PAGES

MISSING

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OFFICIAL PROCEEDINGS

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

COURT ROOM NO. 2, TEMPLE BUILDING, TORONTO,

April 22nd, 1913.

The President, Mr. A. M. Wickens, occupied the chair.

Chairman,—

The first order of business is the reading of minutes of the previous meeting, and as you have all had a copy of them and have no doubt read them, it will be in order for someone to move that they be adopted as read.

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

Chairman,—

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

As you all know we have since our last meeting sustained the loss of our esteemed Past-President Mr. Bannan. The Club advertised in the papers and quite a large number of the members paid their last tribute to our departed friend and brother, on Saturday, April 5th. We have received a card from the family thanking us for our favors and sympathy.

The Executive have made arrangements to go down to the Gas Works next Saturday afternoon about three o'clock. It is said by some people that Station B in Toronto is the best gas plant in the world. It is undoubtedly the best on this continent. Through the courtesy of our Past-President Mr. Jefferies, there will be some person there to meet us and show us the plant, and I would like to see as large a party as possible on this occasion.

This is the first trip of this kind that the Club has had and the Executive have gone to considerable trouble to make the arrangements and we should have a very pleasant and profitable afternoon. Members will take a King street car and get off at Riverdale Station and walk a block down McGee street to the entrance.

The Executive Committee will take in hand at once the

matter of our annual outing. We want to get started early so that we can make proper arrangements and secure transportation to whatever point we decide to go.

I want once again to draw your attention to our Journal. If it was not for the advertisements we get in the Journal we would not be able to have the good times we do sometimes. I want to say that we feel somewhat encouraged, we have got some new advertisements and we want to make the Journal a little more interesting. There is to be a page of Club notes, published each month, and if any members have any short notes that they think would be of interest to the members if they will kindly forward them to the Secretary they will be published. While I am on this subject I want you to bear in mind that the advertisers pay their money with the expectation of getting something in return, and if you are in a position to buy from anyone advertising in this Journal I shall be glad if you will bear the advertisers in mind. It is not necessary for you to buy from them, but if anything you want is advertised give the advertisers a chance to quote you on it, and if you do this there is no doubt they will come along with their future advertising more cheerfully.

The next order of business is the announcement of new members.

NEW MEMBERS.

Mr. K. A. McRae, Chief Engineer, Imperial Life Building, Toronto.
Mr. R. Cairns, Engineer, General Hospital, Toronto.
Mr. Annis, Rep The Anchor Packing Co., Toronto.
Mr. T. Lever, Fitter, Gurney Foundry Co., Toronto.

MEMBERS PRESENT.

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C. A. Saylor
L. E. Ireland
H. Paton
W. H. Wensley
E. Logan
G. S. Powell
J. Sims
S. Pearson
J. Powell
G. A. Young
L. H. Rumage
J. H. Rose
W. W. Garton
T. W. Milne
J. McWater
A. W. Davis
C. H. Zammers
L. Salter
W. Millard
W. Sharp
R. Pearson
J. J. O'Brien
J. Barker
G. D. Bly
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F. Smith
J. McLaren
J. F. Tonge
J. B. Dunlop
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J. Wright
J. Powell
T. Graham
J. P. Law
F. R. Moody
J. H. Stortz

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A. Harris
R. Choyce
J. A. Chenowith
J. Herriot
L. Beale
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J. G. Jones
H. Goodes
J. Morris
J. Hollingworth
J. Sim
T. J. Walsh
A. M. Wickens
J. Jones
J. Anderson.

Mr. Herriot,—

Under the head of new business I would move that the Executive and Reception Committee get together at an early date in regard to our annual outing and get things in shape.

Mr. Fletcher,—

I second that. Carried.

Chairman,—

The paper for to-night is on the Walscheart Valve Gear written by our Past-President Mr. J. Duguid. I am sorry he could not be with us to-night, but Mr. Wickson, Acting General Foreman of the G. T. R. shops, will take his place and read his paper, which I have no doubt will be quite instructive.

Mr. Wickson,—

I am very sorry for your sakes as well as my own that Mr. Duguid is not here to-night to read his paper. Naturally the man who prepares the paper is the one best fitted to read it and discuss it. Another unfortunate circumstance is that the drawings, which were supposed to accompany the paper have been lost in the mail and have not yet been located. However, we will have to do the best we can with the sketch which I have prepared in a hurry.

