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

OFFICIAL PROCEEDINGS

Vol. 3. No. 3. TORONTO, CAN., March 16, 1909. $1.00 per year 15c. per copy

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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, March 16th, 1909.

The President, Mr. Jefferis, occupied the chair.

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

You all have had a copy of the proceedings of our previous

meeting, therefore it will be in order for someone to move the adoption of same.

Moved by Mr. Wickens and seconded by Mr. McRae that the minutes of previous meeting be taken as read.

Chairman—The next order of business is remarks of the President.

I am very sorry that I could not be here last meeting night. I know you will excuse me when I tell you that sickness was the cause.

In looking through the paper given by Mr. Dudley last month, I was agreeably surprised to notice the name of Mr. Berwick mentioned, although he was stated as being, years ago, one of the toughest railroad conductors running into Chicago. Fourteen years ago Mr. Berwick fired a Baldwin compound in the State of Mississippi while I ran her. He did this in order to let me see that he was a railroad man. While laying in the siding he told me his life's story. I have never heard a better speaker than Mr. Berwick, and if he comes up this way by all means go and hear him. If anyone knows the type of railroad man running into Chicago twenty years ago, that he claims to be, you will know a little of what Mr. Berwick was then as they say he was one of the worst. I just say this in passing.

I see the Secretary has made a few notes for me. One is regarding members giving papers. Now if there are any members in the Club or any friend of a member who will be kind enough to give us a paper, we shall be glad to have same. We have sufficient papers for the rest of this season, but if you will confer with the Secretary and let him have the name of the person and the subject of the paper, we shall be glad.

There is another insignificant item here, such as paying your dues. If there is any member who has not paid up his dues, this is a very desirable time.

We will now ask the Secretary to announce the new members.

NEW MEMBERS.

Mr. F. R. Davis, Chief Engineer, Jos. Simpson Sons, Toronto.
Mr. H. H. Scott, Engineer, Weston, Ont.
Mr. A. W. Carmichael, Rep. Philip Carey Co., Toronto.
Mr. A. E. Till, Foreman, C.P.R., Toronto.
Mr. A. W. Givin, Rep. Canadian Fairbanks Co., Toronto.
Mr. G. Cook, Engineer, Consumers Gas Co., Toronto.
Mr. W. Selley, Chargehand, G.T.R. Shops, Stratford.
Mr. D. Ross, Machinist, G.T.R. Shops, Stratford.

MEMBERS PRESENT.

J. Bannon	W. R. McRae	C. A. Jefferis
D. Ross	T. McLean	N. MacNicol
J. H. Stortz	J. H. Morrison	G. D. Bly
W. A. Hare	H. G. Fletcher	P. R. Ross
F. J. Lawlor	S. H. Allen	H. Cowan
T. J. Ward	J. M. Clements	A. W. Durnan
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C. A. Witherspoon	J. R. Armor	E. Southby
J. H. Herriot	A. M. Wickens	S. Turner, jr.
F. J. Clement	J. Lusk	E. B. Allen
G. Baldwin	H. O. Eddrupp	J. W. McLintock
G. Black	R. H. Fish	G. Cooper
W. Evans	J. Dodds	J. Kyle
L. S. Hyde	C. L. Worth	

Chairman—The new members just read out by the Secretary have been referred to the Executive and passed upon favourably.

Chairman—Is there any unfinished business?

Secretary—No.

Chairman,—Then the next order of business is the reading of papers and discussion thereof.

We have with us to-night Mr. Parker, of the Parker Car Heating Co., who has very kindly come down from London to give us a paper on heating of passenger cars. I have much pleasure in calling upon Mr. Parker.

VENTILATION AND HEATING OF PASSENGER CARS.

BY MR. CALVIN S. PARKER, ASSISTANT SALES MANAGER
PARKER CAR HEATING COMPANY, LIMITED.

Mr. Chairman and Gentlemen,—

In the preparation of this paper I have endeavored to consider this very important subject from a non-partisan standpoint and have tried to bring out, not so much the advantages claimed for any particular apparatus, but the conditions to be met and the results produced by the different systems now in use.

The ventilation and heating of passenger cars is a subject upon which has been spent a great deal of time and energy not only by individuals, but by the representative bodies of the various railroad organizations for some time; but little headway was made towards improving the conditions, and about the only result gained was, if I might use the word, a rehash of the already well known results produced by such systems as were then in use.

This state of affairs is now generally believed to have been, owing to the fact that the heating apparatus then in use were in a very crude state of development and remained so until a comparatively recent date. However, as we are all well aware, the construction of the entire equipment and the operation thereof has been materially changed.

I shall not take you back to the days when the crude method of having a stove in either end of the car was the only means used for warming passenger cars, but shall proceed directly to a consideration of the more modern method of heating by means of a system of water circulation.

The method of warming passenger cars by circulating hot water through the pipes placed around the car was first introduced, I believe, by Mr. Wm. C. Baker, of New York City, in the year 1866. The first of these heaters were installed, as near as I have been able to learn, on the New York, New Haven and Hartford Railroad and after a very hard and up hill battle he was successful in having a number of his "Baker Heaters," as they are now generally known, installed on that road and which was, quite properly, considered a wonderful improvement over the former method. In describing this system it will be unnecessary to say more than, that it consists of a number of lines of pipe, usually 1¼ inch, placed along the truss plank on either side of the car, a portion of which is placed inside the heater and having a suitable expansion chamber placed above the stove in the deck of the car. These pipes were filled with

water and when a fire was lighted in the stove the heat therefrom coming in direct contact with the pipes of the coil, heated the water therein, causing it to rise to the expansion chamber and from there on it followed an unbroken course through the piping along both sides of the car distributing its heat evenly to all parts of the car, it was then returned back to the heater, there to be reheated again and this same condition continued as long as there was a fire in the heater and sufficient water within the system to maintain "a chain of circulation."

The Baker Heater System, outside the crude method of a stove in either end of the car, was the only means used to warm passenger cars until about the year 1882 when the system of conveying the steam from the locomotive directly into the radiating pipes inside the car was introduced.

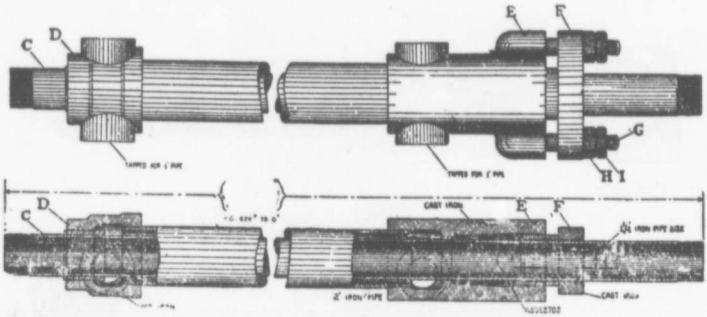

FIG. 1—*Outside Steam Jacket for Hot Water Heating System.*

The first experiments with this system were made on the original New York Elevated R.R. The result of those experiments gave us what is now generally termed direct steam. This system has after years of practical demonstration proven beyond question to be by far the most economical where it is possible to obtain, at all times, a supply of steam. Of course where there is a possibility of the train being left without steam for any considerable length of time, for instance, where there is an engine failure on the road and it is impossible to obtain steam for several consecutive hours it would then be absolutely essential to have some auxiliary means for maintaining a proper degree of heat in the car, and for cases such as these a system of water circulation has proven to be by far the most satisfactory.

