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# The Canadian Engineer

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ESTABLISHED 1893.

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## The Canadian Engineer

ESTABLISHED 1893.

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## INDEX



## THE CANADIAN PEAT ASSOCIATION.

The direct results of the Convention of the American Peat Association in Ottawa has been the organization of the Canadian Peat Association.

Those interested in the developments of the industry in Canada, whether as a source of power or domestic fuel, will be interested in this new organization and the work there is to do to-day in bringing before the country the value of our peat deposits and the possibilities of the peat industry.

Two main factors have been instrumental in bringing about the revival of interest of the Canadian peat deposits. One, the increase in price of fuel, particularly of hard coal. The other has been the great improvements made in the developments of gas producers and gas engines and in their use of low-grade fuels.

Peat gas-producers have proven a success in Europe. Ontario and Quebec buy twenty-five millions worth of coal annually. Ontario is dotted with peat bogs. Along the line of the National Transcontinental Railway large deposits are found. Four bogs within a few miles of Ottawa are by Government engineers estimated to contain 25,000,000 tons of fuel.

The coal deposits of Canada are not general in their distribution. The extreme east and west are supplied, but the great middle country—which at the present is the manufacturing section—is but poorly supplied with fuel. Close to many of the peat bogs there is to be found marl, shale, rock, the raw products of cement and concrete and building material. Our large peat bogs when properly developed will be a factor in the cheap working of other of our natural wealth.

The Canadian Peat Association will have a large membership from the commencement. The industry which it will represent is growing in importance. It is to be hoped the Government will for a few years at least lend what aid they can to this new organization, which has for its purpose the perfecting of methods that will lead to the development of a new industry.

## THE CONTRACT SYSTEM ON GOVERNMENT LAND SURVEYS.

Recent newspaper reports state that the Federal Government of the United States has decided to abandon the contract system of surveying Government lands.

The Surveys Branch of the Department of Interior for Canada have during the last few years been doing more and more of their surveys by "day work."

Unquestionably the contract system enabled the Canadian Government to secure the subdivision of main lands into ranges, townships and sections at a minimum of cost. It is questionable whether this method has saved money. The contractor has rushed his work and completed his survey with as little expense as possible, and sometimes at the expense of accuracy. Re-survey and subsequent troubles and litigations have cost the property-owner and the Government much more than the cheap surveys saved.

The Government inspectors who have had to report on contracts do their work carefully, but their inspection, if complete, would be unreasonably costly. It has been shown time and again that the required observations and closing check, although they have the appearance of accuracy, have been "fudged."

Modified forms of the contract system in which to the salary of the surveyor there was added a bonus for doing certain work under given conditions would perhaps bring better results to the department and cause considerably less worry to the surveyors.

It may be a departure for the Government to offer bonuses to their salaried employees, but if it is good practice for the manufacturer and contractor to pay a bonus to their employees it should be an equally wise policy for the Government to bonus their surveyors.

Stimulus in Government work would be good for both the mental and physical development of the men. Perhaps there is no department of the service in which this is less necessary than the engineering and surveying branches of the Government service; yet we fancy that even in this department the men would welcome the suggestion.

## THE DANGER OF UNSKILL.

Walter G. Beach in the current number of the Popular Science Monthly, has a very interesting article, entitled the "Danger of the Unskill." In view of the sitting of the Royal Commission on Technical Education, which will be held throughout Canada during the coming months, the article is of peculiar interest.

The unskilled laborer of Canada is made up of two classes. One, the immigrant from the crowded out and unskilled workmen of Great Britain, largely supplemented by the peasant immigrant of southern Europe. With this class is to be found mingled the sons and daughters of Canadian citizens, who, because of environment or necessity, have been drafted into the army of the unskilled. These two classes make up the labor reserve upon which the manufacturer and the contractor draw.

The demand for unskilled labor is great, but the fight of the unskilled man for an existence is greater. Specialization and the perfecting of machinery have placed a greater handicap than ever upon the unskilled.

The day was when the natural resources of this country were so prolific as would encourage us to believe that they would be an ever ready source of supply. Co-operation and combination was not needed to produce sufficient for existence. This is changed. The increase in population and in the number of fancied necessities have made complex our social life, and so increased the demands around the purchaser that endurance, courage and assertedness must be supported by skill before the men and women can attain the position or keep pace with the progress that the new industrial life of our country demands.

Skilled citizens are necessary, first, that they may work out an existence and have in reserve leisure for reflection and recuperation; and second, that waste may be lessened in our industrial life.

There are two ways in which they may acquire this skill. It may come either through their connection with the trades and industry or through technical schools and colleges. The demands of our industrial life seems to be too great to allow for the training of the new men by the apprenticeship system alone. There can be no doubt that the apprentice system in the past led to great skill and gave, at least, some of that which is associated with our idea of a school. The apprenticeship system is a thing of the past. The modern workshop is too great a specialist to train the skilled workers. There is too much invested to allow of it being used as a training-ground.

Our modern conditions require that the training be received outside the workshop.

Nova Scotia and Ontario have scattered throughout the Provinces small training and technical schools. These are but the beginning of what the future will require throughout the Dominion in the way of trade schools. The night school where vocational training may be obtained is Canada-wide. They are doing a good and necessary work, but naturally, they are not specialistic enough.

The report of the Royal Commission on Industrial Education will doubtless contain information and suggestions whereby our councils and schools boards may devise means of training the young people in their other things more important than the "three R's."

## GROWTH OF STEEL OUTPUT IN CANADA.

The growth of the pig iron production in Canada, as well as that of the Dominion corporation, since 1901, is clearly shown in the following table:

| | Total for Canada. Tons. |
|---|---|
| 1909 | 609,400 |
| 1908 | 686,800 |
| 1907 | 416,600 |
| 1906 | 585,400 |
| 1905 | 390,200 |
| 1904 | 277,700 |
| 1903 | 323,700 |
| 1902 | 348,600 |
| 1901 | 165,900 |

The output of steel ingots has been as follows:

| | Total for Canada. Tons. |
|---|---|
| 1909 | 570,600 |
| 1908 | 662,000 |
| 1907 | 606,500 |
| 1906 | 569,200 |
| 1905 | 300,400 |
| 1904 | 128,900 |
| 1903 | 260,600 |
| 1902 | 136,400 |
| 1901 | 33,300 |

The Government bounties on pig iron and steel ingots expire on December 31st this year, and those on wire rods, which were given in lieu of tariff, on June 30, 1911. It is thought that when the different bounties are terminated they will be replaced by a protective tariff, although the cessation of the bonuses indicates that the steel industry in Canada is thought to have established itself upon a firm and lasting foundation.

## TECHNICAL EDUCATION COMMISSION.

The Royal Commission on Technical Education commenced their sittings at the Nova Scotia Technical College July 18, 1910.

### Personnel of Commission.

The Commission is composed of seven members, namely: James W. Robertson, C.M.B., D.Sc., LL.D.; Hon. John N. Armstrong, Rev. George Bryce, M.A., D.D., LL.D., F.R.S.R., Gaspard De Serres, Gilbert M. Murray, B.A.; David Forsyth, B.A.; and James Simpson.

Dr. Robertson, the chairman, gave a brief outline of the work of the commission. He said that the Government had expressed a recognition in a new form of the heritage of Canadians. This recognition is in the form of the conservation of the resources of the country. These cannot be utilized until the people have been educated in this regard and in their proper development. The best way is that whereby labor can be applied with the least waste, cost, etc. Industrial efficiency is an all-important item in the successful development of Canada. The commission, by investigation and by personal observation, is to secure all the information possible on the industrial life of Canada. It expected to receive much valuable information from the employers of labor, and would call for and welcome any representative of the laboring man himself. In fact it would receive information from every source. It would investigate all kinds of labor and also how the man working for wages spent his time, and as well would look to see if the people were working under favorable conditions. He hoped that in investigating the transportation services something of great benefit would be discovered. In carrying on the work the commission will confer with the educational authorities in order to learn what facilities are already provided for industrial training and technical education. It will consult the foremen of factories, farmers and other practical men. When it has gathered this information its trip abroad will give the members opportunity to study what has already been accomplished along these lines in order that they may be better prepared to suggest the methods of education best suited to the people of Canada.

### Evidence of F. H. Sexton.

Mr. F. H. Sexton, Director of Technical Education for Nova Scotia, gave an outline of the system of technical education carried on in Nova Scotia. The Government of Nova Scotia laid down a system of technical education two months before the State of Massachusetts, which was the first State to take up this work, and as Nova Scotia was the first Province in Canada, this Province was, therefore, the pioneer in establishing a system of technical education in America. When the scheme was proposed there were four colleges in a healthy condition that were sturdy rivals, all of which had gone into the work to be taken up by the Technical College. Representatives of the colleges were brought together, and a working agreement was arrived at. To-day there exists in all the colleges a uniform course of study for the first two years' work, and when the pupils come to the Provincial Technical College they can go into whichever branch of engineering they most desire. The college did not have to purchase equipment for a complete course, and the Government did not have to provide instructors for the first two years' work. When the question of technical education was taken up there were throughout the Province a number of night schools, mostly for miners, which were not very efficient. These schools were re-organized and to-day are of greater benefit of the miners. These coal mining schools are supported by the Government, and are entirely free. They have prepared the native-born Nova Scotians to take responsible positions, and have made a better class of miners. There is no other State or Province that carries on coal mining schools for miners. If the men work altogether at night, instructors give them instruction in the day time. These schools, like the various schools established throughout the industrial centres were not to increase the number of men seeking employment, but to increase the efficiency of those already at work.

### Second Sitting at Halifax.

President Forrest of Dalhousie University stated there was more money going out of the Province for correspondence school courses than would be necessary to establish and equip several technical schools, some $70,000 or $80,000 a year going out of Nova Scotia alone. When the Technical College was started it took over the work begun by Dalhousie. He did not know of anything that had so stirred up the public to the need of technical education as the evening technical classes had. There was no work that the university had ever touched that had been so successful as technical schools. He added that the trades unions had done all they could to assist technical education.

### Commercial Education.

Geo. S. Campbell, chairman of the Board of Governors of Dalhousie, said that what was apparently neglected was commercial education. Many young men, he said, when they left college, knew very little about business matters. All the colleges in Nova Scotia were doing excellent work, but all had the same difficulty—lack of funds.

### University of Toronto.

President R. A. Falconer pledged the support of his university, and emphasized the value of technical education as a humanizing influence, as producing better workmen, as training leaders, and, above all, as establishing better relations between employer and employees, which would go a long way to bringing about industrial peace.

### Technical Training For Women.

Mrs. F. H. Sexton, who is a graduate of the Massachusetts Technical College, said the question of technical education for girls is more complicated than for boys, because they must be trained as home-makers as well as to earn a living. The complicated part of the question arises when we consider the tremendous number who must earn a living. In the United States there are 6,000,000 women who must earn a living. In Canada there are about 300,000 engaged in gainful occupations. About nine per cent. in the United States enter the professions; about ten per cent. enter commercial pursuits.

