, if you could let your steam off quick enough it would not bend down. As soon as you have a piece of metal red hot it takes a less amount of pressure to bend it.

Mr. J. V. Jackson,—

This question is very broad and is worthy of great thought and discussion, in the first instance we take a flat crown sheet which has become short of water and overheated, at which point the injectors are started and water proceeds to raise in boiler, and on coming to the level of top of crown will at once proceed to cover same, this undoubtedly causes the already hot sheet to contract materially, and causes a liability to fracture said crown sheet, This, of course, does not signify that the boiler has exploded, or is in any way liable to explode from the reason of injecting the water into said boiler.

Whereas with the radial crown sheets allowed to become short of water and overheated, I find the sheet will expand between the staybolts more or less and buckle or corrugate towards the fire, the said corrugations being more pronounced where the heat is most intense on the sheet. These corrugations in turn draw the top side of staybolt holes away from the staybolts, thus throwing the entire strain of withstanding the pressure of steam above the crown sheet, upon the threads at lower portion of staybolt hole, these threads, also the threads and bats of the staybolts having become greatly softened under the heat to which they have been subjected, are not now able to withstand the pressure above, with the result that the crown sheet pulls away from bolts, and in doing this the threads of the staybolts are invariably stripped about three threads back from bat or point of bolt, showing this portion of the bolt to have held the sheet in position until the metal became too soft, and at this point, if any part of this crown sheet has been over such an intense heat that it has become very soft, it is very liable to elongate to such an extent that it reduces greatly in thickness and eventually ruptures at the softest or thinnest part, causing what is usually called an explosion, all such explosions to my personal knowledge have occurred above where the water line had been at time of explosion, and had water been in the act of being injected into these boilers, I cannot see that it would in any way increase the liability of explosion; also taking into consideration the injection of water into a locomotive boiler, the water enters invariably near the front end of boiler, at a considerable distance from the crown sheet; also well below the allowed level of water under proper conditions, this water enters at a lower temperature than the body of water inside of boiler, with the result that it immediately tries to find its way to the lowest part of boiler and in doing this, allows the hot water to raise gradually up the sides of crown, thus showing that the cold water cannot possibly get near to the crown sheet.

In reviewing the foregoing remarks I wish to be understood that I do not advocate the injection of water into boilers, when water is below crown, but that in all cases of low water my suggestion is "dump the fire every time," and wait the results of boiler cooling naturally.

Mr. Fletcher,—

Mr. Chairman, I am a boiler-maker, not a boiler inspector. I wish to ask Mr. Wickens one question. If Mr. Wickens were chief engineer of a boiler room or engine house where there were a number of engines or boilers, and he came down into the boiler room and found the water low and his pumps going pretty hard to fill the boilers up again, what would you do with the fireman?

Mr. Wickens,—I would fire him.

Mr. Fletcher,—What for?

Mr. Wickens,—I would be afraid of a rupture.

Mr. Fletcher,—It is a general rule that when they find the water low in the boiler and turn in the water, that every person runs, who has any knowledge of the danger attached to such an act.

I manufacture boilers, and the best of them will explode. Explosions are caused in a great many cases by carelessness on the part of the engineers and firemen, and also on account of having incompetent men. Quite a number of crown sheets dropped on locomotives are caused by low water. When the sheet gets hot it elongates at the holes, so that there is no support for the radial stays. In some instances where stay-bolts are nutted, it holds the bolts in place instead of riveting them over. With the nuts on, the bolts cannot pull out, and it gives the engineer and fireman a chance. If they are not too stupid, all they have to do is to throttle the engine, drop their fire, and go sit on the fence until cooled down.

I was always led to believe that water pumped on hot plates was the cause of explosion, and I would say that a man was insane if he pumped cold water on hot plates, and should not have charge of boilers of any description.

Mr. N. MacNicol,—

I noticed an item in the paper regarding care of locomotive boilers. It stated that for a certain period noted 126 boiler explosions happened and out of these there were only 14 on locomotives.

Mr. E. D. Bly,—

Is it possible to put cold water on a boiler, or in other words, is it possible to pump cold water on a red hot crown sheet?

Mr. A. J. Lewkowiez,—

Mr. Wickens' remarks relate mostly to the circular flues. In marine practice we have a great deal of experience with the flues or furnaces coming down. That is caused by a hot circular crown sheet getting soft enough to bulge down, due to local accumulation of grease thereon and insulating plate from the water thereby getting plate very hot and as soon as the grease is burnt off the water gets there and cools it off immediately, and occasionally it cracks. On the flat crown sheet it is not only the plate that elongates and weakens, but the staybolt holes elongate and the staybolt refuses to hold it and it bulges down.

Mr. C. V. Jackson,—

In Mr. Fletcher's remarks he states that when the crown sheet gets hot it elongates, also the holes. In my experience these holes tighten on the bolt, but when the crown sheet gets cool then they commence to contract, and then you have a leaky crown sheet.