I was expecting to get considerable information from this paper, and am therefore not prepared to give a great deal of information; however, under the circumstances we will have to do the best we can.

WALSCHEART VALVE GEAR.

BY MR. J. DUGUID, KINGSTON LOCOMOTIVE WORKS, KINGSTON, ONTARIO.

The gear was invented and patented by Egide Walscheart, an employee of the State Railways of Belgium in 1844, or one year after the invention of the Stephenson link gear, and although it has been improved since that time the principle features remain.

This gear found great favor on European railways and although it has been used in a few cases in the United States during the past twenty-five years, it is only in the past few years that it has come into general use.

Its use in Canada is, however, of quite recent date and therefore a great many of even railway men are still of the

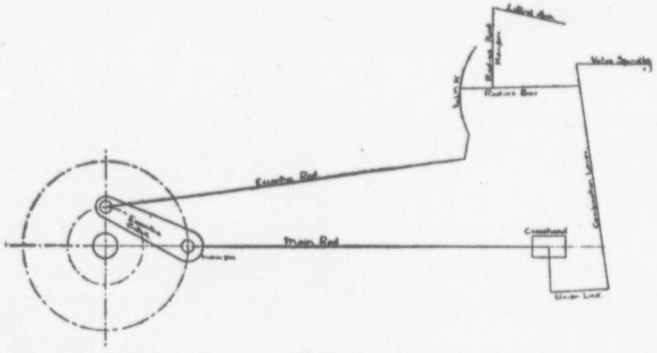

FIG. 1

opinion that this gear is very complicated and not as simple an arrangement as the Stephenson link type. This, however, is not the case, as there is no reversing valve gear that is as simple in construction and operation as the Walscheart.

As there are others here to-night, other than those who are connected with locomotive work and operation, I will endeavour to give you a rough idea of the construction and working of this gear.

Fig. 1 is a rough sketch of it applied to a 2-8-0 engine.

As will be seen from the figure this gear combines two en-

tirely distinct motions, viz: that derived from a single eccentric and the other from the crosshead, in such a manner that the combined effect is quite the same as from a link driven by two eccentrics.

The eccentric is applied in the form of a return crank from the main crank pin, its centre being approximately at right angles to the main crank pin. The Walscheart eccentric crank is always referred to as being located 90 degrees from the main crank pin, but it will usually be found to be located somewhat nearer to the crank pin than 90 degrees, where outside admission valves are used, and an engine with exactly the same set up of gear except in having inside admission valves, would have the eccentric crank placed the same distance, more than the 90 degrees away from the crank pin, for it must be remembered that the link is so placed that it can transmit motion to the valve without the result of wrong angles. The link, therefore, is placed so high that it is usually at a considerable angle from the eccentric crank to the link, and it is to overcome this angle that the eccentric is slightly shifted. If the end of the link arm extended down in line with the main driving axle the eccentric crank would be set 90 degrees from the main crank pins. These conditions cannot usually be obtained on modern engines. You will see therefore the eccentric has no angular advance and the link gives the valve no lap or lead. The link rolls on a fixed axis and its radius is the length of the radius bar. A union link fastened to a rigid arm on the crosshead is attached to the bottom of the combination lever, the top end is connected to the radius bar and also to the valve spindle, this then combines the crosshead and eccentric motions and gives the lap and lead to the valve. The combination lever is proportioned so that the full travel of the crosshead moves the valve twice the amount of the lap and the lead, therefore giving the valve constant lead at all points of cut off.

With the reverse lever in the centre position, the link will give no motion to the valve, and the valve will only move through twice the lead and twice the lap which motion it receives from the crosshead.

By moving the lever forward the link block is lowered in the link and the motion of the eccentric crank is brought into combination with the crosshead motion moving the engine forward, and vice versa when the link block is moved to the top of the link.

The difference in the gear for outside and inside admission valves must be considered when setting the eccentric crank, the forward motion is usually taken from the bottom end of the link and the eccentric will follow the main crank for in-

side admission valves and lead, the main pin for outside admission valves.

The connection of the radius bar to the combination lever from the crosshead is above the valve spindle connection for inside admission and below the valve spindle for outside admission valves.

The foregoing I hope gives you a rough idea, at any rate, of the working of this gear, and I will now try and give you the method (or at least one method) of the adjusting and setting of this gear.

It has three points of adjustment: 1, the position of the eccentric crank; 2, the length of the eccentric rod; 3, the length of the valve spindle.