Mrs. Sexton gave a detailed account of what Boston is doing in her trade schools for saleswomen, and all that outside agencies are doing to induce women to enter agricultural pursuits. About twenty-five per cent. enter manufacturing in the United States, and about forty per cent. enter domestic service. If we are to train this forty per cent. we must go back to the mistresses and train them first, which is essential. From investigation in Halifax she thought it would not be difficult to give practical training to girls for domestic service.

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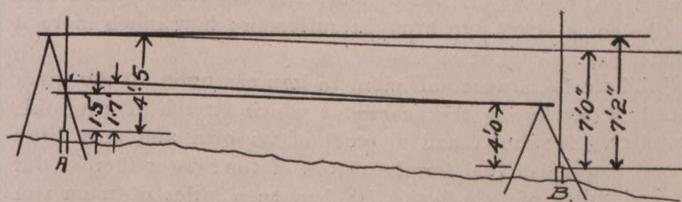
## ADJUSTING A DUMPY LEVEL.

A. R. Sprenger, Cochrane, Ont.

Many engineers object to using a dumpy level on account of the time it takes to adjust the crosshairs for collination. The textbooks are to a great extent to blame for this as they give such a long-winded, tedious method. The following will be found a useful short cut:

Drive 2 stakes A and B about 200 feet apart, set up over one, say A, sufficiently to one side that the H.I. can be read at the eyepiece, call it 4.5. Next read the rod held at B,




which we will assume to be 2.5 feet lower than A. Were the instrument in adjustment the reading should be 7.0 feet, but as the crosshairs are not true, let it read 7.2 feet, thus showing B to be apparently 2.7 feet lower than A, an error of .2 feet.

Reverse the proceedings—set up at B, find the H.I. by reading at the eyepiece, say 4.0 feet. The true reading of

A would be 1.5 feet, but as there is an error of .2 feet in this distance the rod will read 1.7 feet. Thus:

On the 1st set up we had an apparent fall of 7.2—4.5=2.7 feet.

On the 2nd set up we had an apparent rise of 4.0—1.7=2.3 feet.

The mean of these two differences ½(2.7+2.3)=2.5 feet must be the correct difference in elevation between A and B, and the wires should be adjusted to read 4.0—2.5=1.5 feet. This 1.5 fet is half the difference between the apparent rise and fall of the two set-ups, ½(2.7—2.3)=.2 feet.

In short if the fall from A to B is the same as the rise from B to A the level is true, if not, then correct the collination for half the difference, i.e., ½(2.7—2.3)=.2 feet.

## THE AMERICAN PEAT SOCIETY.

The American Peat Society held their fourth annual meeting at Ottawa, Canada, July 26th, 27th and 28th, 1910.

Hon. Clifford Sifton, in addressing the gathering, paid a tribute to Dr. Eugene Haanel, the president of the society, for his work in connection with the arrangement for this convention and went on that the society had done Ottawa an honor in deciding to hold its annual meeting here this year.

Canadians and Americans, he said, were so accustomed to having abundance of all things which constituted the necessities of life, that they had little idea of ways of conserving natural resources and preventing waste. In fact the speaker was in much the same position, and it was not until he had travelled in European countries and saw there the way waste land was utilized, and the twigs and leaves of trees gathered, that he could appreciate what complete utilization meant.

In Ottawa it was hard to impress on the people the saving of fuel. For years the great difficulty was to get rid of the refuse of lumber manufacture, a refuse which in many other cities would have been very valuable as fuel. For those who had been reared on a farm there was very little appreciation for sparing the tree until quite recently. But the time was very near when what is now known as firewood will be no longer available.

It is important to consider that at no time in the future will the price of coal be any less for any length of time than it is to-day. According to statistics, in 100 years the present visible supply of coal in America will be exhausted, according to the present rate of mining, and long before that it will have become very expensive.

Canada has no very large cities, yet in its present larger ones, people are herded together in the winter in a way that prevents proper sanitation or living in a civilized manner because of the cost of coal to heat a larger house. The coal strike some years ago brought suffering; how much more if there was no coal at all?

These facts were sufficient to impress upon all the great need of developing the peat bogs which stretch all over this country. Manitoba had no coal of its own and very little wood to furnish fuel for the rigors of the winter there. But it had miles of peat bog. He had seen miles of it on fire where it had been turned up in the construction of railways.

He said that Canada and the United States had been too prone to begin works before the experiments and experiences in similar works in other countries had been thoroughly studied. He knew of many instances where much capital had been wasted by constructing wrong plants which had later to be dismantled. There had been much waste of capital in the peat industry by people who had not inquired the exact facts of the situation before plunging into expense. The method of this society in diffusing knowledge was most admirable, and he suggested that at every annual meeting a statement be compiled giving the exact situation of the industry as briefly as possible in order that people all over the country could read it and be prevented from mistakes.

As far as he had studied the question the cost of harnessing and developing water power were such that electricity could not become the poor man's source of heat.

## THE EXPLOITATION OF OUR PEAT BOGS.

**For the Production of Fuel for Domestic and Industrial Purposes.***

**Dr. Eugene Haanel, Ph.D.**

In a country, such as ours, where independently of the continually increasing amount of fuel required for industrial purposes, we are during the long winters dependent upon artificial heat in our homes, the item of cheap fuel becomes one of the most important factors in the prosperity of the nation.—Our coal deposits are situated in the far east and west, and the long hauls to bring this fuel to the central provinces render the price of our own coal prohibitive, and leave us dependent on outside sources for the necessary supply of fuel in these provinces.

The rapid industrial development of Canada and increase of our population render therefore the intelligent exploitation of our abundant and excellent peat deposits for fuel purposes of supreme importance.

We can at present form no estimate of the enormous extent of our peat bogs. The 37,000 square miles already known form probably but a small fraction of the amount of this valuable fuel asset in existence in Canada.

The necessity of utilizing the peat deposits scattered throughout the provinces in the more settled portions of them, has within recent times been appreciated, and efforts have been made by some of our enterprising citizens to establish a peat industry. Much money, thought and energy have been spent on this problem. Many plants have been erected, but unfortunately so far without reaching commercial results.

Only in rare instances is progress made in improvement of processes of manufacture by those who are unfamiliar with what has already been achieved, and the causes which have led to failure. This may have been one of the reasons why the efforts so far made in utilizing our peat deposits have not been attended with success.

To prevent further failure from this cause in the manufacture of peat fuel, an investigation was made by our Department three years ago, and a report issued on the manufacture of peat for fuel and other purposes in the peat-using countries of Europe.

This investigation has demonstrated that:—

1st. For the economic production of fuel from peat, machinery driven by power must be substituted as far as possible for manual labor.

2nd. That processes so far invented for removing the water content of the peat by pressure and artificial heat have not led to commercial results, and after trial have been abandoned.

At any rate the existence of plants in any country furnishing regularly and at reasonable prices artifically dried and briquetted peat, are not known at our office. The recent re-

(Continued on page 133).

* Presidential address before the American Peat Association.

THE

# Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

## THE PROVINCE OF ALBERTA AND SEWAGE DISPOSAL.

We publish in this issue a copy of a resolution lately passed by the Alberta Provincial Board of Health and forwarded to several of the municipalities.

The resolution extends the period allowed for the commencement of sewage disposal works.

Many of the cities and towns of Alberta were under notice to install sewage disposal works by 31st December of this year.

It will be noted that the whole question of sewage disposal is being held up throughout the Province in order that a test experiment may be made in what the Board terms "Mr. Owens' system."

Reflections are made upon all other systems of sewage disposal, and it is stated in the resolution that: "All the old systems now in use are regarded by sanitary authorities as falling short of giving anything like a safe standard of purification, and are practically condemned."

A statement such as the above coming from a Provincial Board of Health requires serious consideration. We must confess we are at a loss to understand it. Does it mean that all modern sewage disposal plants, which duly accomplish the removal of putrescibility and are accompanied by disinfection by hypochlorite or some other agent, stand condemned?

If this is what is meant, then we are at a complete loss to understand why the whole question is being held up until Mr. Owens' system is tried out.

We have seen a copy of the plan and specification of Mr. Owens' system, and we find that there is no new feature connected with it but what may be found in other systems. For example, the system aims at a non-putrescible effluent followed by disinfection by hypochlorite. The system is similar in detail to Dibden's slate-bed system, except that concrete slabs are substituted for the slates. This system has already been tried out, both in England and in connection with the Lawrence Experiment Station at Massachusetts. Calcium hypochlorite has been thoroughly investigated and its efficiency as a disinfectant assured.

When old systems are said to stand condemned, it can only mean that reference is made to systems which do not include the destruction of bacteria by disinfection. If this is the case, then Alberta is far behind the adjoining Province of Saskatchewan, where disinfection of non-putrescible sewage effluents is insisted upon by the Government as a necessary adjunct to all sewage plants where pathogenic purification is required.

Mr. Owens, who is referred to, is a member of the Alberta Provincial Board of Health, and is their adviser on sanitary matters. We consider it as somewhat peculiar that the Board should hold up all sewage work in order to test out a scheme which one of its members appears to claim as his own, and which has already been patented by a sanitary chemist in England, and in connection with which all data as to efficiency or otherwise is at hand.

## STERILIZATION OF WATER AT CAMBRIDGE, ENGLAND.

Sterilization as a method of procuring pure water for drinking purposes appears to have come into extensive use. In a number of cities in Europe and the United States and a few cases in Canada, sterilization by means of chlorine has been tried and apparently with some considerable success. What the effect will be by long and continued treatment is not yet known.

At a recent meeting of the Royal Sanitary Institute of Great Britain Prof. Simms Woodhead gave a careful description of experiments carried out at Cambridge, where some 77,000 gallons of water were treated daily by chlorine.

Cambridge water is being treated with one part of available chlorine in 7,000,000. This water is free from organic matter through the small proportion of chlorine necessary to sterilize the water.

In the discussion following the reading of Prof. Woodhead's paper it was made known that several English towns were using this method of purification, one of the speakers mentioning that he was trying 200,000 gallons of river water daily and was getting satisfactory results.

It is interesting to mention in this connection that one of the speakers intimated that he had a large ozone plant installed, and that, although he was satisfied with the results, he did not wish to make known the location of the plant as yet.

Chemical standards for pure water are now being replaced by a bacteriological standard, and indications point to pure water standard of the future being practically the absence of **coli.** If this is to be the standard, then filtration will not be enough, as the best filters will not entirely remove coli, nor will storage. Sterilization will. It may be that this standard is too high, the requirements too severe, but, with the increased engineering experience and the more hearty working together of the chemist and the engineer, the old standards will be so much improved and methods perfected so that pure water may be cheaply secured by efficient processes.

## THE TORONTO GLOBE AND THE TORONTO WATER SUPPLY.

A distinguished British visitor has expressed surprise that Toronto has not been filtering her supply of water. When he learns that Toronto has at her doors more fresh water than exists in Britain and the adjacent countries of Europe, and that it is purer than the ordinary British supplies can be made by filtration, he will be quite as much surprised that Toronto is about to filter her supply of water.