It has been found after years of practical use that where a system of water circulation must be used, that it is more economical, as well as good practice, to heat and circulate the water

within the Baker Heater System by the application of steam from the locomotive.

This has been best accomplished by enclosing a portion of the radiating pipes in a suitable jacket and conveying the steam either on the outside of the radiating pipe on the inside of the heating jacket or by running the steam pipe through the heating jacket which is filled with water, which, when it is heated, passes on up to the expansion chamber or drum and thereby causing a circulation of hot water passing through the radiating pipes entirely around the car, exactly the same as when a fire is lighted in the heater. (See FIG. 1.)

Of course a system of this kind has several disadvantages not found in straight or direct steam systems, nevertheless it has a number of desirable features which makes its use in some cases very essential.

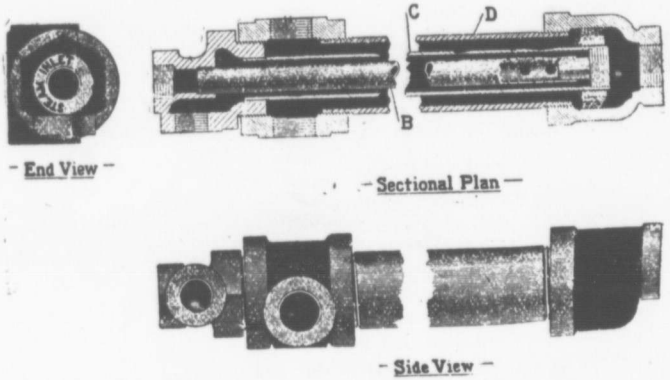

FIG. 2—*Inside Steam Jacket for Hot Water Heating System.*

In using steam for circulating the water it is absolutely necessary that the condensation be gotten rid of as soon as it accumulates with all styles of apparatus working on the gravity system, otherwise the heating would be impaired and ineffective and the apparatus very liable to freeze, particularly that portion of the system placed underneath the car.

Upon the introduction of the so-called Automatic Trap to release periodically the water of condensation, it has been found that such a device overcame the hand manipulation of the drip or blow off valve, but it also wasted considerable quantities of steam. If the trap were adjusted so as not to blow steam there was the liability of the trap freezing and if such became the case, as had frequently occurred, it was then necessary to stop the train and make the outside application of heat to the

frozen part by means of a steamhose or by setting fire to a shovel full of oily waste and holding it against the frozen trap. The latter practice, which is quite common, is very dangerous, as there is a great liability of setting fire to the deafing between the floors of the car. (See FIG. 2.)

In using steam from the locomotive to heat the cars equipped with an indirect system it is the common practice to supply from 60 to 75 pounds of steam pressure for a 10 car train or less and it has been found that ordinarily a car will condense from 70 to 100 pounds of water per hour, which on a 10 car train making a ten hour run, represents a considerable drain upon the locomotive. (See FIG. 3.)

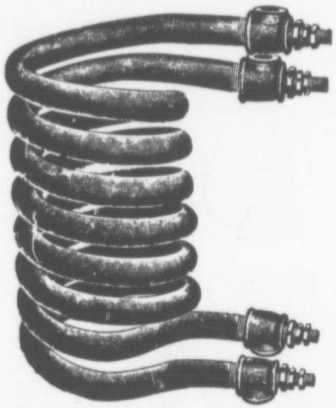

FIG. 3—*Duplex Double Coil for Hot Water Heating System.*

It is to be understood, of course, that all systems of water circulation do not have the same condensing capacity, for instance,—a system having the steam jackets outside and underneath the car will condense a great deal more steam than a system having no part of the apparatus outside for the very apparent reason that with so much of the pipeing, steam jackets, etc., outside, a great deal of heat is lost by exposure and it is also necessary to create a greater pressure within the heater pipes with this system in order to force the water through so many sags and around the many sharp turns and elbows necessary with a system of this kind.

By having the entire arrangement of radiating pipes, steam jackets or steam coils inside the car the liability of freezing is greatly reduced and the only point of difference in a system having this similar arrangement of piping is in the construction

of the heater coil, so far as the Baker Heater System in itself is concerned.

The coils used in some systems are so constructed that after a fire has been used for some little time the ashes, clinkers, etc., accumulate around the coil, especially between the coil and the heater shell, greatly decreasing the heating surface and the result is that a great deal more fuel will necessarily be consumed in order to absorb the same amount of heat through this decreased heating surface.

The operating of the steam attachment of all apparatuses working on the gravity system is practically the same, namely: the steam is admitted into the steam jacket or steam coil at the highest point and follows an unbroken circuit to the lowest point of the apparatus where one of the several styles of automatic traps allows the condensation to escape to the atmosphere. There has been in the past, and in fact it is being experienced at the present time, considerable trouble with the trap freezing, or if the trap be adjusted so as to allow a little steam to escape with the condensation this will overcome the liability of the traps freezing in extremely cold weather, but this adjustment will cause the car to become intensely overheated when the weather moderates and will require a re-adjustment of the traps if it be desired to maintain a proper degree of heat in the cars.

Then again this trap may be adjusted to discharge condensation freely under a head of pressure of say fifty pounds and perhaps to-morrow this same car is put in a postion in the train where it is being supplied with only ten pound steam pressure, it will be easily understood by those who understand the practical operation of any of the so-called automatic traps that this adjustment which was correct for a 50 pound head of steam will not be the proper adjustment where the pressure is reduced to 10 pounds and will require another re-adjustment with a wrench, to make this trap work properly.

It is the common practice with trainmen and others in the operation of the steam attachment of an indirect system of heating, to open wide the supply valve in heater room and so long as the trap is blowing a little steam with the condensation they give little or no attention to the apparatus during the run, and this practice usually results in an intensely over heated car. If the passengers complain of this overheated condition it is customary for the trainmen to open several or all of the ventilators in the deck of the car in an attempt to lower the temperature and when the car has cooled off below what is considered the average temperature the trainmen then closes the ventilators allowing the temperature to rise and when the car becomes uncomfortably warm again the ventilators are opened, so that this condition of affairs

continues during the entire run, while the heating apparatus in itself is automatic in so far that it requires very little attention during the run it is absolutely necessary to be continually opening and closing the ventilators in an attempt to control the temperature of the car, and whether this is done properly or not depends upon the varying judgment of trainmen to what is, in their opinion, the correct amount of ventilation for the different classes of cars.