Assuming of course that the combination levers and all parts are properly proportioned. Place the engine on say the right front centre and with a train from some fixed point, describe the arc a-a on the link as indicated on Fig. 2, and

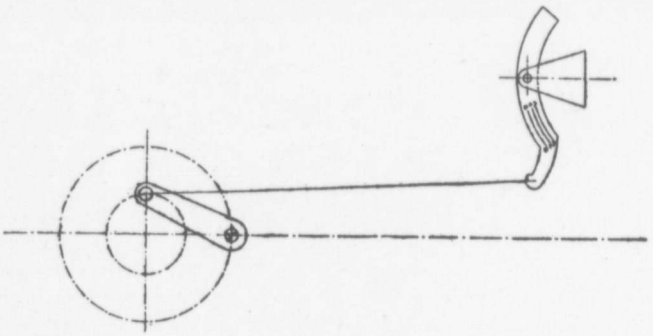

FIG. 2

then turn engine to the opposite centre and mark the arc b-b. If these two lines or arcs are in the same place on the link the position of the eccentric crank is correct, if however they come as indicated on Fig. 2 the crank must be moved until you can describe the arc c-c, with the main crank on both centres. The eccentric crank there is secured to the main pin permanently. The next is to adjust the length of the eccentric rod. The engine should be placed on the dead centre and the eccentric rod adjusted so that the link block can be moved from full forward gear to full back gear with any movement of the valve spindle, and if this cannot be done it indicates that the radius bar is too long or too short. If the valve spindle moves ahead when the link block is moved from the

center of the link the radius bar is too long, and if it moves back the radius bar is too short. To adjust the length of the valve stem the link block should be placed in the centre of the link and the crosshead moved to exactly half stroke, the valve should then stand centre over the ports and providing that the union link from the crosshead to combination lever is the proper length, so that the combination lever stands perfectly plumb and if the valve is not then central over the ports the valve spindle should be adjusted to suit.

ADVANTAGES OF THE WALSCHEART.

A great many think that there is a much better steam distribution with the use of this gear, but by noting the table on Fig. 3 of a setting of a Walscheart and a Stephenson gear, that except for the constant lead with the Walscheart there is very little difference in steam distribution. This, then, might bring up the question, viz.: Is constant lead an efficient feature on a locomotive? I do not think it is. On all classes of stationary engines the lead is set to suit the speed the engine is required to run, viz., the lead is increased for high speed engines. The Stephenson gear does this on the locomotive, only it overdoes it and this feature is eliminated altogether with the Walscheart gear. If, for instance, the lead with the Walscheart is set to suit high speed and give proper compression to properly arrest the flight of the heavy reciprocating parts of the engine. The engine would then be slow and sluggish at slow speeds and when lifting a train, on the other hand if the lead is set to suit for starting or slow speeds it is not sufficient for high speed and I think it will be proved now that as the Walscheart gear is coming into general use that it will be much harder to keep the engine up as regards shoes, wedges and boxes and reciprocating parts. This, no doubt, will be offset greatly by the general mechanical efficiency of this gear compared with the Stephenson. The first of these, no doubt, would be the decreased cost of maintenance, and the following is a statement of a test made by the Lake Shore and Michigan Southern of three passenger and three freight engines, showing cost of running and general repairs, that is one general repair and running repairs until they were again shopped. Cost is for each engine.

	Stephenson	Walscheart
Passenger—General Repair	$47.83	$16.31
Freight—General Repair	33.41	16.02
Passenger—Running Repair	$27.67	Nil
Freight—Running Repair	10.87	Nil

Another strong feature in favor of the Walscheart gear is

that it is all outside the frame and running gear of the engine, allowing for proper oiling and proper inspection both at the shop and on the road, as an engineer, if only stopped for a few minutes at a station can easily glance over the gear and detect any loose nuts, etc., that he could not do with the Stephenson link on account of the accumulation of parts and close wheel base on large modern engines, and in this way preventing road failures and cutting down running repairs, both very important, as road failures disorganize traffic and

SETTING OF WALSCHEART VALVE-GEAR

Position	Lead		Valve Opening		Cut-off	
	Front	Back	Front	Back	Front	Back
Full Stroke	3/16″	3/16″	2″	2″	27 13/16″	26 3/4″
Half Stroke	3/16″	3/16″	9/16″	9/16″	16 5/16″	16 1/16″
Quarter Stroke ..	3/16″	3/16″	1/4″	1/4″	8″	7 11/16″

SETTING OF STEPHENSON LINK MOTION

Position	Lead		Valve Opening		Cut-off	
	Front	Back	Front	Back	Front	Back
Full Stroke	0	0	2″	2″	23″	23 1116″
Half Stroke	1/4″	1/4″	17/32″	17/32″	13	13
Quarter Stroke ..	9/32″	9/32″	11/32″	11/32″	6″	6 1/16″

FIG. 3

roundhouse repairs keep the engine out of service which is also costly.