## RESOLUTION PASSED BY PROVINCIAL BOARD OF ALBERTA.

July 15th, 1910.

For unavoidable reasons it is not possible to proceed with the construction and installation of the sewage demonstration plant for the purification of sewage until after the meeting of the Legislature, when it will be taken up.

Before undertaking construction of any other system the Board would strongly advise all municipalities contemplating the installation or extension of sewage plants to await the session of the Legislature, when the Board hopes to have money voted for the live earth bed system advocated by Mr. Owens, the Provincial Sanitary Engineer.

The question of sewage purification is passing through a period of transition, all the old systems now in use being regarded by sanitary authorities as falling short of giving anything like a safe standard of purification, and are practically condemned, and it is the all-absorbing question engaging the attention of sanitary experts.

The Board has had the opinion of a consulting engineer from New York (a high authority) as to Mr. Owens' system. He has stated to the members of the Board that he believes it will give results that for all practical purposes will be satisfactory, and he expresses the opinion that it will be a success.

In view of the unavoidable delay in the installation of the demonstration plant and the great importance of this subject, the Board is of the opinion that it will be justifiable to extend the period for the installation of sewage plants beyond the period of the present notification, viz., the 31st of December, 1910, until a practical demonstration has been made of Mr. Owens' system.

## THE STERILIZATION OF WATER BY CHLORINE AND OZONE.*

**By Prof. G. Sims Woodhead.**

In consequence of a suspected relation between an outbreak of typhoid and the water supply at the Fulbourn Asylum, a Local Government Board inquiry was set on foot, and the inspectors, Dr. Theodore Thomson and Mr. Crossfield reported that although there was no evidence of present contamination or "surface relations," they thought it was possible that, at some time or other, these "surface relations" might be set up; there was, they thought, a "potential danger" which ought to be anticipated. They mentioned certain forms of treatment of the water, but pointed out that they had not sufficient experience of the efficacy of these methods to enable them to give a definite opinion as to their value in actual practice. They suggested, therefore, in the absence of such experience, that it might be necessary to go further afield for a water supply.

It was evident to those in authority in the water company that the inspectors had two lines of action in mind, and they determined in deference to their view to investigate both. With the latter it is not necessary to deal to-day, but as regards the former I take the opportunity of laying before you the results of some of our experiments, as I think they have an interest far wider than that bearing merely on the Cambridge water supply. With the other experiments I hope to deal elsewhere.

All the methods of sterilization now under consideration are essentially oxidation methods, and apply specially to clear, bright water, and especially to water containing a small amount of organic matter.

### (1) Treatment with Small Quantities of Bleaching Powder (Chloro-Hypochloride of Lime).

Following Prof. Delépine, I have always had a strong belief in the disinfectant and bactericidal properties of bleaching powder, and when Dr. Thresh called my attention to the excellent work that was being done in the treatment with this material of sewage and water in the United States, and recalling Dr. Houston's work at Lincoln and my own at Maidstone, I determined to carry out a fresh series of oxychlorine experiments with the Cambridge water.

For nearly a year we worked with small quantities of water containing comparatively large numbers of bacilli (B. coli) with and without additional organic matter, and it was found that even large numbers of bacilli (several hundred per c.c. of water) could be rendered inactive by three parts of "chlorinated lime" (bleaching powder) in 2,000,000 parts of water—i.e., one part of available chlorine in 2,000,000 parts of water. Having thus obtained a basis for further operations, it was deemed expedient to carry out an experiment on a large scale. This, of course, had to be done without interfering in any way with the main supply to the town. Until we knew what would happen we could not allow any of the treated water to get into the main supply. It was obviously out of the question, therefore, to carry out any of our operations on the water that was being pumped into the mains or up to the reservoir. Some method had to be devised by which a certain proportion of the water could be short circuited, as it were. Here I was greatly assisted by Dr. Thresh and Mr. Hawksley, the former of whom indicated a method of doing this, the latter carrying out the details and getting over the engineering difficulties of the developed scheme. Many of these difficulties were, of course, unforeseen, as they could arise only as the delicacy and efficiency of the process became manifest.

The apparatus consists of a vertical steel cylinder, capable of holding 7,000 gallons. The water enters by a rising main, leading into the dome of the cylinder, and leaves at the base. The "bleach" solution, of moderate strength, is pumped in measured quantities into the water as it travels in the rising main at the rate of 7,000 gallons per hour, so that, theoretically, it should remain in the cylinder for one hour. (As a matter of fact, before a series of perforated baffle plates had been inserted, some of the water passed through the cylinder in about eighteen minutes. After the insertion of the baffle plates the flow was more equable.) In the earlier experiments, neutralization of the chlorine was effected by the addition of small quantities of bisulphite of soda, which was introduced by means of a pump at the bottom of a cylinder—i.e., as the water was leaving the sterilization chamber. It was found, however, that when the chlorination was properly carried out, i.e., when sufficient, but no excess of, the "bleach" was added, this addition of bisulphite of soda was not only unnecessary, but was actually disconcerting. In the first place, it is very

*Paper read before the Royal Sanitary Institute at Cambridge, Eng.

difficult to keep the bisulphite solution sterile, any micro-organisms gaining access to the solution are not killed by the bisulphite, and when added to the water in the cylinder they are not killed by the chlorine, which is neutralized at once by the solution in which they arrive. Further, the bisulphite salt is very unstable, especially when the water in which it is dissolved is aerated, so that, unless a constant watch be kept, the proportion of neutralizer to chlorine may be very much out, and an excess of chlorine may easily be allowed to pass into the mains. The watchfulness necessary for this part of the operation may be far more profitably diverted to the maintenance of a balance between the amount of organic matter in the water and the amount of "bleach" solution necessary to bring about its complete oxidation.

The water, as it leaves the cylinder, where it has been exposed to the action of the chlorine, flows into a galvanized-iron tank over a slotted weir, so graduated that the amount of water flowing at any given time may be easily measured.

In a series of preliminary experiments, six in number, in which one part of chlorine was added to 1,000,000 parts of water, the excess of chlorine being neutralized by bisulphite of soda solution, samples of water of 150 c.c. were found to contain no B. coli or any of its congeners.

Similar results were obtained with one part of chlorine in 2,000,000 of water, then with six in 4,000,000, larger samples, 500 c.c. of the treated water being submitted to the test for the B. coli. The method of testing, though simple, was very efficient. A strong solution of McConkey's bile salts, glucose litmus medium, was prepared and decanted into a litre flask. This, plugged with cotton wool, was thoroughly sterilized and taken out to the Fulbourn pumping station. At the weir the cotton wool plug, protected from dust by a cap of paper, was removed, and half a litre of the treated water was allowed to flow into the flask, which was then incubated for forty-eight hours. If the B. coli was present and gas was formed, the litmus becoming red and gas bubbles making their appearance at the surface, under the circumstances this "presumptive coli test" was sufficient for our purpose, but in most cases control agar and gelatine plate cultures were made. From these a few spore-bearing organisms were obtained, but B. coli was never found.

After these preliminary runs, a series of runs under actual working conditions was made—i.e., continuous runs of twelve hours a day for periods of about a fortnight each, weekdays and Sundays. During the whole of these runs half-hourly observations were taken, and on certain days samples were sent to Prof. Percy Frankland and Drs. Thresh, Houston and Otto Hehner. While we were using the neutralising solution we often obtained somewhat irregular results, which could, however, almost invariably, be traced to the presence of micro-organisms introduced, through accidental contamination of the bisulphite solution with dust from without. In the main, however, and in every case where we were able to eliminate this accidental contamination of the water, and especially when we dissolved the bisulphite of soda in water already rendered sterile by the addition of "bleach," the results obtained were uniformly good; those results obtained by the other bacteriologists coinciding most regularly with those obtained in the Cambridge laboratories.

For example, I examined the four sets of samples sent on the first day of a new series of experiments, and found that one sample contained B. coli in 50 c.c. of water, while in 500 c.c. of each of the other samples no B. coli could be found. The first sample sent to Dr. Frankland was reported by him to contain B. coli in 50 c.c., while the other reporters returned their samples as containing no B. coli in 500 c.c. of the treated water. On the next three days of the run every sample of the treated water tested was found to be free from any but sporing organisms.

A change was then made to one part of available chlorine in 2,000,000 of water with almost identical results; then to one part in 4,000,000 of water, again with the same results. There was always a little trouble at first with the neutralizing solution, and special arrangements had to be made to keep it sterile, but as soon as the initial difficulties had been overcome we had little or no further trouble in obtaining consistently satisfactory results.

It was evident, however, that, as some chlorine always remained to be neutralized, the limit of the dilution had not yet been reached, and the installation was run for a couple of days so as to introduce one part of chlorine into between 7,000,000 and 8,000,000 parts of water. Here we found the excess of chlorine unabsorbed was so slight that neutralization by the bisulphite solution was unnecessary. There was neither taste nor smell of chlorine left in the treated water an hour after it was taken at the weir, but the destruction of the non-sporing organisms was complete.

After the baffle plates had been inserted another series of experiments were carried out with absolutely parallel results, and I was able to obtain bad or good results at will. Of thirteen samples of 500 c.c., each taken during this series when one part of available chlorine was added to between 7,000,000 and 8,000,000 parts of water, no bisulphite solution being used, every one was "sterile," no coliform organisms being found in 6½ litres of the water treated. Moreover, on no single occasion was there either taste or smell of chlorine, the water was clear and bright, and very fresh and palatable.

It is evident, then, (a) that sterilization of Cambridge water by bleaching powder is not only efficient, but is easily carried out, for when there is the faintest chlorine reaction in the treated water as it comes from the chlorinating cylinder (after being in contact with the chlorine for at least twenty minutes) sterilization is complete; (b) that, in the case of the Cambridge water, it is unnecessary to add bisulphite of soda, the process thus being enormously simplified; (c) that the trace of chlorine remaining at the end of treatment disappears very rapidly as the water passes through the mains, or as it is exposed in the reservoir.

The amount of chlorine remaining at the end of the period of contact may be measured very readily by any intelligent laborer supplied with a bottle of iodide of potassium crystals, a flask of filtered starch, and a little weak acetic acid. A crystal of iodide of potassium, a few drops of acetic acid, and a tablespoonful of starch solution added to a litre of the treated water in a glass jug held over a white tile gives a color reaction which may readily be observed. If a blue tint, especially a deep blue, appears, too much chlorine is being added. A violet tint is the proper "end reaction," showing the presence of a trace of chlorine, while if no color reaction be obtained—i.e., if the water remains uncolored—the amount of chlorine present is probably not sufficient to ensure sterilization.

In the first instance the work was carried out for me mainly by my assistant, Mr. W. A. Mitchell, to whom I am greatly indebted for the careful manner in which these observations were made (he remained at Fulbourn during the whole of the time over which the experiments extended), but after a time the engineer who looked after the pumps was told off to make the color estimations. These I compared with my own and Mr. Mitchell's estimations, and found that they were, in all respects, satisfactory.