Mr. J. J. Fletcher,—

When the plate is hot it elongates, and when it is cool it gets shorter.

Mr. Lewkowiez,—

The plate in shrinking gets cool and shrinks hole away from the bolt. The plate first squeezes the bolt, and when it cools off the bolt fails to fill up the hole.

In marine practice we try to avoid anything like overheating of plates in boilers by putting fusable plugs in which will melt at certain temperatures. When these go off we know what to do.

Mr. Garden,—

I am sure we have all listened with a good deal of interest to the very practical talks of practical men on the subject of boiler explosions. It is not quite clear to me, however, where our learned friends draw the line between a rupture and an explosion, if as the first speaker has stated, putting water on to a hot crown sheet will cause the sheet to rupture, this rupture opens a seam so wide that the steam rushes through and lifts the boiler off the truck and lands it in the ditch with my little experience this would appear to be an explosion. I cannot see why it is not the same as if the sheet is allowed to overheat and the pressure of the steam blows it down, the result is the same. In neither case I think, is there any excessive accumulation of gas as would be experienced in the explosion of gunpowder or other combustibles.*

After reading an article in the "Locomotive Engineer," some months ago on the question of putting water into boilers on hot crown sheets, I am fully convinced that there are more boilers damaged by trying to rake the fires or smother them with sand and coal, than there would be if the engineers were instructed to get the water in as quickly as possible when they notice the shortage. The great trouble with boiler explosions is that the engineer does not notice the shortage of water until after the boiler is blown up and usually he leaves no record behind as to what remedy he thought most advisable to apply.

Chairman,—

We will call on the scrutineers to make their report.

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*The energy being stored in the hot water and released through the opening causes a reaction similar to the recoil of a gun.

Scrutineers report,—

The following gentlemen were declared elected:
President, Mr. W. R. McRae.
1st Vice-President, Mr. Acton Burrows.
2nd Vice-President, Mr. C. A. Jefferis.

EXECUTIVE.

Mr. J. J. Fletcher, Foreman, Boiler Department, Canada Foundry, Toronto.

Mr. J. Bannon, Chief Engineer, City Hall, Toronto.

Mr. J. C. Garden, General Foreman, G.T.R. Shops, Toronto.

Mr. H. G. Fletcher, Rep. Garlock Packing Co., Toronto.

Mr. Geo. Black, Road Foreman, G.T.R., Stratford.

Mr. A. Dixon, General Foreman, C.P.R., Toronto Junction.

Mr. Robt. Patterson, Master Mechanic, G.T.R., Stratford.

AUDITORS.

Mr. F. G. Tushingham, Chief Engineer, Toronto Railway Co., Toronto.

Mr. Geo. Baldwin, Yardmaster, Canada Foundry Co., Toronto.

Mr. R. N. Card, Car Distributor, G.T.R., Toronto.

Chairman,—

Gentlemen, you have heard the announcement made by the scrutineers, and we are in duty bound to adopt the decision of the majority.

Personally, I sincerely thank you for the trust you have given me, in electing me as your president. I had sincerely hoped, ever since the inception of the Club, that our first President, Mr. Kennedy, would have been able to continue among us for the following year. However, I appreciate more highly than you can readily understand, the honor you have shown in electing me to be president of the Club, and I promise to put forth my best efforts for the welfare of the Club.

I do not know that I can say anything further, excepting to thank you one and all.

Mr. Acton Burrows,—

I think you all know since the last meeting Mr. Kennedy has met with very severe treatment in the loss of his wife. As he is not with us to-night, I would move that we pass a resolution expressing our sympathies with him.

Chairman,—

The following resolution of Mr. Burrows is moved and seconded by Mr. Worth, and carried, that a motion of condolence be conveyed to our past President.

Resolution,—

We are all very sorry that our President, Mr. Kennedy, is unable to be with us this evening. As most of you know, his wife died a very short time ago, and since then his mother has met with a very serious accident. I think we should express our feelings in this connection, and I therefore beg to move:

That the members of The Central Railway & Engineering Club of Canada, at this, their first meeting after the death of Mrs. Kennedy, desire to place on record their deep regret at her decease, and to convey to their retiring President, Mr. Kennedy, their heartfelt sympathy for him and his family in their severe bereavement.

Mr. A. J. Lewkowiez,—

As I am one of the youngest members here I do not know Mr. Kennedy as you, no doubt, do, but I think we should have some tangible means of showing our appreciation and sympathies with him. I know on several occasions where I have been treated that way and it is a great gratification afterwards I assure you.

Seconded by Mr. Campbell.

Chairman,—

I heartily concur with this, and would leave it to the Executive Committee.

Moved by Mr. C. A. Jefferis, seconded by Mr. J. J. Fletcher, that the meeting be adjourned.