Another feature that greatly favors this gear is less danger of parts heating, as compared with the Stephenson, as all working parts are steel pins case hardened and working in case hardened bushes, with the exception of the eccentric rod connection which has a brass bush working on a case hardened pin. It also eliminates the large eccentrics and their heavy friction, which consume considerable of the engine's power and, in a test made, it was shown that with an engine and tender which weighed 16 per cent. of the weight of the train, that the power consumed by the engine and tender was from 30 to 33 per cent. of the indicated horse power. The absence of the eccentrics from the main axle also gives free access to the driving box cellars and also to the wedes.

With a properly proportioned reversing mechanism the Walscheart gear is much lighter on the reverse, than the Stephenson link, as with the former it is only the back ends of the comparatively light radius bars that have to be raised, as compared with the heavy links and front ends of the eccentric rods on the latter.

The difference in weight of the Walscheart gear, as compared with the Stephenson, is an important point.

The weight of a Walscheart gear on a 2-8-0 class of engine will be about as follows:—

	Pounds.
Crosshead arms	58
Vibrating rods	225
Eccentric rods	225
Links	275
Transmission bars	135
Valve rods	75
Eccentric cranks	110
Vibrating links	65
Valve stems	65
Transmission bar hangers	75
Total	1,308

Whereas on an engine of the same class, equipped with Stephenson gear the weight would be approximately 2,800 pounds.

These figures show that the Stephenson link has become a ponderous affair.

The main load which comes on the eccentrics causing them to heat is not the friction of the valve, but is due to the inertia of the reciprocating parts of the valve gears whose motion is

reversed twice every revolution, for the above weight shows that there is a very heavy load on the eccentrics causing them to heat and when they have to be taken down their location inside the frames is the most inconvenient one possible, making repairs heavy and expensive.

Then again, large eccentrics occupying so much space wear unevenly and lubrication is difficult with the high surface velocities of the largest type, whereas with small bearings and hardened pins there is an important advantage in maintenance.

The removal of the gear from between the frames also facilitates bracing the frames properly, a very important matter with heavy locomotives.

Another feature which favors this gear is the facility with which it can be disconnected in case of failure on the road, thereby cutting down the time that a disabled engine can be got into a terminal or divisional point.

The motion with the Walscheart is more direct to the valve than the Stephenson link, as the undue angles in the latter cause undue jamming and link block slip.

To the members of this Club who are particularly interested in the repairs and handling of locomotives, I would refer them to a pamphlet by Mr. C. O. Rogers, travelling engineer for the American Locomotive Co., published by the Railway World Publishing Co., Chicago, as it contains a full description of the construction and operation and a set of questions and answers regarding breakdowns on the road.

There are also certain disadvantages of the Walscheart gear, as compared with the Stephenson, and one important one is the liability to clog up with ice and snow, especially in cold parts of the country, and on one particular railroad that I had occasion to do business with last winter, there were three times when it was necessary to haul the road engines from the station to the roundhouse on account of link and link hanger bearings being so badly frozen up that it was impossible to reverse the engine. This trouble does not occur with Stephenson link motion, which is protected behind the cylinders and under the boilers.

Another disadvantage is that in case of collision or the breaking of a main or side rod, it is liable to cause serious damage to the Walscheart gear. Still another disadvantage is that the same construction of this gear cannot be placed on different classes of engines; on a 2-8-0 type the links, of course, are usually attached to the motion plate (or cross tie, as it is sometimes called), while on the 4-6-0 type, on account of the wheel positions, the links supports are usually carried on the steel frame outside of the leading wheels. Some railroads also

have the cross centres of the piston valve chambers narrower than the cylinder centres, thereby necessitating the radius bar being connected to the valve spindle by an offset rocker arm arrangement, while with the Stephenson motion all these different designs are eliminated and the same style of motion is practically suited for all classes of engines.