This, of course, is an exceedingly important practical detail, for it is evident that the chlorine may be made to serve as an indicator of the presence or absence not only of organic matter in the water, but of non-sporing organisms. Instead of waiting for the results of a bacterioscopic examination, the simplest and shortest of which cannot be carried out under two or three days, an estimate of the amount of chlorine "absorbed" may, if necessary, be made from hour to hour, the amount of chlorine required to give the violet reaction at the end of "contact" being the amount necessary to ensure complete sterilization after the organic matter has been combined.

During dry weather the addition of very minute quantities of the oxychlorine compound is sufficient to ensure complete and continued sterilization of the Cambridge water, and the amount of chlorine once determined and the flow regulated, the process may be allowed to go on almost automatically.

During rainy weather rough tests should be made from time to time. In our experience it has never been necessary to add more than 20 per cent. of the dry-weather amount of "bleach" to the chlorine solution, the addition of this quantity invariably ensuring complete sterilization. The chlorine solution and water should be thoroughly mixed in the mains leading to the reservoir, which should be of sufficient capacity to contain at least a couple of days' supply. Equalization of the chlorine added at different times would thus be obtained, and the conversion of any slight excess of chlorine into hydrochloric acid would be ensured.

### OZONIZATION.

The next method suggested, ozonization, has, of course, passed beyond the experimental stage in France and Germany, but in this country we had no plant at work.

Through the courtesy of Messrs. Siemens and the water company, I am able to show you the Siemens-Halske ozonizing apparatus at work, and to give you the results of a series of experiments carried out with this apparatus. This apparatus has been so fully described by Dr. Rideal and others that I will not worry you with details.

Whatever results can be obtained by the "bleach" method can be obtained by the use of ozone, and though the working of the process is necessarily more expensive and less simple, it has advantages, from the æsthetic point of view at any rate, over the chlorine process which will ensure its use, especially in connection with large water supplies. That it would work as efficiently as the chlorine method I was quite prepared to find, as in both cases we have the same element, "nascent" oxygen, doing the real work. In this I was not disappointed, for, working with the same water, I found that the B. coli was eliminated, and time after time I obtained 500-c.c. samples in which this took place. Moreover, water taken from the Marne, when filtered and thus converted into a water very similar to our Cambridge water after treatment with ozone, was found to give similar excellent results.

From the sentimental point of view there can, of course, be no objection to the use of "health-giving ozone," but I would warn those who take up this work that, just as in the case when chlorine is used, decomposing organic matter, or large quantities of organic matter of any kind held in solution, may, when attacked by ozone, give rise to an unpleasant flavor. These substances, which appear to be related to the amines, chloramines, etc., require further study. I mention them here in order to prevent disappointment to those who undertake to sterilize impure waters without subjecting them to some preliminary treatment.

### Sterilization by the Ultra-Violet Rays.

Here, again, the process resolves itself into one of ozonization or oxidation. The intense chemical activity of the ultra-violet rays has long been recognized, and Marshall Ward and others have already utilized this activity in connection with the destruction of bacteria, both non-sporulating and spore-bearing, More recently it has been suggested and proved that water may be rendered germ-free by the action of these ultra-violet rays. Various lamps have been devised to effect this sterilization—the Cooper-Hewett lamp and others. Through the courtesy of Messrs. Siemens I am enabled to show you a simple French form of lamp which, so far as we have tested it, seems to be extremely efficient.

It consists, as you see, of a small reservoir, through which the flow of water can be so regulated that it always remains at a constant level. In the centre is an overflow pipe so arranged that all the water passing through the reservoir must come immediately beneath an electric arc spark passing between two carbons. The core of each of these carbons contains alumina, which as it burns gives off an intensely white light, containing a very large proportion of the chemically active ultra-violet rays. These rays, acting upon the oxygen in the water, convert it into ozone, or into some intensely active form of oxygen—so active, indeed, that the process of sterilization is carried out at once. How far the direct action of the ultra-violet rays on the protoplasm of the bacteria plays a further part it is impossible to state, but as to the sterilization there can be no doubt. The Cambridge water is especially suited for this method of treatment. It is very translucent, and the full effect of the rays can be exerted at once. Then the amount of organic matter present is small, and the whole of the active oxygen is concentrated on the bacteria; and, the number of bacteria being limited, the concentration factor may again receive its full value. I intend to give a further and fuller account of the experiments carried on with this lamp.

## THE GREAT NORTHERN RAILWAY TUMWATER POWER PLANT.

**By Frank C. Perkins**

The first installation in America supplying a three-phase current for an electrified railway was placed in operation recently for handling transcontinental trains leaving Tidewater

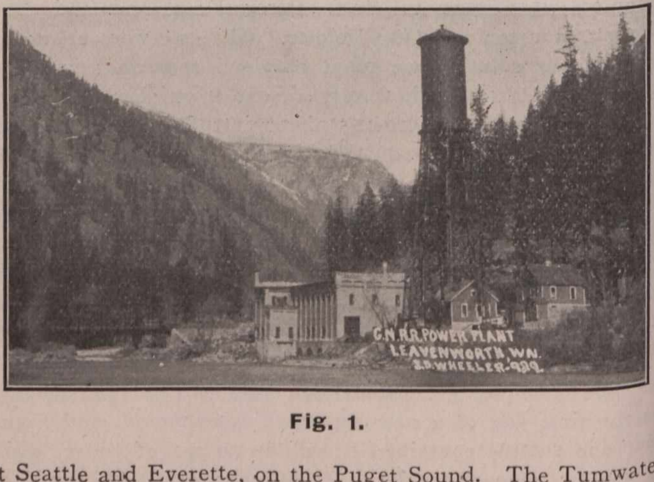



Fig. 1.

at Seattle and Everette, on the Puget Sound. The Tumwater hydro-electric plant supplies current for the Great Northern Railway trains proceeding eastward on a rising grade for eighty-five miles where they then begin the ascent of the western slope of the Cascade Mountains. The Cascade tunnel is at the end of this line and measures 2½ miles in length this summit tunnel having a 2 per cent. rising grade eastward. At an altitude of 3,375 feet above the inside level is located the eastern portal, and the eastbound trains continue beyond it through the Tumwater canyon to the crossing of the Columbia River at the Washington State eastern boundary.

Two of the largest mallet steam locomotives were necessary to handle these trains over the neacy grade charging the tunnel with smoke and seriously interfering with the operation of the train.

In using three-phase alternating current for the electrification of the Great Northern Railway, at this point it was necessary to take care of enormous fluctuations of loads at the Tumwater hydro-electric power plant.

The power house was located in the middle of the canyon down the mountain side into the river, creating a natural dam down the mountain side into the river, creating a natural dam and providing a reservoir of 40 acres, forming an excellent storage basin.

Between the crest of the dam and the power house, located about two miles down the canyon and about the same distance from the town of Leavenworth, there is a fall of from 180 feet to 200 feet. This power site noted in illustration Fig. 1, is about 30 miles east of the cascade tunnel where the electric current is utilized for operating the high power electric motomotive. The crest of the dam, which is built of concrete, is from 12 to 20 feet high, with an elevation of nearly 1,500 feet above mean tide level.

From the gate-house the penstock has an internal diameter of 8½ feet and a total length of 11,870 feet, passing over a steel bridge of 200 feet span across the river near the power house as indicated in illustration Fig. 1.

Continuous wood stave construction is used as shown in the accompanying illustration Fig. 2, for more than 10,000 feet of this penstock. It is hooped with round steel rods varying in size and spacing according to the head, and made of Washington fir, a head of 170 feet of water being sustained by the lower end of this wood stave penstock. Steel plate construction is used for a penstock for the last section of about 1,000 feet at the power house.

**Fig. 2.**

The arrangement of the two main turbine units, with a space reserved for a third unit and two exciter turbine generator sets may be noted in the plan of the power house seen in drawing Fig. 3, each of the main turbines having a capacity of 4,000 horse power and operating at a speed of 375 revolutions per minute, while the two exciter turbines operate at 750 revolutions per minute and develop 175 horse power each.

The steel penstock at the power house has three outlet feeders of 7½ feet diameter which supply the 42-inch Victor-Francis turbine, each taking 465 sec.-ft. of water, the mean velocity in the penstock being 8.2 feet per second when developing 8,000 horse power with the two main turbines in operation.

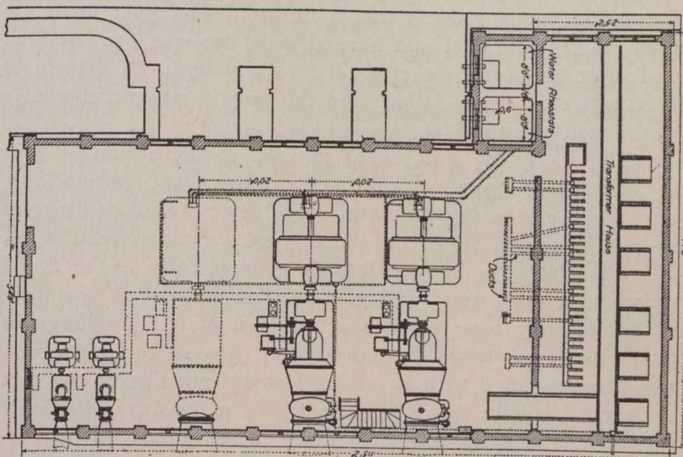


**Fig. 3.**

Each of these water wheels has an efficiency of 80 per cent. from full load to 50 per cent. overload on the electrical generators. The three-phase alternating current generators which are directly coupled to the turbine are of the general electric type as well as the direct current exciter dynamo.

An interesting feature of this Great Northern Railway hydro-electric power plant is the surge tank near the power house as noted in illustration Fig. 1. It is located on the end of the penstock at a point just beyond where the turbine feeders leave it, and is 183 feet high extending 10 feet above the level of the crest of the dam. The penstock is really extended into an upright pipe 8 feet in diameter while within the tank and this vertical pipe there is a waste pipe which extends 7 feet above the level of the crest of the dam.

The top of this waste pipe is nearly 8 feet in diameter and forms a circular weir nearly 24 feet in length and reducing in diameter to about 3 feet near the bottom of the tank.

The operation of this surge tank and waste pipe in the speed regulation of the turbines is unique, as when the power is instantly thrown onto the turbine by the electric generators taking a heavy load as the electric locomotives start a heavy train on grade, the surge tank supplies water to the turbine as a storage reservoir, until the water in the penstock is accelerated to the proper speed. In case the heavy load of 4,000 to 8,000 horse power is suddenly thrown off and the turbine gates closed, the great amount of water in the penstocks travelling at a speed of 8.2 feet per second surges into the tank and finds relief by overflowing into the waste pipe for a minute or so.

## THE EXPLOITATION OF OUR PEAT BOGS

(Continued from page 128).

ports received by us regarding two very promising processes employing artificial heat in the production of peat fuel, are very disappointing; namely, the process of the Electropeat Syndicate, with head office at Newcastle-on-Tyne, England, and the somewhat famous Ekenberg process.