To those of us who have to provide the necessary fuel for heating our homes, we would not, I am sure, consider it good practice nor would we be altogether pleased to learn that it was the common practice when the house became too warm, to open wide the doors and windows, but naturally it would be expected that we should check the furnace to reduce the heat and save fuel. The question then arises why is this not done with the heating apparatus in passenger cars? As we are all well aware it has been claimed that when a car becomes too warm with a system of water circulation having its steam attachment working on the gravity system, the proper method of operation is to close the supply valve in heater room, thereby cutting off the admission of steam. This practice from a theoretical standpoint is quite proper, but in the practical operation of such a system this is very seldom, if ever done, for the very apparent reason that if all the condensation were not blown out of steam jackets or steam coils and it drained to the traps in a very cool condition there is always a liabilty of freezing. Then again if the supply valve is not absolutely tight, as is very frequently the case, the small amount of steam thus admitted quickly condenses and reaches the trap in a very cool condition and this is another of the causes for the trap freezing. When the trap has become frozen from any one of the several causes, it is absolutely necessary, owing to the construction of the apparatus working on the gravity system, to stop the train and make the outside application of heat to the frozen part by means of the steam hose, torch, fusee or shovel full of burning waste. This practice which is the only available means with a system of this kind, is frequently the direct cause of serious delays as well as considerable expense when repairs are made necessary.

The amount of steam being used and the drain on the locomotive is practically the same in moderate weather as in extremely cold weather. In extreme weather almost all the heat developed is needed to maintain a comfortable degree of heat in the car and it is well known that but a few of the ventilators are opened and which admit of an abundant supply of fresh air to keep the atmosphere inside the car sweet and pure; while in milder weather there is being supplied the same head of steam from the locomotive and the adjustment of the automatic

traps is the same so that it is the common practice to open nearly all of the ventilators in the car in an attempt to control the temperature. It will be readily understood that there is being supplied and wasted a great deal more heat than is necessary to properly warm the car. After making extensive inquiries and having had considerable practical experience along this line, I have found that there is more trouble with cars freezing in moderate weather than in extremely cold weather. Of course it must be admitted that considerable portion of the trouble with heating equipments is due to the inexperience of those whose duty it is to handle them, nevertheless, it cannot be denied that any method of heating working on the gravity system will condense upon an average of seventy pounds of water per car, per hour, through the entire heating season while the system of indirect heating being placed upon the market by the company with which I am connected has shown after exhaustive tests in weather varying from freezing point down to 40 degrees below zero, to condense upon an average of but three gallons of water per car per hour. Furthermore, with this system means have been devised whereby a frozen steam trap, heating jacket, transfer pipe, or steam coil may be quickly thawed out while the train is in motion. The method of regulating the temperature of the cars with this system is such that it does not supply any predetermined quantity of steam to any particular car in the train, but each car is supplied with just sufficient steam to maintain equal pressure throughout every car in the train and consequently an even temperature is produced automatically. It will be readily understood that by equalizing the pressure throughout the train that the car which is condensing the most steam, or losing the most heat by radiation, will be supplied with the most steam, regardless of its position in the train.

Another important and very desirable feature possible only with this system is that there is no blowing of steam from the trap to endanger the lives of the travelling public nor employees.

DIRECT STEAM SYSTEM.

What is generally termed direct steam systems of heating includes all systems wherein steam from the locomotive is conveyed by means of suitable train pipes, and steam hose couplings and is used directly in the radiating pipes placed along the truss planks on either side of the car.

Under this heading are classed three separate and entirely different systems, namely: All styles of steam systems having a supply valve which admits the steam into the radiating pipes at the highest point from there it is allowed to flow (by gravity) to the lowest point where the discharge of con-

densation is controlled by one of the several styles of "Automatic Traps."

The second system of this class includes the several styles of "Vapor System," wherein the admission of steam into the radiating pipes is controlled by the temperature of the escaping condensation.

The other system which comes under the heading of direct steam is the "No Drip Low Pressure Hot Water System."

With this latter style of apparatus the steam is admitted into the radiating pipes through the regulator at practically their lowest point and it follows an unbroken circuit throughout the entire length of the radiating pipes to the Combination Discharge and Auxiliary Trap placed in proximity to the Regulator valve. These Traps and Regulator valves are connected by means of a By-pass or Cross-over. With this system the water of condensation instead of being discharged as soon as it accumulates is retained and kept heated by the inflowing steam which enters the apparatus as before stated at the lowest point, so that it will be obvious that the heating is affected by means of the combined steam and hot water therein.

There is usually a separate supply valve controlling the admission of steam into the radiating pipes on either side of the car with the improved systems of direct steam heating.

The operation of the first mentioned system, namely: those having pressure in the radiating pipes and equipped with an "automatic trap" for the periodical discharge of condensation, is precisely this,—steam is turned into the train pipe after all steam hose have been properly coupled and it passes along through the train pipe in the first car until it reaches the branch which conveys the steam into the radiating pipes inside the car, here part of the pressure goes into the apparatus in this car the greater portion of the pressure is, however, forced on to the next car where the pressure is again reduced and so on until the steam has reached the rear of last car in the train. (See FIG. 4.)

When steam first enters the radiating pipes in the car there is always an excessive amount of condensation due chiefly to the cold condition of the pipes and to the low temperature of the cars. This condensation is forced along through the pipes by the pressure of steam behind it and as the Automatic Trap does not expand sufficient to close the port until steam has blown upon the diaphram, it will be readily understood that the condensation is allowed to escape and as the trap, cools the condensation is again discharged to the atmosphere, and when the temperature of this escaping condensation and steam is sufficient to cause the diaphram to expand its maximum the port is again closed (provided of course that the adjusting device which holds the diaphram be properly set). This

continual expanding and contracting or heating and cooling of diaphram will continue as long as there is steam in the apparatus.

With a direct steam system there is not the same liability of the trap freezing as when applied to systems of water circulation, nevertheless, there is being experienced considerable trouble from this cause and the only means available for thawing it out are the same as when applied to Indirect systems.

One of the chief disadvantages of a system of this kind is that after the car has become heated considerable trouble has been experienced in regulating the temperature, and the only really satisfactory means was to open and close the ventilators as the conditions required it.

VAPOR SYSTEM OF HEATING.

Upon the introduction of this system some few years ago it was believed by many quite experienced in the art of car heating that it would be necessary to increase or decrease the amount of heating surface according to the weather, but this is now believed to have been incorrect.

The operation of this system is similar to the other drip system in so far that the steam is admitted into the radiating pipes at the highest point and following the laws of gravity it drains to the lowest where the temperature of the escaping condensation regulates the admittance of steam into the radiating pipe. (See FIG. 5.)

With this system atmospheric pressure is maintained from the inlet valve through the radiating pipes to the diaphram in the bottom of trap. When steam is first turned into this apparatus it passes through the admission valve and into the radiating pipes and is then free to escape to the atmosphere first passing over the diaphram or coil containing the expansive fluid which, when it has expanded its maximum, shuts off the supply of steam. When the diaphram or coil has cooled, caused by the contact of cold air, the inlet valve is again opened admitting more steam so that it will be understood that there is a continual heating and cooling of the radiating pipes.

This system has an advantage over the pressure systems in mild weather in so much that it does not produce that intense heat so noticeable and so very disagreeable, but in extremely cold weather this Vapor System does not produce sufficient heat to maintain a proper degree of warmth in the cars without considerable waste of steam.