I have ridden on a great number of engines with both Walscheart and steam gear and, in my opinion, the Stephenson link gear is the smoothest riding engine at high speed (having none of the surging movement found with the Walscheart gear); this, I believe, is lack of proper compression at high speed.

In getting up this paper I have endeavored to give you my experience from actual observation and I hope, therefore, that the members of this Club will give it a thorough discussion and point out any points that I may be going astray on, as a discussion on any paper is generally of a great deal more interest and instructive than the paper itself and, in this way, I will learn more from the discussion than the members will learn from the reading of this paper.

Chairman,—

We have all heard Mr. Wickson read this paper, which he has done very well. I have no doubt he will be able to enlighten some of us on any points that may not be clear to us.

I will ask Mr. Sharp to speak.

Mr. Sharp,—

I am not in a position to say anything on this subject. I came here to seek knowledge in regard to the Walscheart valve gear.

Mr. Battley,—

I have been very much interested in this subject and would like to ask Mr. Wickson who the pamphlet was written by that Mr. Duguid recommended us to get in regard to this question.

Mr. Wickson,—

The pamphlet was written by Mr. C. O. Rogers, travelling engineer for the American Locomotive Co., and published by the Railway World Publishing Co., Chicago.

Mr. Battley,—

There are quite a number of articles published on this sub-

ject; I have some of them myself and would like to obtain the one mentioned.

Mr. Stortz,—

Mr. Chairman and Gentlemen,—I happened to have charge of the first engine, No. 705, equipped with the Walscheart valve gear on the Grand Trunk Railway. This engine was equipped for test purposes and was applied to a cross compound consolidation engine, which I consider did not give the same opportunity for a fair test as when applied to a simple engine. This test, which covered three or four years, with general repairs about every twelve months, during which time the cylinders were changed to try out piston inside admission valve in place of outside admission valve. Prior to this change it was almost impossible to ride on the engine when travelling over twenty miles per hour. After the cylinder was changed this trouble was lessened and the engine rode more smoothly.

From a point of service with this test this engine was not able to do anything that could not be done with an engine equipped with the Stephenson gear. As a matter of fact, the engine equipped with the Stephenson gear appeared to be a little better, as far as this type of locomotive is concerned. Further experience with the Walscheart gear, when applied to the simple superheated engine, will not bear out my last remark in regard to the compound engines. In fact the Walscheart gear appears to give a little better service when applied to the simple superheated engine than when equipped with the Stephenson gear. While the Walscheart gear is practically in its initial stage in Canada, it has been in service many years, as stated by Mr. Duguid's paper.

As early as 1895 I had some experience with a valve gear that was practically the same as the Walscheart on the Southern Pacific Railway. This company had 75 per cent. of their power equipped with this gear, which gave excellent service. As far as the mechanical design of this valve motion, I think Mr. Wickson has made this quite clear and I have nothing to add to his explanations. In regard to the roundhouse maintenance, the Walscheart gear is decidedly an improvement over the Stephenson gear, as there is practically no roundhouse maintenance from one general repair to another. Nuts do not work loose on the Walscheart gear, and if there are any engineers present I shall be glad if they will take note of this remark; there is more damage done by engineer's inspection of this gear than the roundhouse maintenance amounts to, caused by the engineers striking the nuts on case hardened pins breaking the ends of pins; this is unnecessary and should be

avoided. From my experience I would favor the Walscheart gear for the reason of its light roundhouse maintenance, less liability to failure on the road, more accessible to the working parts and an advantage derived making repairs to engine and strengthening the engine frame. Although the gear costs $350.00 more, I consider it well worth the money to any railway company.

Chairman,—

We would like to hear from Mr. Wensley.

Mr. Wensley,—

I am much the same as Mr. Stortz. It is really a matter of opinion as far as my experience goes. The cost of applying this gear is of course much higher, and it has to be found out whether it is worth the extra cost or not. We have troubles with the Walscheart valve gear and troubles with the Stephenson gear, but, of course, our troubles with the former are not to the same extent.

Chairman,—

Perhaps Mr. Kirkwood would like to say something?

Mr. W. Kirkwood,—

I am not in a position to say anything about the Walscheart valve gear. Since I came over to the 15th district I have not had any experience with it, and I left the 17th district before the Walscheart valve gear was in operation.

Mr. McRobert,—

Mr. Wickson mentioned that there was no lap or lead from the crank motion. I have had considerable experience with engines and would think that this would be detrimental and I would like the reader to explain this.