The Electropeat Syndicate erected an extensive plant at Kilberg in the County of Kildare, Ireland, for the production of a substitute for coal from peat, which they expected to sell at six shillings per ton. No money was spared in trying to make the experiments a success, and most expensive machinery was put down. Experts were brought from Germany to look after the work under the superintendence of Captain Verey, R.E. Large shipping companies on the strength of samples submitted, and representations made to them, promised some very large contracts for fuel, but the company, at the end of over one year's experimentation, found that their process was a failure. The peat made by them looked like coal and burned well, but was hygroscopic, and after a short time crumbled to powder. All efforts to overcome this defect failed, and the project was permanently abandoned in June last.

The Ekenberg process of the wet carbonization of peat is exceedingly ingenious, and has aroused great expectations, but is still in the experimental stage after the expenditure of 200,000 kronor in Sweden to place it upon a commercial basis.

The endeavor to accomplish economically by artificial means in a short time, what has been accomplished by nature in exceedingly long periods of time, namely the change of peat into a substance similar to coal, has so far apparently not been attended with success. I would not like to say that it cannot be done, since it is unsafe to make any statements regarding the possibilities of future achievement, but at present the outlook in this direction is certainly not encouraging.

In view of these facts, the only proper course for us in Canada to follow, if we desire to establish a peat industry and render ourselves at least to some extent independent of outside sources for our fuel, is to introduce such processes and such machinery as have proven successful and are now in actual commercial operation in Europe.

We may safely leave experimentation and the development of new ideas to the future, when our peat industry is on a secure basis and peat fuel in abundance on the market. We will then have gained in the manufacture of peat fuel along lines which are at present commercial, the necessary experience to warrant the hope that proposals for modifications and improvements of present processes will be based upon a thorough and practical understanding of the nature of peat and the principles upon which future economy may reasonably be expected. This is a safe proceeding for our country, and above criticism. It will give us the required fuel and prevent waste of capital in experimentation. Departure from this principle has led to failure and the creation of a pronounced distrust in everything connected with peat and the utilization of our peat bogs.

To re-establish the confidence of the people of Canada in the value of peat as a domestic and industrial fuel, and to stimulate renewed activity in the development of our peat resources, the Government has acquired 300 acres of peat bog, with an average depth of 9 feet, for the purpose of manufacturing peat fuel on a commercial scale, and by a method which has proven successful in European practice. At this plant interested parties will have an opportunity of ascertaining for themselves the working of the bog as well as the suitability of the peat fuel produced. The capacity of our plant is a production of 30 tons per day. For a large commercial plant, mechanical excavators should replace the manual labor employed at our plant, if the bog to be exploited is suitable for this class of labor-saving machinery.

The plant at Alfred is to serve as a model of a successful process, and not for the production of peat fuel on an extensive scale. We expect, however, to manufacture during this season, about 2,000 tons of peat fuel, part of which is to be used in our peat-gas producer at Ottawa.

There is nothing artistic about the appearance of the fuel produced at our bog. It has not the regular geometric form of briquettes nor their smooth exterior, but it serves the purpose for which fuel is intended as well as briquettes, and has the advantage of being low in cost of manufacture.

Allowing 140 days for a season's operation, the cost per ton of air-dried machine peat, including interest on capital invested, amortization, oil and repairs is as follows:

| | |
|---|---|
| Cost of fuel on the field ............ | $1.40 |
| Cost of fuel stored in shed ........... | 1.65 |
| Cost of fuel loaded on car ............ | 1.65 |
| Cost of fuel in stack ................. | 1.70 |

By the employment of mechanical excavators and the manufacture of peat on a large scale, the cost of production per ton should be considerably less than the figures here given.

The objection to the air-drying process, practised at our plant, is that it is not a continuous process, that it can be worked only during the summer months, and that the amount of fuel which can be produced during one season is dependent upon weather conditions.

These statements are quite true, and yet Sweden, Finland, Denmark, Germany, Holland, Austria and Russia, depend for a large part of their fuel supply on the simple process of pulping the peat, forming it into bricks upon the field and harvesting it as air-dried fuel. The weather conditions in Canada are as favorable, if not more so, for the production of air-dried machine peat as in the countries mentioned. To prevent shortage of peat fuel on account of unfavorable weather conditions during a season's work, a year's supply of peat fuel should always be kept in storage.

Russia is the largest producer of peat fuel in the world. In 1902, the production was 4,000,000 tons of peat fuel, and the annual increase of production has since then amounted to nearly 200,000 tons. Many private plants exist in Russia in connection with cotton mills for the production for their own use of 200,000 tons of peat fuel annually. 1,300 plants making machine peat are now in operation in Russia.

I admit that the hardness of anthracite permitting long hauls without much waste—the small volume it occupies requiring a minimum of space for storage—and the small amount of volatile matter it contains insuring a nearly smokeless flame are such valuable properties of this fuel that so long as it can be obtained, it will be used by those who can afford to pay for it. Peat fuel is, however, admirably adapted for use in grates during the late fall and early spring, when our heating furnaces are not in operation. This fuel will compete in price and cleanliness with soft coal for the purpose stated in our most luxurious homes. For the inhabitants of our rural districts, villages, and certain parts of our cities, whose homes are not supplied with hot air, hot water, and steam systems of heating but require the use of stoves, peat fuel will prove a cheap and excellent fuel, far superior to wood, and far more convenient to handle.

Although peat can be used in any of the common stoves now in use in Canada, a stove of excellent design, specially constructed for peat fuel, has been brought out in Sweden by the Aktiebolaget Ankarsrums bruk. These stoves—a model of which may be seen at our peat plant at Alfred, are tasteful in appearance, and very convenient in operation.

The economy, which may be effected by the use of peat is readily understood, when it is stated that in Ontario and Quebec the average price of anthracite with a high percentage of ash is $7.50, and in Manitoba $10.00 per ton, whereas air-dried machine peat, containing only about 5% of ash can be manufactured at a cost of considerably under $3.00 for an amount having the same calorific value as a ton of the anthracite we import. This could be sold at places conveniently situated as regards transportation facilities and not too far from the place of manufacture for a little more than one-half the price paid for anthracite in Ontario and Quebec, and for a little more than one-third of the price paid for anthracite in Winnipeg.

Some few years back the labor troubles in the United States taught us a lesson which should be heeded, and which should enable us to conceive what a real fuel famine would mean for Canada. Anthracite coal in Ottawa at that time was sold at $12.00 per ton,—what! if it could not be got at any price, and if we had to pay the transportation costs of fuel from either Nova Scotia or the far west? Who can even imagine the suffering it would entail upon our population? It is very easy to say that such a state of affairs is not likely to occur, but who will guarantee that it might not?

The central provinces of Canada have accumulated no stores of fuel, ready to be drawn upon in cases of emergency. We import what we need from year to year, and any shortage of supply from whatever cause affects seriously our industries and the comfort of our people.

We can not afford, in the light of past experience, to waste capital on the experimentation for the discovery of processes, which shall be continuous in operation and furnish a fuel from peat similar to coal, nor can we wait until someone at sometime in the future will invent such process and demonstrate its commercial possibilities.

Neither should prospective manufacturers listen to the marvelous representations made by promoters of schemes and processes, which promise great profit from production at excessively low costs of a peat fuel superior to anything yet put upon the market, but wisely adopt processes, which are already an assured commercial success in the peat-using countries of Europe.

The peat bog at Alfred was acquired by the Government for the purpose of demonstrating to prospective manufacturers of peat fuel one of these processes and to prevent failure from choosing bogs unsuitable for their purpose, the Mines Branch has recently undertaken a systematic investigation of the more easily accessible peat bogs. In carrying out this investigation, our peat expert has been instructed to determine and map their extent, ascertain their depth and also the quantity, character and calorific value of the peat contained in them. So far, twelve bogs have been investigated, mapped and reported upon. In case of need the staff performing this work can be increased to meet the requisitions made upon the Department.

The successful inauguration of a peat fuel industry in Canada may be looked forward to with confidence if, content to accept European practice, we establish peat plants at strategic points on the workable bogs scattered throughout the farming regions of those provinces, which require to import coal, and operate them in the interests of the neighboring communities. This will avoid long hauls, for which air-dried machine peat is not fitted.

Regarding the transportation of peat fuel, our railroad companies, realizing the importance of an adequate fuel supply for the central provinces, and its intimate connection with the prosperity and further development of these provinces, should come to our aid by granting special rates for the transportation of this class of fuel. This is the course followed by Germany in those districts which depend to a large extent upon peat for their fuel.

Air-dried peat is not alone an excellent fuel for domestic use, but for the production of power it proves an ideal fuel in the peat-gas producer, which is to-day as reliable and efficient in its operation as the coal gas producer. I do not hesitate to say that it is an ideal fuel because the peat from most bogs is free from a clinkering ash and yields on combustion a fine white residue which readily allows of the thorough cleaning of the fire, and the property of not fusing or caking in the producer assures regular operation. Moreover since gas leaves the producer with a high degree of sensible heat, which must be cooled to the temperature of the atmosphere before being used in the gas engine, it is exceedingly important that as much of this sensible heat as possible be utilized in the producer itself, in order to increase its thermal efficiency. This is accomplished in coal-gas producers by the introduction of water vapor which passes through the incandescent fuel with the air supplied for combustion. This water vapor is decomposed, yielding hydrogen and oxygen. The latter combines with the carbon of the fuel forming carbon monoxide. This chemical reaction absorbs a large amount of heat and lowers the sensible heat of the gas, but the heat absorbed in liberating the hydrogen is to a large extent restored and utilized when the gas enriched by hydrogen is burned in the gas engine or other apparatus. With peat containing from 25 to 30 and more per cent. of moisture, the moisture content is sufficient to accomplish all that is required without the introduction of water in the producer from an outside source.

To demonstrate the value of peat for the production of power of industrial purposes, a modern German peat gas power plant has been erected by the Department in Ottawa. Its capacity is 60 h. p., and consists of a double fire zone Korting Peat Gas producer, with the necessary gas cleaning apparatus, and a Korting four-cycle single acting gas engine direct connected to a Westinghouse 50 K. W. direct current generator.

While no definite figure can at present be given of the consumption of peat per brake horse-power hour, since the investigation begun some time ago, is not yet completed; our preliminary trials, however, bear out the results obtained in Swedish and German plants, where the amount of peat consumed per brake horse-power hour ranges from a little over two pounds to about three pounds, depending on the calorific value of the peat employed. Since the peat of the different bogs so far examined has a high calorific value, we expect that our figure for the consumption of peat per brake horse-power hour will be in the neighborhood of two pounds.

The erection of gas producers designed for the recovery of by-products is not recommended except in localities where such by-products would command a ready and profitable market. In Canada it is far more economical to aim at the complete gasification of all the heat elements in the fuel.

Peat gas producers for power purposes should, whenever possible, be erected on the bog, and the energy generated in the form of electricity transmitted to neighboring towns and villages for power and lighting purposes as in the case of water power. This is the policy adopted in European countries.

Whatever other valuable products may be obtained, such as moss litter, peat mull, alcohol, packing paper, millboards, ammonia and nitrates, the great and important need for us in Canada is the production from the peat deposits of a constant reliable supply of fuel for domestic and industrial purposes.