It will be noticed that the operation of all of these systems depends primarily upon a diaphram in other means for gaining expansion and contraction within the trap and the successful operation thereof depends upon the adjustment of this dia-

phram by means of the adjusting device placed upon all traps of this class.

The opening and closing of this so-called Automatic Trap is not governed solely by the amount of condensation backed up in the discharge pipe as is generally believed, but the opening is governed by the length of time it takes for the diaphragm to cool off thereby opening the port and the closing is governed by the amount of steam it takes to again expand the diaphram sufficient to close the port. The condensation may have all been released, but as soon as the diaphram cools again, more steam is allowed to escape until sufficient expansion has taken place within the diaphram to close the port and this state of affairs continues indefinitely.

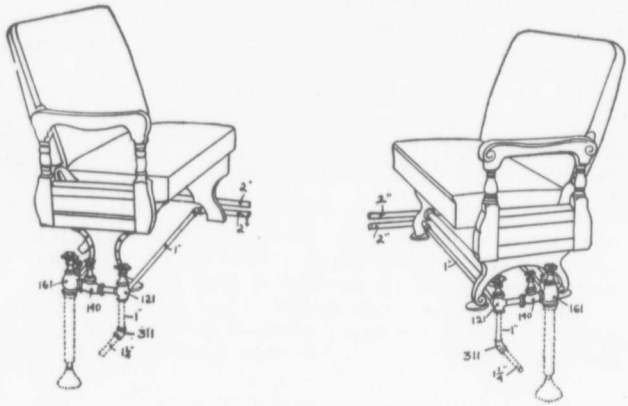

FIG. 9—"*No Drip*" *as applied to seats.*

NO DRIP LOW PRESSURE? HOT WATER SYSTEM FROM DIRECT STEAM.

The operation of this system is very similar to any of the other pressure systems in so far as the manipulation of the apparatus is concerned. (See FIGS. 6, 7 and 8.)

Steam is turned into the train pipe from the locomotive and passes through the train pipe to the branches which supply the radiating pipes on either side of the car. When steam is first admitted into the apparatus through the Regulator valve it follows an unbroken circuit through the entire radiating pipes to the Trap which is placed as before stated, in proximity to the Regulator valve, here the condensation first accumulating and the air is discharged, and the trap is then tightly closed

and the Cross-over valve opened in which position it remains throughout the entire run.

Now what actually takes place is this,—when the entire radiating pipes are filled with steam the Regulator valve is forced to seat and will positively not admit any more steam until the pressure in the radiating pipe is reduced (due to condensation) when it will allow just sufficient steam to enter the apparatus to again equalize the pressure. (See FIG. 9.)

It will be understood that by this method of regulation the pressure throughout the entire train is equalized, its operation is very similar to the working of the air brake system of which you are all familiar. So it can be readily seen that by entirely closing the traps and by this method of regulation a much lower initial or train pipe pressure can be carried.

The question, quite naturally, has arisen, "How long will it take then to fill the entire radiating pipes with condensation, so as to retard the heating, and what is done to relieve this condition of affairs?

It can be stated after several years of continued use in all kinds of regular service that trains equipped with this system have been run over divisions varying from 100 to 300 miles without once releasing any of the condensation. (See FIG. 10.)

If the radiating pipes with this system becomes so full of water that the heating is decreased all that is necessary is to release just sufficient water to allow for expansion and the heating may be quickly established again.

By referring to the illustration it will be noticed that it is possible to have the same pressure of live steam on the discharge side of the radiating pipes as on the supply thereby overcoming the liability of freezing.

The initial or train pipe pressure required with this system is about 3 pound pressure for each car in the train, or about 30 pounds pressure for a ten car train and about 15 pound pressure for a five car train, while any method of heating working on the gravity system will require from 60 to 75 pounds steam pressure for a ten car train and for a five car train it is the common practice to supply a minimum pressure of 40 pounds.

With such a great reduction in the steam pressure it will be seen that a great saving is affected in the wear and tear on steam hose which is to-day, where the high pressure system is used, one of the largest items charged to maintenance account.

The different roads which have used this system have, after several years of exhaustive testing, concluded that,—"drips are expensive."

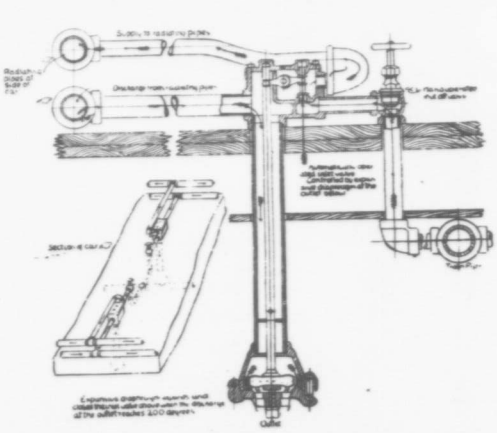

Fig. 5—"*Atmospheric Pressure*" *Drip System.*

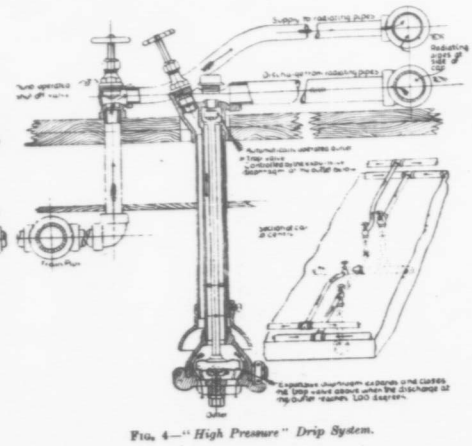

Fig. 4—"*High Pressure*" *Drip System.*

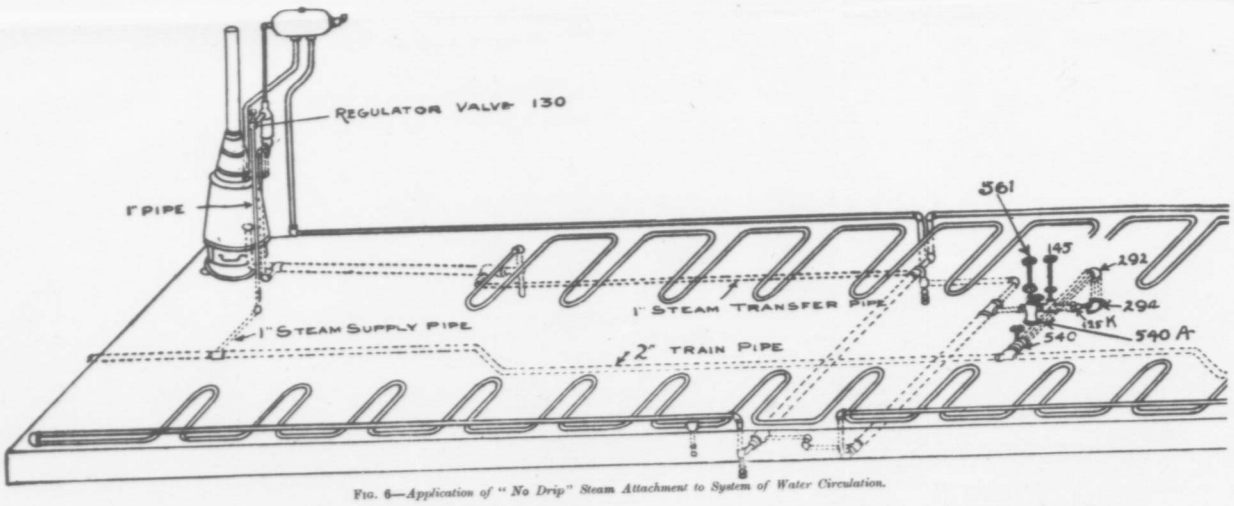

Fig. 6—*Application of "No Drip" Steam Attachment to System of Water Circulation.*