I would also like to know if the Walscheart valve gear takes steam on the inside or the outside of the piston valve and if the valves are single or double ported.

Mr. Wickson,—

You are correct in saying that there is no lap or lead from the crank motion. This is derived entirely from the motion of the crosshead and is transmitted through the combination lever.

So far as the valve is concerned there is no difference what-

ever from the valve used with the Stephenson link. The whole difference between the two gears lies in the different mechanism for moving the valve and does not extend to the valve proper.

In the Walscheart gear the piston valve takes steam on the inside just the same as the valve with the Stephenson gear.

The ports are single and the same in both cases.

Mr. McRobert,—

Some people say that the travel of the valve is equal to twice the lap and the lead. If you measure it up with a tram you will find it is more than this due to the straightening up of the rod.

Mr. Wickson,—

Suppose that the link block is placed exactly in the centre of the link. This is connected to the radius rod and even though the link oscilates the radius rod will be perfectly stationary and will therefore transmit no motion to the valve from the eccentric rod. So long as the crosshead moves, however, the combination lever will transmit to the valve, motion equal to twice the lap and the lead and this will occur so long as the crosshead is moving provided the gear is in good order. The moment, however, that the link block is moved above or below the centre of the link, the motion from the eccentric crank is transmitted to the valve. This motion is not altogether added to or subtracted from the motion of the crosshead, but is a combination of the two.

Chairman,—

What has Mr. Saylor to say?

Mr. Saylor,—

One of the great difficulties with the Stephenson gear we experience is on account of the eccentric straps breaking, this is due to the strap wearing, also the bolts come loose which causes them to break.

The Walscheart is no doubt all right, but we have not yet had it long enough to tell much about it. However, there is one point in its favor and that is that it will be easy for the engineers to lubricate and they will also be able to look over the parts and detect any loose nuts much easier than with the Stephenson gear. In regard to the wear of it we have not had sufficient experience on the Grand Trunk as yet with this gear to determine as to its length of service.

Chairman,—

We would like to hear from Mr. Sealy.

Mr. Sealy,—

So far we have not had any trouble with these gears, they have not yet been long enough in the service. It seems to me that it will be an easy matter to keep a stock of supply parts on hand, so that, in the event of any of the parts getting broken, they can be easily replaced, as they are much lighter than the parts of the Stephenson gear.

I have been looking for one of these engines to come in with the side torn off, so that I would have a chance to get right into it and examine it thoroughly. One can read about them and so on, but one wants the practical side before becoming familiar with them.

Chairman,—

We would like to hear from Mr. Davis.

Mr. Davis,—

I have not yet had any experience with the Walscheart gear on the Grand Trunk. However, I had some experience with them for about four years in the Southern States and I found that the maintenance of the Walscheart gear was practically nothing to what the Stephenson gear is. This is one strong point in favor of the Walscheart gear. I have known one to be in operation for over two years and at the end of that time there was only one inch lost motion in the bottom of the radius bar.

I am very much in favor of this gear on account of the easy way in which it can be inspected and looked after in the event of anything breaking. On account of this gear being outside the frames, it allows of a better inspection being made and any work requiring to be done there can be completed much better by the machinist.

Chairman,—

Perhaps Mr. Roy Battley has had some experience in regard to this matter.

Mr. Roy Battley,—

My experience with the Walscheart gear has been very limited. So far we have had no failures with it, and I came here to-night to learn all I could about it. However, there is

one thing in its favor and that is the fact that it is easy to attend to in case of a failure.

Mr. John Battley,—

You state that the travel of the valve is equal to twice the lap and the lead. I do not quite understand these technical terms. Although I have been an engineer for several years I never understood that twice the lap and the lead was the travel of the valve and I would like an explanation of this point. If we have a valve with ⅛-inch lead and ⅞-inch lap back and front, twice that would be 2 inches. It seems to me that would be a short travel for the valve. I thought all valves travelled more than that.

Mr. Wickson,—

Double the distance from the centre of the eccentric crank will give the travel of the lower end of the link which is connected to the eccentric rod. The valve travel, however, is not equal to this on account of the link block in its lowest position, being a considerable distance nearer the pivot than the point whose travel we have just spoken of.

Mr. John Battley,—

It appears to me that I have read that the radius rod takes care of the travel of the valve and the combination lever takes care of the lap and lead.