When this has been attained and peat fuel is put on the market in abundance and sold at a reasonable price, we shall not alone have rendered ourselves to a great extent independent of outside sources for this necessity, thus enabling us to retain in our own country a large part of the capital now spent annually for the purchase of fuel from abroad, but a new era of industrial development will dawn upon our nation, and we shall here see repeated what has been accomplished in Europe—the establishment of large industrial concerns on the waste areas of our country underlaid by peat, and the wide stretches of these solitudes will become resonant with the welcome sounds of industrial activity.

## CANADIAN PEAT ASSOCIATION.

The Canadian Peat Society was formed at Ottawa on July 28th. All the Canadians present at the annual meeting of the American Peat Society joined the new organization and from now on a vigorous campaign will be carried on to interest Canadians in the peat industry and to join the new society. Dr. J. McWilliams, of London, is the president, Mr. L. B. Lincoln, of Montreal, vice-president, and Mr. A. J. Forward, of Ottawa, secretary-treasurer. The headquarters of the new organization will be at Ottawa and its annual meetings will be held here.

It will remain affiliated to the American society. It will work along very similar lines to the American society, but will not do much experimenting. It will approach the railways with regard to securing rates when necessary and be advisory to the Government.

## ELEMENTARY ELECTRICAL ENGINEERING.

L. W. Gill, M.Sc.

### CHAPTER V.

### ALTERNATING CURRENT APPARATUS AND SYSTEMS.

This series of articles will be continued for some months. They will be of particular interest to the student of electrical work and the civil engineer anxious to secure some knowledge of the simpler electrical problems.

**General Principles.**—Before proceeding to a discussion of alternating current systems as used in commercial work, it is necessary to consider some of the laws which govern the generation and flow of alternating current.

If the flow of electricity in any circuit changes periodically in direction, and the total quantity which flows in each direction in each period is constant, the current is said to be "alternating." If the total quantity which flows in each direction in each period is not constant, the current is said to be "oscillating." The difference is illustrated in Fig. 49, where the two currents are represented by graphs plotted on a time base. The term "cycle" is applied to any one of the repeated series of changes. The change of flow in the case of an alternating current may follow any one of an infinite number of laws, and before it is possible to deal mathematically with any particular case it is necessary to know the law which governs the change in its magnitude and direction. The above remarks, except regarding quantity, apply to e.m.fs. as well as currents.

A very simple alternating current system is shown in Fig. 50. The generator is composed of a wire bent into the form of a rectangle of length **l** and width **d**, and the ends are connected to two insulated rings $r_1$ and $r_2$, the axes of which are coincident with that of the rectangle. This rectangle is placed between the poles of a magnet and revolved at the rate of **n** revolutions per second. As the wire revolves it cuts the lines of force which pass from one pole of its magnet to the other, and an e.m.f. is generated in it. At any instant the e.m.f. generated in one side of the rectangle is in the opposite direction in space to that generated in the other side, but, when the rectangle is considered as a circuit, the e.m.fs. in the two sides act in the same direction around the circuit. This e.m.f. acts in one direction around the rectangle during one-half of the revolution

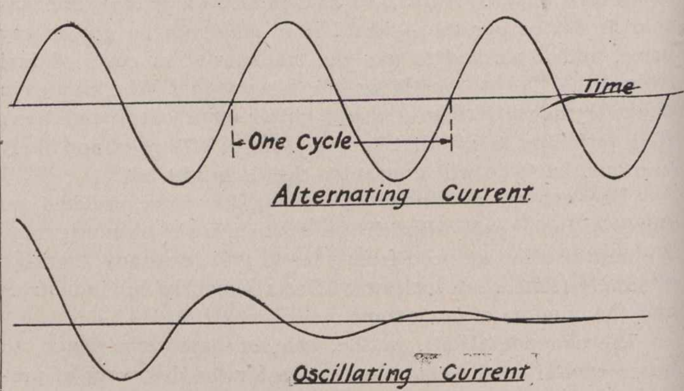



FIG. 49

and in the opposite direction during the other half. The e.m.f. impressed on the rings is thus an alternating one, each revolution being accompanied by a complete cycle of changes. If two fingers or brushes, $b_1$ and $b_2$, are fixed so that they press against the rings, the alternating e.m.f. will be impressed on these brushes, and if the latter are connected by a conductor of any kind, an alternating current will flow through the closed circuit formed by the rectangle, brushes and external conductor.

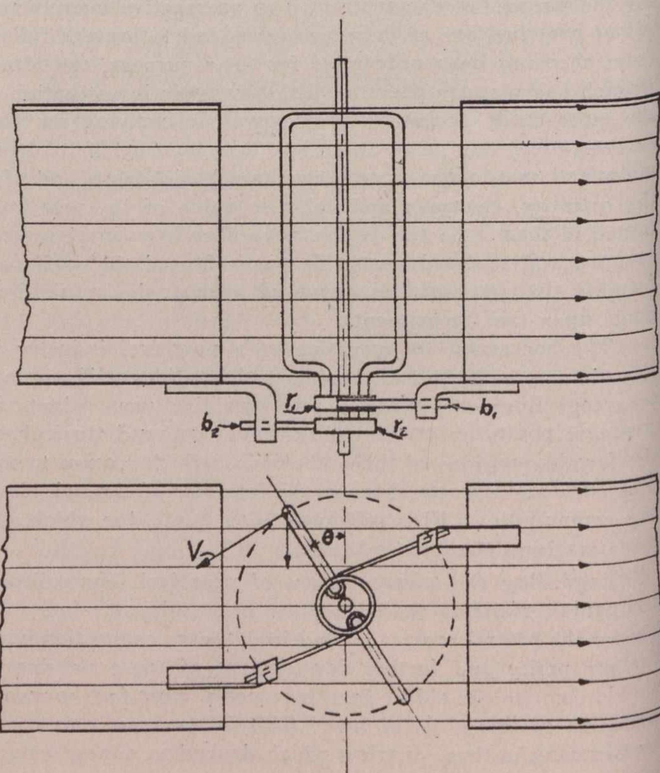



FIG. 50

Let H represent the strength of the magnetic field (supposed uniform).

Let V represent the linear velocity of the sides of the rectangle.

Let $\omega$ represent the angular velocity of rectangle $= 2\pi\mathbf{n}$.

Let A represent the area of the rectangle $= \mathbf{ld}$.

When the rectangle has turned an angle $\theta$ from the

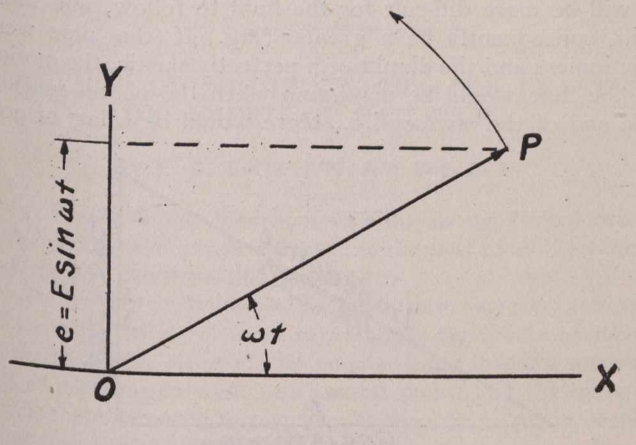



FIG. 51

vertical position, as shown in Fig. 50, the wires forming its sides have a velocity at right angles to the lines of force of V sin $\theta$. The lines of force cut per second by the sides will thus be 2HlV sin $\theta$. But $V = \pi\mathbf{dn}$, and if time is reckoned from the instant when the rectangle was in the verticle position, $\theta = \omega\mathbf{t}$. Since the ends of the rectangle do not cut lines of force, the total instantaneous e.m.f. generated will be

$$e = 2Hl\mathbf{d}\pi\mathbf{n} \sin \omega\mathbf{t} = \omega HA \sin \omega\mathbf{t} \quad \ldots\ldots\ldots\ldots (20)$$

If the rectangle is made up of N turns of wire instead of one turn an e.m.f. will be generated in each turn, and, since these e.m.fs. will act in the same direction around the circuit, the total e.m.f. impressed on the brushes will be

$$e = \omega HAN \sin \omega\mathbf{t} \quad \ldots\ldots\ldots\ldots (21)$$

The e.m.f. represented by this equation is obviously an alternating one, for the value of sin $\omega\mathbf{t}$ changes periodically from $+1$ to $-1$. It will also be observed that the maximum value of the e.m.f. is $\omega$ HAN, which is constant. If E is taken to represent this maximum value (positive or negative), equation (21) may be written

$$e = E \sin \omega\mathbf{t} \quad \ldots\ldots\ldots\ldots (21a)$$

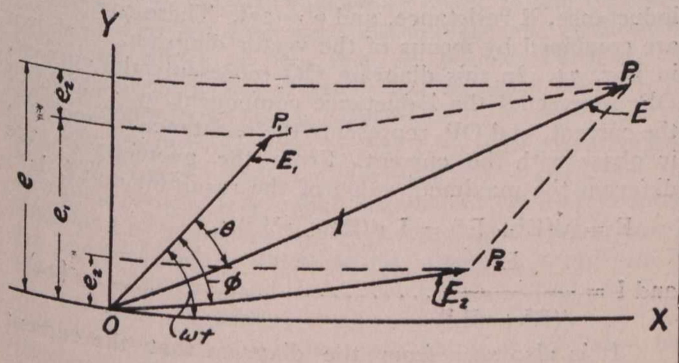



FIG. 52

This equation is a particular case of the general expression $\mathbf{x} = \mathbf{a} \sin \mathbf{y}$, which is known as a simple harmonic function, and applies to many natural phenomena. For example, if velocity is substituted for e.m.f. in equation (20a) the expression will represent a simple harmonic motion. In each case the time in which a complete cycle of changes takes place is known as the "period." The number of cycles or periods per second is known as the "frequency." In the illustration (Fig. 50) the frequency is equal to the number of revolutions = n. At any instant the angle $\theta$ through which the coil has turned from the zero-of-time position is known as the "phase." When $\theta$ is 90° the e.m.f. is said to be in quarter phase. Any alternating e.m.f. which can be expressed by a simple harmonic function as in equation (21a) is known as a "simple harmonic." Similarly with alternating currents. Alternating e.m.fs. and currents which are not harmonic tend to become harmonic. For this reason and for the reason that the harmonic law lends itself easily to mathematical treatment, designers and builders endeavor to construct alternating current generators so that as far as possible they will generate e.m.fs., which will vary according to this law. All calculations relating to these quantities, except where a high degree of precision is required, are based on the above assumption.