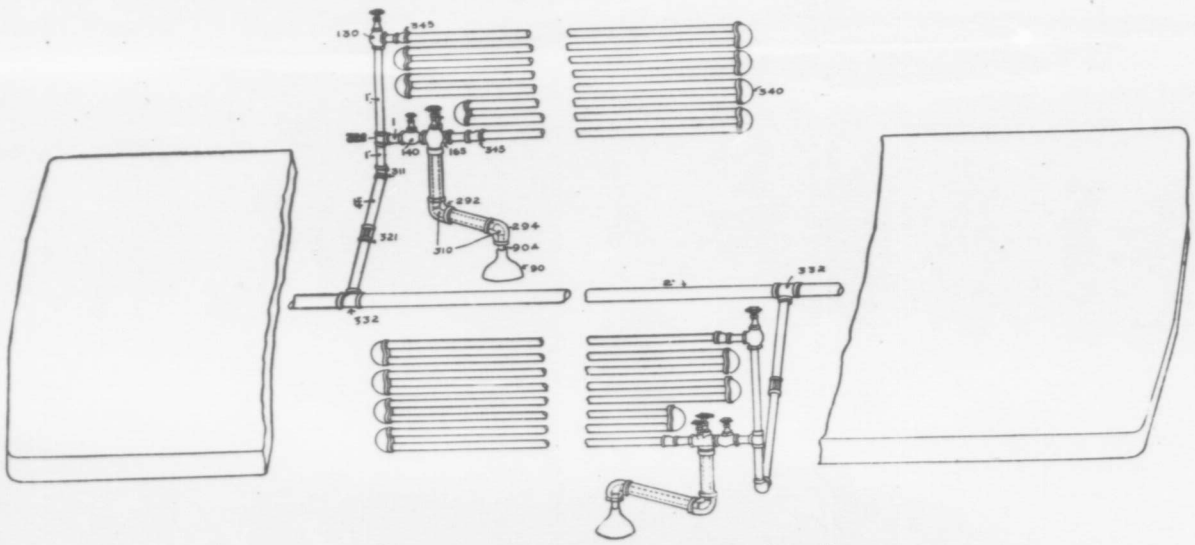

Fig. 7—"*No Drip, Low Pressure, Hot Water System*" *as applied to Baggage Car.*

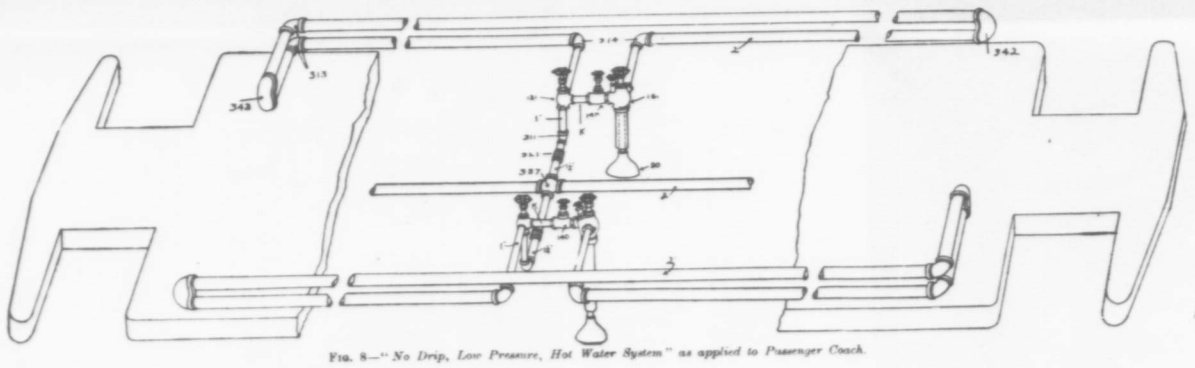

Fig. 8—"*No Drip, Low Pressure, Hot Water System*" *as applied to Passenger Coach.*

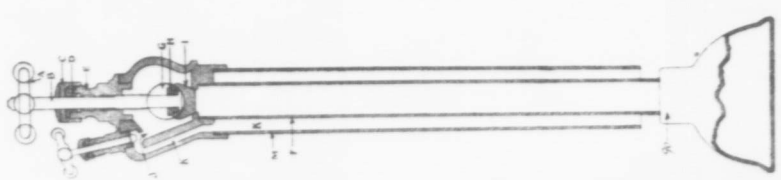

Fig. 10—*Sectional View of Combination Discharge and Auxiliary Trap used with "No Drip" System.*

Chairman,—

We should be glad to hear from Mr. McRae.

Mr. McRae,—

Mr. Chairman and gentlemen, you noticed the tone of voice the Chairman used in asking me to say a few words concerning car heating—kind of a funeral tone. Asking me to speak on this subject is somewhat of a joke. In the first place we have no trouble in heating our rolling stock by steam. However, the matter of ventilating the tram car is just as important as heating and ventilating the steam rolling stock. This question of heating and ventilating the rolling stock has been one of the most foremost questions on the steam railroads. If not in Canada, I speak the truth that it is so in the States. The State of New York has taken this question up so seriously that the Public Service Commission for that State has made this one of their most important tasks. It has now become a matter of competition in order to bring about the best results in heating and ventilating rolling stock.

In speaking of this question I am only justified to do so as a passenger or as a subscriber to the general funds of a steam railroad. I may say that I have had considerable experience in this way as I have travelled considerably. I know of nothing worse than riding in a steam railroad coach that is not well ventilated. There are very few coaches on our railroads which are properly ventilated and heated. If you go into a first class day coach there are probably seventy or eighty people. Some have the habit of washing themselves regularly and wearing clean clothes, while others have not this habit. In speaking to a number of conductors, they say that one of the worst parts of their job is in living in these coaches day after day.

I do not think the discussing of this subject by any railroad man present will bring about a censure on the part of the senior officials of his road, as it is a subject they are anxious to get information on.

The system which Mr. Parker has just spoken about is quite new to me, although I do know there is plenty of room for improvement in this regard. I am informed that there has been an apparatus patented during the past year or so, along the line of a Thermostat, but I do not know anything about it. Perhaps some of you may be able to say something about it.

As I said before there is hardly a railroad company which is not watching this matter closely. The Englishman says the only way to get proper heating and ventilating to satisfy everybody, is to go back to the compartments; however any remarks we make should bear on our regular type passenger coaches, as used in this country.