Mr. Wickson,—

Suppose, for instance, the crosshead was disconnected from the main crank and the crosshead blocked in such a position that the combination lever was standing perfectly vertical on the central point of travel and the engine was moving either backward or forward. The only motion transmitted to the valve would be from the eccentric crank and would be equal to the full motion of the valve less twice the lap and lead, since this lap and lead is given to the valve by the crosshead motion and in this case there is no crosshead motion.

Mr. John Battley,—

I have imagined that when the eccentric rod is at the extreme end of its travel the combination lever then moves the valve over still farther. Is such the case?

Mr. Lewkowicz,—

The combination lever moves the valve just twice the lap and the lead.

Mr. Wickson,—

In this case suppose the engine is at dead centre, as shown in this diagram, by the position of the main crank. So far as this side of the engine is concerned it is now in a position to go either forward or backward. If the link block is raised or lowered there will be no movement of the valve, since the link block travels in the arc of this circle with a radius equal to the length of the radius arm. Since the link is the same radius, there will be, as mentioned, no movement to the valve, the block simply moving up and down the link.

You must remember, however, that on the other side of the engine the main crank is either on its top or bottom quarter and the eccentric either full forward or full back, thus having the link at an angle to the full extent of its travel in one direction. When the link block is moved up or down since the link is on an angle, the valve immediately moves either backward or forward, opening the forward or back port as the case may be, which determines the forward or backward motion of the engine. As soon as the engine moves, the crank on this side comes off the dead centre and the link begins to move, when, of course, the whole valve motion comes into play.

Mr. Lewkowicz,—

I would like to move that a vote of thanks be tendered to Mr. Wickson for the very able manner in which he has read and discussed this paper; also to Mr. Duguid for the trouble he has taken in preparing same.

Seconded by Mr. Wright. Carried.

Chairman,—

I have great pleasure in tendering you the hearty vote of thanks of this Club for the very able manner in which you have handled this paper and the discussion to-night. The vote of thanks is also extended to Mr. Duguid for his care and attention in preparing the paper and we greatly regret his inability to be with us to-night.

Mr. Wickson,—

I thank you very much for the hearty vote of thanks and am very sorry that Mr. Duguid was unable to be present, as

I am sure the discussion would have been much more interesting. It is a difficult proposition for anyone to get up and answer questions on another man's paper. However, I feel that we have all learned something from this paper to-night and for my own part I have gained an insight to the Walscheart valve gear that I would not have done had I not read this paper.

Chairman,—

I am glad to see our old friend Mr. Lewkowicz back with us again. He has been absent nearly a year and I am sure we would all like to hear from him as to how he has been getting along during this time.

Mr. Lewkowicz,—

I feel like a stranger amongst you after my long sojourn across the ocean; however, I am very glad to be with you all again.

I understand we are going to have a picnic pretty soon. It is two years since I was with you on a similar occasion, but I hope to be with you on the next occasion.

Chairman,—

Do not forget the visit to the Gas Works on Saturday. I would like to see as many as possible there, as we want to make it a success.

If there is nothing further it will be in order for someone to move that we adjourn.

Moved by Mr. Lewkowicz, seconded by Mr. Davis, that the meeting adjourn. Carried.

CLUB NOTES.

The visit to Station B. of the Consumers' Gas Co. was a great success. "The coal dust was fine." Come on in.

Some of the boys were charging up with gas for the next meeting.

Our old friend and active worker, Joe Lewkowicz—right from the Old Sod—don't-cher-know—was always to the front, as usual.

Gardiner—you know Gardiner—he was there. So was Thompson, about the same size as ever.

> The boy stood on the burning deck,
> Howard Fletcher, he was there, you bet;
> Howard didn't do a thing,
> But play away on the same old string.

General Superintendent Jefferies is always on hand at the opportune time.

None of the boys got away with their pockets full of gas for home consumption.

It was a gas picnic. O, but just wait for June.

The Walscheart valve gear always runs smooth—just read the paper in this number and be convinced.

The Stratford contingent was all smiles.

The paper for the May meeting will be on "Superheated Steam: Its Properties and Advantages," by A. G. Hill, M.I.M.E., A.M.C.S.C.E., Manager, Babcock & Wilcox, Toronto.

Don't Forget

The Club's Annual Picnic

June 21st

To

Erin

The Longest Day and Best Picnic of the Year. All come

James Bannan

Died

April 2nd, 1913