A graph representing an alternating current or e.m.f., plotted on a base of time, as shown in Fig. 49, is usually known as a simple harmonic diagram. For some purposes it is more convenient to represent such quantities by a diagram, as shown in Fig. 51. In this diagram OP is a line drawn to represent the maximum e.m.f., E; OX is a reference axis, and OY is a line

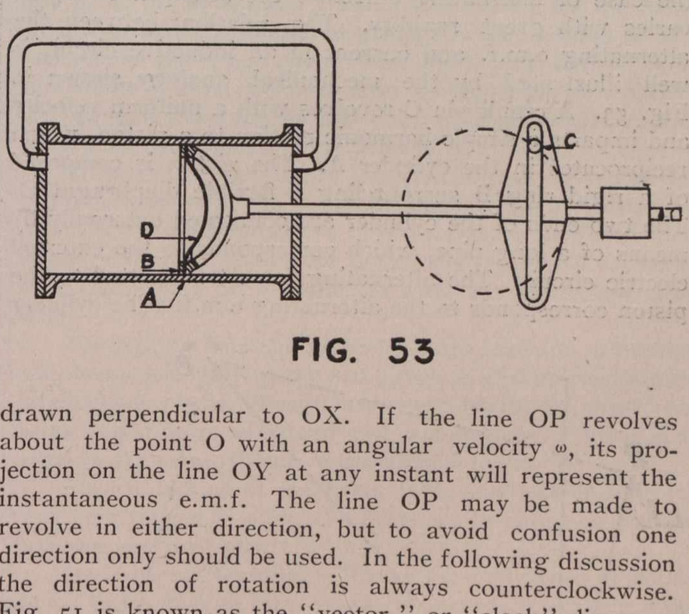



FIG. 53

drawn perpendicular to OX. If the line OP revolves about the point O with an angular velocity $\omega$, its projection on the line OY at any instant will represent the instantaneous e.m.f. The line OP may be made to revolve in either direction, but to avoid confusion one direction only should be used. In the following discussion the direction of rotation is always counterclockwise. Fig. 51 is known as the "vector," or "clock" diagram.

The clock diagram is convenient for use when it is required to find the resultant of two e.m.fs. differing in magnitude and phase. Suppose the two e.m.fs. to be represented by the equations $\mathbf{e}_1 = E_1 \sin \omega\mathbf{t}$ and $\mathbf{e}_2 = E_2 \sin (\omega\mathbf{t} - \theta)$. According to these equations the second e.m.f. lags behind the first one by an angle $\theta$; i.e., the angle $\theta$ is the difference in their phases at all times. These e.m.fs. are both represented in the clock diagram (Fig. 52). At any instant the total instantaneous e.m.f. is $\mathbf{e} = \mathbf{e}_1 + \mathbf{e}_2$, which is represented by the projection OY of the diagonal of the parallelogram formed on $OP_1$ and $OP_2$, representing $E_1$ and $E_2$. The resultant of these two harmonic e.m.fs. is, therefore, a simple harmonic e.m.f., of which the maximum value is represented by OP = E.

It is thus seen that alternating e.m.fs. are combined in the same way as mechanical forces. The same is true of alternating currents in parallel.

From the geometric relation between E, $E_1$ and $E_2$ (Fig. 52)

$E^2 = E_1^2 + E_2^2 + 2E_1E_2 \cos\theta$ .............. (22)

If $\theta$ represents the angle between $E_1$ and E, then

$\sin\theta / \sin\phi = E_2/E$ ........................ (23)

Example 15.—An alternating e.m.f. expressed by the equation $e = 60 \sin \omega t$ is generated in one coil of wire, and a second e.m.f., expressed by the equation $e = 80 \sin(\omega t - 30)$, is generated in another coil. If the two coils are connected in series, to determine the resultant e.m.f.,

The second e.m.f. lags 30° behind the first.

The maximum value of the resultant is

$E = \sqrt{(60^2 + 80^2 + 2 \times 60 \times 80 \times \cos 30)} = 135.$

If $\theta$ is the angle between the first e.m.f. and the resultant,

$\sin\theta = \sin 30 \times 80/135$, and $\theta = 17° \; 10'$.

Since the resultant e.m.f. lags $\theta°$ behind the first e.m.f., it will be expressed by the equation $e = 135 \sin(\omega t - 17° \; 10')$.

It has been noted in a previous chapter that when there is a change in the strength of the current in a circuit the accompanying change of magnetic flux induces in the circuit an e.m.f. which opposes the change of current strength. While this is of little or no importance in the case of a direct current, it is of very great importance in the case of alternating currents, the strength of which varies with great rapidity. The relation between the alternating e.m.f. and current in an inductive circuit is well illustrated by the mechanical analogy shown in Fig. 53. A crank pin C revolves with a uniform velocity and imparts a simple harmonic motion to a piston, which reciprocates in the cylinder A. The piston is composed of a rigid ring B surrounding a flexible diaphragm D. The two ends of the cylinder are connected externally by means of a long pipe, which corresponds to the external electric circuit. The alternating force transmitted to the piston corresponds to the alternating e.m.f. The cylinder

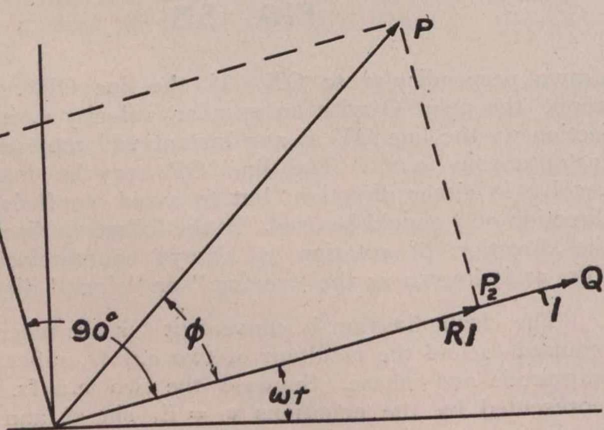



FIG. 54

and pipe are filled with any fluid medium, such as water or air. As the piston moves from right to left the inertia of the fluid will cause the diaphragm to extend, as shown in the figure, and when the piston reaches the end of its stroke the fluid will still be moving with considerable velocity, due to its momentum. The flexibility of the diaphragm will allow this motion to continue after the piston has started on the return stroke. The alternating motion of the fluid thus lags behind the alternating motion of the piston ring; i.e., there is a constant phase difference between them. The longer the pipe the greater the weight of fluid in motion and the greater the lag. If the frequency of the strokes of the piston is increased it will be more difficult for the fluid to follow, and there will consequently be a greater lag. If the pipe were frictionless and the diaphragm perfectly elastic, the motion of the fluid would be maximum when the piston reached the end of the stroke; i.e., there would be a lag of 90°,

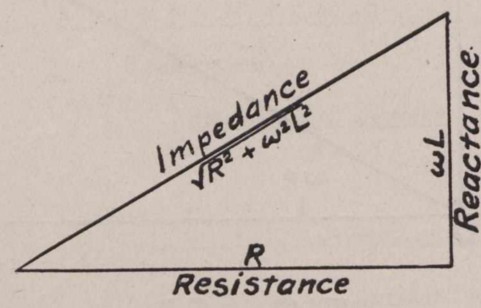



FIG. 55

or one-quarter phase. In this case the force impressed on the piston would be zero at the end of the stroke and maximum at the middle of the stroke, at which point the diaphragm would have maximum extension. The alternating force would thus be 90° ahead of the motion of the fluid. If, however, the pipe is not frictionless (which is always the case) a force must be applied to the piston to overcome the friction. This force will be maximum when the flow or fluid is maximum and zero when the flow is zero; i.e., it will be in phase with the flow of fluid and 90° behind the force required to overcome the inertia. The total force is made up of these two components.

The inductance of an electric circuit is analogous to the inertia of the fluid in the above illustration. It causes the current to lag behind the e.m.f. To overcome the inductance an e.m.f. 90° ahead of the current must be impressed on the circuit, and to overcome the resistance an e.m.f. in phase with the current is required. The total e.m.f. is the resultant of these two components, one 90° behind the other. The maximum value of the inductive component is $\omega LI$, and the maximum value of the resistance component is RI, where f represents frequency, L inductance, R resistance, and $\omega = 2\pi f$. These components are combined by means of the vector diagram, as shown in Fig. 54. In this diagram OQ represents the current, $OP_1$ represents the inductance component, 90° ahead of the current, and $OP_2$ represents the resistance component, in phase with the current. From the geometry of the diagram the maximum value of the resultant e.m.f. is

$$E = \sqrt{(E^2 + E^2)} = I\sqrt{(R^2 + \omega^2 L^2)},$$

and $I = \dfrac{E}{\sqrt{(R^2 + \omega^2 L^2)}}$ .......................... (24)

It is also seen from the diagram that the current lags behind the e.m.f. by an angle $\phi$ such that

$\tan\phi = \dfrac{\omega L}{R}$ .......................... (25)

These two equations show that the effect of inductance is not only to make the current lag behind the e.m.f., but also to diminish its value. Equation (24) also indicates that the strength of the current diminishes to some extent as the frequency increases, for $\omega = 2\pi \times$ frequency. The quantity $\omega L$ is known as the "reactance," and the quantity $\sqrt{(R^2 + \omega^2 L^2)}$ is known as the "impedance." The relation between these quantities is clearly shown in Fig. 55.

## A REVIEW OF MODERN SIGNALING PRACTICE ON AMERICAN RAILWAYS.*

**By E. C. Carter,† M. Am. Soc. C. E.**

A review of the conditions existing in the United States at the present time, with reference to the operation of switches and signals, develops the following:—

Centralized installations for operating switches and signals are limited to (1) those in which the required movements of the functions are made by manual force through mechanical connections brought to a central point, and (2) those in which some form of stored power is controlled from a central point for such operations.

The first is represented by the mechanical interlocking mechanism which is in such general use throughout the world as to require no particular description. There has been, in America, very little, if any, change in the details of the apparatus or of its installation for a number of years. The use of 1-in. pipe connections is universal for the operation of switches, movable point frogs, draw-bridge couplers, and their respective locks, compensated for the effects of temperature changes by an equalizing system of cranks and levers. It is also very generally used for the operation of home signals. Wire connections (one wire for the front connection and one for the back) are still used for the operation of distant signals which can be located not over 1,300 to 2,000 ft. from the tower. But when the signal has to be located at a greater distance, liquid carbonic acid gas (stored in steel bottles) or electricity (derived from a battery) is used as the source of operating power, located at the signal and controlled electrically from the tower.

The second comprises those in which hydraulic, pneumatic, or electric power is stored and used for the operation of the various functions. Owing to the severe climatic conditions which continue in winter for from two to four months throughout the northern portion of America the use of hydraulic switch and signal apparatus is subject to such derangement and such interruptions in operation as to be very unsatisfactory. A small number of plants of this type have been installed but have been discontinued and replaced by other kinds which are free from the troubles which are inseparable from the use of liquids as a means of power transmission under such climatic conditions.

The use of compressed air has been quite extensive and has given a very fair degree of satisfaction as the means for operating switch and signal installations in this country. This kind of power application is represented by two types: (1) low pressure, in which the air is used at a pressure of from 15 to 25 lbs. per sq. in., and (2) high pressure, 80 to 100 lbs. per sq. in.