Chairman,—

Mr. McRae spoke of it as a joke, but I notice that he spoke more seriously about it later on.

Mr. Duguid,—

I think this is more of a joke calling upon me than Mr. McRae. I have no more connection with the passenger car system than with the street railway system, therefore there is no use my discussing anything I do not know anything about.

I think the ventilating of the cars is of greater importance than the heating of them. I believe in most cases the cars are always too hot.

Regarding condensation of steam, I think most of the condensation is not in the car at all. They claim that the coach will condense about 100 pounds of water per hour. That would really be about 20 pounds of coal per hour. So that you will therefore see they are either keeping the coach too hot or it is an expensive heating system. I think the area of radiation in most of the coaches is too much. I do not like the location of the piping. Although the warm air will rise to the top, yet it will have a good effect on you before its gets to the top. While they claim that the radiating pipes should be placed at the lowest point, yet I think it would be well if the pipes were above the seats. I may be wrong in this idea as I do not know much about it. By the old system on the Grand Trunk they had the pipes very near the roof, yet that was out of consideration.

Regarding the amount of steam to heat a coach, the figures given were low for a train of ten cars. If these figures are correct, which no doubt they are, it is no wonder that some of the engineers turn off the steam heat before climbing the hills. On some of those systems in the States where they distribute the heat throughout the city, they will run a steam main for a mile and a half at a loss of only 3 per cent. Yet this is impossible in train service. The position of the hose bags gives them the full benefit of the air. No doubt the hose bags is one of the greatest condensers on a passenger coach.

I do not know that I can say anything further about this subject, but there are some others here who, I know, will be able to speak more intelligently on the subject.

Mr. Bannon,—

I have listened very attentively to the paper and to the words spoken by our friend. I am somewhat like Mr. McRae, I have to discuss this subject from a subscriber's point of view. In my opinion there is no doubt that it is possible

to maintain the temperature of a car the same as in a building if the piping is properly placed in the cars. I will probably take this matter up later on as I am not in a position now to discuss it.

Mr. MacNicol,—

Mr. Chairman, I do not know why I should not make an excuse like the other speakers, as I am just as much entitled to it as they are.

No doubt the car heating question is a very serious one. For a long time it seems to have been impossible or impracticable to devise a proper means of heating and ventilating coaches. If you get in a car probably there are only a dozen people. You go a few stations down the line and a number of people get on and the car begins to get warm. The heat of their bodies and their breath makes it hot. Later on they get off and by the time that coach is at the next station you are looking for your overcoat. It seems to be a hard matter to get a system to cover all these difficulties.

The system which Mr. Parker has spoken about to-night is applying the heat at a lower point. There is one point which I do not get clear. It is how you regulate the heat going into the car. I presume it is by a diaphram. By our present system we apply the heat at the highest point and drop it down to the lowest. If I can get this explained I believe it will help us out some.

Mr. Parker, Jr.,—

The method of regulating the amount of steam being drawn from the train line is controlled by the Regulating Valve. When the radiating pipes are filled with steam the Regulator Valve is forced to seat and will not admit any steam until the pressure in the radiating pipes is reduced. Then it will allow just sufficient steam to enter the apparatus to again equalize the pressure. By this method you have the same pressure throughout all the cars in the train. Our apparatus is entirely self regulating. It does not require any attention until arrival at terminal, whereas with the other systems of heating it is the common practice to open the blow-off valve, periodically, to make sure that the condensation is being released. This is not good practice as a great deal of steam is wasted each time the blow-off valve is so manipulated. With the "Parker System" there will be no manipulation of the Trap necessary as cars equipped with this system have run in regular service in eight and ten car trains over divisions varying from 100 to 300 miles without once changing the position of the Trap or re-adjusting any part of the apparatus, and during this time no condensation was

released from the radiating pipes, whereas with the drip systems there is the continual discharge of 6 to 10 gallons of condensation per hour.

Chairman,—

May I ask you, Mr. Parker, if we start out here to-night to Montreal with 5 or 10 pounds pressure from the engine, and we put a thermometer in the car, if the temperature drops down to 10 or 15 degrees, what will be the variation in those cars if the trainmen do not touch the regulating valve?

Mr. Parker, Jr.,—

If you refer to our method of heating, there should not be a variation of more than two or three degrees. If there is more heat being lost by radiation, the car is going to be supplied with more steam.

Chairman,—

As I understand it, the trainmen have nothing to do with the heating arrangement during the run.

Mr. Parker, Jr.,—

No sir.

Chairman,—

All the variation in the cars will not be more than 5 degrees?

Mr. Parker,—

No sir.

Mr. MacNicol,—

Why should there be any variation in the temperature?

Mr. Parker, Jr.,—

If you have an ordinary check valve it should cease when the pressure equalizes and it should not make any difference whether the steam has travelled ten or twenty feet. If the check valve is working properly there should not be any steam or air going through it and the cars in the front end of the train will get the same pressure as those at the rear end, but the check valve must remain properly seated.

Mr. MacNicol,—

I think your system will vary at the tail end just the same.

Mr. Parker, Jr.,—

The difference is, that the cars in the tail end of the train will be using more steam than the cars at the head end of the train because there is more condensation taking place. The cars on the head end of the train will be getting the steam at a higher temperature and that accounts for the differenc in degrees.

Mr. MacNicol,—

As I understand it, if there is a higher temperature in the first cars due to the steam being more nearer live steam than at the tail end of the train on account of the condensation taking place there, then the temperature at the rear end must be a degree or two cooler than at the front end.

Mr. Parker, Jr.,—

Not necessarily; if you want to raise the temperature of the car in the front end of the train to 62 degrees, it will not take any more steam to do so.

Mr. Duguid,—

As I understand this system, if we have a pressure of 10 pounds in the front end of the train, you cannot get the same temperature at the rear end because as the pressure reduces, the temperature will reduce. If the pressure on the front end is as low as 10 pounds, in my estimation it would be cold water at the rear end of the train unless you had a rapid circulation, and I am afraid you would have ice. You certainly could not get the same temperature of steam at the rear end as you have not the same pressure as on the front end although you have a greater volume.

Mr. Bannon,—

I would like to ask the reader of the paper if it is possible to regulate the temperatures in the different cars. In one car where the temperature is 68 and in another, it is 65 and so on, is it possible to regulate the temperatures by your system?

Mr. Parker, Jr.,—

In answering this question if I may be allowed to read some of the temperatures taken recently in a train carrying all classes of equipment, it would, I think answer that point more clearly. This train consisted of seven cars made up of a Mail, Baggage, second class, two first class coaches, diner and sleeper. The average temperature of each car during a thirty-six hour run was as follows,—67, 68, 68, 69, 68, 63, 69

degrees, with an average steam pressure of 24 pounds. The weather varied from zero down to 7 degrees below, during the thirty-six hours. Now I have here another record taken when the temperature varied in thirty-six hours from 25 degrees of frost down to 43 degrees below zero a variation of 50 degrees. This, Mr. Chairman, refers to the questions asked by you a few minutes ago. The average temperatures of the cars were, 65, 67, 71, 73, 63 degrees. There were two cars in this train equipped with the "Automatic" Trap in which the temperatures were not taken periodically. The average steam pressure used was 45 pounds, which was 10 pounds higher than would be necessary if all the cars had been equipped with the "Parker System." We all know that it is the common practice to try to keep the temperature of a sleeping car between 60 and 65 degrees, but as one gentleman has already remarked, you probably wake up during the night, feeling as though you are being roasted, and perhaps before morning you will be again awakened by the cold. These variations in temperature may occur several times during the night as many of you already know. Now the whole trouble is that with the "Drip" system it is impossible to shut down the steam with safety.

Chairman,—

Has each car a Regulator Valve?

Mr. Parker, Jr.,—

Yes, the admission of steam is regulated by the amount of heat being lost by radiation in that particular car.

Chairman,—

Do you set all those regulating valves at, say, 68?

Mr. Parker,—

There is no means of adjusting these devices to a number of degrees. We set the Regulator Valve according to the weather. In our system it is impossible to get 68 degrees unless you turn up the steam.

Chairman,—

If you went 50 or 60 miles and picked up three or four more sleepers, would the variation in those be the same?

Mr. Parker—Yes.

Chairman,—

Is it necessary for the trainmen to adjust the regulating valve?

Mr. Parker,—

We do not rely upon the trainmen to adjust it. It operates automatically.

Mr. Armer,—

The paper on steam heating of cars has been very interesting to me and very instructive, but I have had no experience with this car heating and would rather ask questions than discuss the paper. I would like to ask Mr. Parker, supposing a train leaves the city here and the temperature outside is, say, freezing and you probably go 100 miles and the temperature goes down to 30 below zero. Have you got your regulating valve now at the same tension? Supposing the temperature went down this 30 degrees, how would you take care of it?

Mr. Parker,—

That all depends upon the amount of steam you speak of. You would not expect to carry the same pressure for 60 degrees as you would for freezing point. There is no spring in the Regulator Valve. It is simply a disc and at 30 degrees below zero you would have to increase the pressure.

Mr. Armer,—

Who would increase the pressure?

Mr. Parker, Jr.,—

The engineer.

Mr. Armer,—

That would give you an increased pressure in the cars and give you more heat?

Mr. Parker, Jr.,—

Yes. If you have 10 pounds pressure in starting out and you have 20 degrees of frost, and it drops to 30 degrees below zero you would have to increase the pressure, but that is because you are condensing more steam. The car would heat up almost as much with a low pressure as with a high pressure, but it would be condensing more steam in the latter case.

Mr. McRae,—

I would like to ask a question; with the present equipment on the coaches, generally speaking, what would be the amount of alterations necessary to introduce this system?

Mr. Parker,—

All necessary alterations would be done for less than $5.00

per car in labour, so that you will see there is no radical changes necessary in the piping of the car. You simply take off the old trap and the admission valve and put the new valves and traps in the same place where the other ones were. With the small expenditure of $5.00 in labour you cannot have a man around a car very long.

Chairman,—

I have a great deal of pleasure in calling upon the inventor of this system, Mr. Parker, Sr., because he is not only the inventor of this system, but is a practical railroad man.

Mr. Parker, Sr.,—

Mr. Chairman, this is like helping the other fellow out. That was my son who read the paper, and he has expressed my opinion on the subject. Of course there are some questions asked and some things which are not very clear. to the inexperienced man. That is where the trouble comes in. Now if we could only see eye to eye, we would not have so much trouble.

Engineers have considerable to do with the proper heating of coaches. They will reduce the steam or shut off the reducing valve, entirely. Often he will have a pressure of forty or fifty pounds, but on looking back will see the "white stuff" and will reduce it to 20 or 30 pounds. I do not know whether any Superintendent or Master Mechanic is here to-night, but you know when the engineer does that with the drip system and has, say, 40 pounds on the head end of ten cars, it is hard to say how much you have on the rear end. If you have a common angle valve or automatic valve open, it will certainly greatly reduce the pressure the farther back you go in the train. By the engineer reducing the pressure on the head end, he gets the brakeman or conductor into trouble and they get five days. I only wish that the trainmaster who gives the brakemen sixty days was here to-night so that I could explain the difficulty to him.

I do not wish to take up your time, but I might mention this incident. Four cars were picked up at Flint, Mich., to be taken to Detroit. Those four cars were what we call "Deadheads," and were not going to be used. The engine was not steaming very well and in order to assist the engineer, the steam was not turned into these cars. The Supply Valves were shut down and the Blow Off Valves opened. Upon arrival at the terminal the head end cars were properly blown out, also the train line, these four "Deadhead" cars were not blown out as they had not been working steam, but owing to the leaky valves the small amount of steam thus admitted quickly condensed and drained to the trap in a very cool

condition and as the weather was very cold and having no pressure behind it, it froze in the discharge pipe and held the water of condensation, causing the radiating pipes to become frozen also; the result was, when the cars were required for service the next day it was found that the return bends were split by the frost causing a delay of one hour for which the brakeman, who handled these cars the previous day, was suspended for 60 days. He was getting $55.00 per month and had a wife and three children living in Detroit. He came to me and asked what he had better do as he could not afford to be idle. I went down and got several new valves which I took to the Trainmaster and Superintendent's office and proved to them that the brakeman was not at fault as not one in a dozen valves was absolutely tight and through which you could not suck air, and his eagerness to assist the engineer, in not using steam in the "Deadhead" cars, was the cause of the trouble.

After this explanation of the cause of the trouble, the brakeman was put to work.

My advice to anyone who picks up "deadhead" cars is to work steam in all the cars, or do not couple up the train line.

Now concerning the proper heating of coaches. You all know there is not a man living who can satisfy the travelling public. If you can keep the temperature of a coach at 70 degrees of heat and anyone complains of the cold, he should take a walk, and if complaint is made of the heat, that gentleman should see a doctor.

In speaking of the amount of coal consumed on a 10 car train between Montreal and Portland, with the drip system, there was burned from a ton to one and half tons more coal than a train which had the "No Drip" system. Is it possible? If you have a train leaving here with ten cars for Detroit and do not have to stop to thaw them out, then the trainmaster does not get after you for losing a few minutes. With our system it is not necessary to stop the train to thaw out any pipes. If the locomotive department is not in trouble with the engine they do not care, and if the train is on time the traffic department does not bother. The car department does not care whether the engine supplies 10 pounds of steam or 100 pounds. However you have got to get around to the economical part of it. By the "Parker System" we have reduced the pressure by cutting off the drip. I think, gentlemen, you will admit that. If you close off the drips you reduce the drain upon the locomotive, although you may carry 60 pounds pressure on the train line, you are not using it. We have conductors asking for 60 pounds pressure on three cars while we have others running three car trains between

Windsor and London on from 5 to 15 pounds. If a car is cold you have got to heat it, and of course it takes more steam at the start. However, we do away with the escaping steam around the train which is dangerous to the travelling public and employees and prevents the carmen from making a proper inspection which if there be any thing wrong may result in disaster.

With the drip system we damage our cars and injure the braking power because the Traps are dripping on the braking apparatus, and that is a pretty dangerous thing, also a very expensive thing. Then again take the outside of the cars which have the "No Drip" system, there is a great deal of difference. There are cars equipped with the "No Drip" system running on several roads which after a year's service were found to be in better condition, from outside appearance, than cars equipped with the drip system which had only been three months out of the shop.

By being enabled to reduce the pressure in the train line a great saving is effected.

On the New York New Haven and Hartford R. R. the pressure was reduced from 60 pounds to 25 pounds and during two heating seasons only two out of five hose bags were replaced.

On the Western Division of the Grand Trunk the Master Mechanic claimed he felt justified in setting the reducing valves at 25 pounds on the locomotives running on trains equipped with the "No Drip" system.

On the Grand Trunk there was a train of five cars and a Pullman run from Toronto to North Bay carrying a pressure of 15 pounds to Allandale, and from there on to North Bay 20 pounds pressure was carried. The outside temperature was down to zero.

By admitting the steam at the lowest point we are doing what every man's mother does, sets the fire under the kettle and not on the lid.

I am running a train as conductor, and am not a mechanic, but if we can control the heat there is no difficulty in controlling the ventilation.

Mr. Ross,—

I am a better listener than I am a talker. I must admit that I am very well pleased with the paper read by Mr. Parker and the remarks made by Mr. Parker, Sr. I know we have had difficulties, and as Mr. Duguid says, we shut the steam off some going up a hill. Also many times we look back and see, as we think, the steam being wasted. If we can heat the train on a lower pressure it will be a great advantage to the engineer, the coal pile and to the company. I am not well enough posted to speak any further on the subject

Mr. MacNicol,—

On the Mimico street cars they have some kind of a heating system, which, however, is not by stoves.

Mr. McRae,—

It is a water system called the Peter Smith heater, and is largely in use in traction service. It is similar to the Baker system.

Mr. Lusk,—

I did not come prepared to say anything about this subject. One point I would like to ask Mr. Parker, what causes the heating system to freeze up?

Mr. Parker, Sr.,—

The cause of freezing with all methods of heating working on the gravity system is the leaky valves or not sufficient pressure to force the condensation around the two or three pipes of radiation in the car and out the so called "Automatic" Trap before it freezes and when it does freeze there are no means, other than to stop the train and make the outside application of heat to the frozen part.

Mr. Lusk,—

There is another question I would like to ask. Take, for instance in the fall, do you have to go over the cars and set them at a certain pressure?

Mr. Parker, Sr.,—

If I require steam I simply close down the combination Discharge and Auxiliary Trap and open the Crossover Valve and go to the engineer and ask for 2, 3 or 4 pounds steam pressure, on a three or four car train.

Mr. McRae,—

When this Club was organized it was the intention of the original promoters, that the members should be as one family; that they should exchange confidences more or less in the discussions and, of course, these details would not be repeated out of school. I had the honor of occupying the chair for a year succeeding Mr. Kennedy, and I must say we have got nearer to-night what was the original intentions of this Club. Mr. Parker, Senior, relating the troubles of that train down at Flint, Michigan, and the discussion taking place to-night, is just what we should always have.

It is a hard thing to discuss a paper like that given to-night,

especially by a representative of a firm, and it is equally hard to keep such matters out of the discussion. I am prepared to say, however, I am sure that Mr. Parker, Sr., and Mr. Parker, Jr., have not used this Club to-night as an advertising medium. I feel that no railroad official will censure us for discussing this subject. It is only by getting down to the men who have dealings with these things, that we get at the facts.

I have listened to-night to Mr. Parker's paper with the greatest of pleasure and I would like to move a vote of thanks to Mr. Parker for the paper he has so kindly given us.

Mr. Bly,—

I take very much pleasure in seconding the motion. I would like to ask, before sitting down, what would be the temperature of the radiators and how much would it cost to heat a car for 24 hours in severe weather, say at zero.

Mr. Parker, Jr.,—

That is rather a difficult question to answer accurately. We have never had a railroad of our own to figure this out, however a rough estimate can be had from some tests which have been made where cars have run as many as 446 miles in freezing weather before releasing any of the condensation it was found that there was then discharged about 20 gallons of water or 200 pounds, whereas a car equipped with a drip system would discharge during this eleven hour run upon an average of 60 pounds of condensation per hour or 660 pounds in all.

Mr. Bly,—

I would like to find out the temperature of the discharge water through the drip.

Mr. Parker, Sr.,—

We have no drip, we have the same pressure of live steam on the discharge side of the radiation as on the supply by means of a by-pass or Crossover and as there is no escape the water of condensation is retained and is prevented from returning back into the train line by the Automatic Regulator Valve.

If I may be allowed to demonstrate this point by the use of this glass model it would materially assist those present to understand the operation of the system.

The model consists of a glass tube with a bulb attached to create an air pressure, which in this case, takes the place of the steam. By entering at the lowest point the steam will pass through the water of condensation just as you see the air working through the water in the glass. Now by entering

the steam at the high point, as with all other methods of heating, the steam quickly condenses and if it is not allowed to escape readily, will make a "deadend" and decrease the heating surface and is very liable to freeze.

Mr. Bannon,—

I have learned more durlng the last few minutes. I would like to know how you would get rid of the condensation. I want to know how far you could run without emptying your system.

Mr. Parker, Sr.,—

We have run from here to North Bay, 227 miles, without a drip, we have run 312 miles on actual test, in zero weather, with a pressure of 15 to 20 pounds before the heating was noticeably decreased. This you will understand is a great saving in steam.

There are, no doubt, some gentlemen here who are acquainted with Mr. Ash Kennedy. I heard Mr. Kennedy make a statement in the presence of a C.P.R. official that after standing for fourteen hours behind a wreck, they used two tanks of water in heating the train. I am not positive of the capacity of the tank, but the engine was hauling ten cars. Those cars you will understand were equipped with the "Automatic" Trap and Drip System.

Mr. Bly,—

What was the temperature of the water when you got to North Bay, and when it was emptied out?

Mr. Parker, Sr.,—

We do not take the temperature of the water, but the temperature of the car.

Chairman,—

On behalf of the Club I tender a sincere vote of thanks to Mr. Parker, Sr., Mr. Parker, Jr., and any Engineers and Conductors present. I am sure this has been one of the best nights we have had as it has been one of the most practical.

Before adjourning I would like to read a letter received from our First Vice-President, Mr. Garden·

"It will now be impossible for me to attend the meetings of your committees, and shall be pleased, if you will permit me to withdraw from the position of First Vice-President of the Club. Will be pleased to still retain membership in the Club and assist in any way I can."

In connection with this matter the Executive Committee has suggested the name of Mr. Duguid, General Foreman of the Grand Trunk, Toronto, to fill the vacancy. Moved by Mr. McRae and seconded by Mr. Fletcher. What is your pleasure in the matter?

Carried.

Proposed by Mr. Fletcher, seconded by Mr. Bannon, that the meeting adjourn. Carried.