The low-pressure type has many points of excellence, but for some reason has not become very popular, probably on account of the great number of pipes leading to the switches and signals. Inquiry develops the fact that no plants of this type have been installed since 1905 anl also that, as the existing plants require extensive reconstruction or renewal, this type is giving place to some form of all-electric apparatus.

The high-pressure type is represented only by the Westinghouse electro-pneumatic system. A very large number of plants at large and complicated junction points and terminals have been installed and are in very satisfactory operation throughout the entire country. It is a recognized fact, however, that compressed air under high pressure is subject to a number of characteristic losses in efficiency, which will limit its use. The loss on account of the heat generated, due to the work of compression, is unavoidable and amounts to from 50 to 60 per cent. of the energy expended in storing this kind of power. The losses due to leaks in the distributing pipes are variable but increase as the system grows older, and often become an element of serious expense, necessitating extensive repairs and renewals.

The application of all-electric interlocking plants has made rapid strides in the last eight or ten years and, as this type offers very superior advantages, it bids fair to take the lead. The reasons for this are: (1) greater flexibility in application and use; (2) in the storage of the power and its distribution the losses can be reduced to a very small figure; (3) the distribution and application of the power is free from any inherent troubles due to variations or extremes of temperature.

This type of interlocking development is represented by the product of four principal companies. The common feature in all of the designs is the use of motors for the movement of switches by means of gears, a screw, a worm or by a cam motion plate, any one of these mechanical devices being susceptible of development to meet the requirements. Signals are operated generally by motor-driven gears, dwarf signals sometimes being operated by solenoids.

All power interlocking is arranged so that the completion of the movement of the switch or signal gives a return indication at the machine in the tower, releasing the mechanical locking and insuring that the position of the switch or signal, as the case may be, corresponds with that of the operating lever.

The locking between the levers of the machine is mechanical, being generally of the same type as that for mechanical interlocking plants, though not made nearly so heavy, not being called on to withstand such applications of force as is usual in the manipulation of mechanical levers.

Electric locking of the levers in the interlocking machine may be arranged to effect the following in either mechanical or power operated plants:—

(1) Advance Locking.—This is generally used at points where trains pass at high speeds to prevent the taking away of the route which has been cleared for an approaching train, the switch levers remaining locked until the train has passed or until the signalman has operated a releasing device which is arranged to take time, thus requiring deliberation and giving an interval during which the train can be stopped. The signal levers are never included in this advance locking but can, in their proper rotation, be restored to their normal positions at any time.

(2) Detector Bar Locking.—Electric locking is used for this purpose in connection with track circuits in yards where such circuits are used in place of mechanical detector bars.

(3) Route Locking.—This form of electric locking is used to lock all switches in a route so that they cannot be moved in advance of a train after the train has accepted the route, even though the mechanical locking on the machine has been released by the leverman in placing his signal lever in the normal position.

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(4) Release Route Locking.—This form of electric locking effects the consecutive release of each switch as and after the rear of the train has passed it, and is only used in large and complicated terminals to save time.

(5) Check Locking.—This is the form of electric locking between adjacent interlocking towers which are so near each other as to call for co-operative action of the signalmen in them.

Route Levers, as known in Europe, have never become popular in the United States, it being considered an essential operating requirement that the plant should permit of any possible route combination of switches being given so as to cover irregular movements and emergencies.

Switch Locks.—The use of track circuits in place of detector bars has become usual in complicated terminals and is considered as being safer than any mechanical devices for this purpose, it being possible with such circuits to prevent the movement of the switches while the train is passing over them, and may be arranged so that the train is wholly clear of any adjoining track or switch before another train can be permitted to pass that point. In plants where the spacing of the switches is such as to permit it, mechanical detector bars, either inside or outside of the rail, are still generally used, though it is evident that, with the increasing use of heavier rail sections which have materially wider heads, such use must be limited to bars of the inside type.

### Auxiliary Apparatus at Passenger Terminals

In heavily worked, large, and complicated terminals a miniature track model is generally provided on the interlocking machine for the information and convenience of the levermen. Formerly, this model was arranged to show the movement of the switches corresponding to the movement of the levers, but with the greater perfection of the return indication apparatus which controls the operation of completing the stroke of the lever, the model has been used to indicate the occupation of tracks or of two or more sections of a track as may be needed. An indication is often provided showing the failure of any train to wholly clear an adjoining track.

One of the most complete and elaborate installations of this later type is that provided for the operation of the new union terminal at Washington, D.C. Each standing track in the station has an independent track circuit fed through a resistance from a single supply circuit, the track relays all being in the tower at the outer end of the yard. In the tower and over the interlocking machine is arranged a large track model, covered with ground glass, on which the track arrangement of the station is outlined. So long as a track is unoccupied and is not fouled by cars on an adjoining track, that particular track on the model is illuminated from behind the glass. As soon as it is occupied by a car or train the lights are extinguished. It will be seen from this that these indications are given from a closed circuit, which is used preferably on account of its indicating at once any derangement in the circuits and is generally considered to be the only safe way in which track circuits for this or any other purpose can be used.

This station is also provided with a very complete system of communication between the director of the interlocking tower, the train conductors on the different departure platforms and the gateman controlling the admission of passengers to those platforms. In the interlocking tower, in front of the director, there is a bank of indicator lights arranged one above the other, three for each track, the upper light being the return indication from the train conductor, the middle light an indication to the conductor and the gateman, and the lower light an indication from the gateman. Adjoining each gate there are two incandescent glow lights on the circuit, one above the other, connected in such a way that the gateman, by inserting a special key, can complete a circuit to the tower.

At four points, distributed along the platform, are located boxes on the columns supporting the umbrella shed, each box having two glow lights, one above the other, the boxes being so arranged that the conductor of a train, by inserting a special key, can likewise complete a circuit with the tower. The method of using this system of communication is as follows:

One minute before the departure time of the train, the conductor inserts his key in one of the boxes on the platform and turning it closes the circuit which lights the upper light for the corresponding track in the bank of lights in front of the tower director and likewise lighting the upper of the two glow lights at the gate. If the director is ready to have the routes given for this train, he presses a button which puts out the top light given by the conductor and lights the one next below it and lights the top light in each of the boxes along the platform and puts out the upper and lights the lower of the two lights at the gate. When the time has arrived for the train to go, the gateman closes his gate and with his key puts out the light at the gate. This also puts out the upper and lights the lower of the tower indicator lights, in this way advising the conductor and the towerman simultaneously that the train may leave. The conductor may then give his usual starting signal to the engine runner to go, which he then does, provided the proper fixed signal is clear. This arrangement provides a very simple and accurate system for transmitting the required information and works perfectly.

The use of diagrams for facilitating the full utilization of tracks along passenger platforms has been investigated, but enquiry of the roads in this country having the largest terminals develops the fact that no such diagrams are used or are considered as being necessary for the distribution of trains at platforms, experience having proved that the familiarity of the director in the tower with the station lay-out and the information which he receives in advance as to the trains to be handled is such that the desired results can be better obtained by relying upon his skill.

### Developments in Signal Practice

It will be interesting to present a discussion which has been under consideration by those interested in signaling of the various railways of the United States during the last three years. In general, the practice in America has been to give the indications of fixed semaphore signals for both interlocking and automatic block signals in the lower right-hand quadrant, usually by two positions the home signal being horizontal for "stop" and diagonally downward or vertically downward for "proceed," and the distant or caution signal (the end of the blade being of a different form from that of the home signal, being notched or fish tailed, whereas the end of the home signal is square) indicating in the horizontal position "caution" and diagonally downward or vertically downward indicating "clear."

The extensive application of automatic semaphore block signals and the attempt to carry the block working through more or less complicated interlockings has led to considerable diversity of practice on different lines, and the automatic block semaphore, both home and distant, being of the same form as the home and distant semaphores for interlocking plants has led most naturally to a possible confusion on the part of the engine runner in the interpretation to be given for a given signal indication, especially when in its normal position, which, for an interlocked semaphore indicates "stop and stay" and for an automatic block signal semaphore indicates "stop and proceed with train under control."

The practice on different roads in connection with interlocked semaphores at points where a number of routes are to be indicated has also varied, a number of the older lines having a home signal blade for each route, placed one above the other on a single mast, and other roads for similar situations having only two, the upper for the main high speed route and the lower for diverging routes.

Figure or letter indicators combined with the lower blades under the two-blade system have been tried but were discarded as of no value corresponding to the complication or cost due to their use.

The consolidation of different railway properties under one management has brought together lines having both systems in use, and the necessity for unifying the practice over the whole of such a consolidated line and doing it in such a way as would provide for the future as well as the present requirements, led to a very prolonged and exhaustive investigation by committees appointed by the larger lines interested in the question, and later by committees of the Railway Signal Association and Maintenance of Way Association The result of these investigations was the statement of a series of fundamental principles and of the rules which should govern any applications under those principles.

(1) The first and most radical departure was the use of the upper right-hand quadrant for giving signal indications, in this respect following the German practice. (2) The giving of three indications by one signal blade (in a horizontal position and pointing to the right, pointing upwardly at an angle of 45°, and pointing in a vertical direction upward). (3) The use of a second blade below the first, which in turn gives three indications by similar positions to those of the first or upper blade. (4) The distinguishing of interlocked semaphore signals from automatic semaphore signals by having the ends of the interlocked signal blades (when the blades were in a horizontal position, in the same vertical line, and by having the ends of the automatic semaphore signals (when the blades were in a horizontal position) so arranged that the upper blade projected further to the right than the lower blade. The night signal lights were correspondingly arranged, one being vertically above the other for interlocked signals and for automatic signals the lower light being located diagonally below and to the left of the upper light.

The above combinations of three positions for two signals permitted of giving a considerable number of indications which were thought necessary for giving information to direct the movement at the high speeds at present required for through limited and special service trains.

It is generally admitted that the night indications should be given by lights of distinctive color, and the difficulty in giving so many combinations as above required has been solved by the use of green, yellow and red lights for the three positions of vertical, 45°, and horizontal. It appears to the writer that by far the most logical solution would have been (1) green, (2) red-and-green, and (3) red for the corresponding positions, the red and green from one source of light having been proved by years of use on one or two of the largest systems in the country to be absolutely distinct and reliable.

Up to the point where two blades have been decided on for giving indications in combination, there has been a fair degree of unanimity in the ideas of those responsible for the system, but some divergence of opinion has developed as to the system by which the combinations shall be made, and the great danger appears to be that greater confusion may result as between the practice of different roads in this respect than has existed under the systems which have been in use heretofore.

**Simplicity of Signals; A Single-Blade System**

It is the writer's opinion, that simplicity should never be sacrificed in so grave a matter as giving indications for governing the runner of high-speed trains, in order to give modifying instructions for slower speed movements. The time for correct action by the runner of a high-speed train is so short that the message to be conveyed by signals must be so simple that its interpretation is intuitive and not the result of reasoning. The message, therefore, must be limited to that which can be instantly comprehended by anyone who can be expected to reach the position of runner and not by the highest, or even the average mental development to be found in runners as a class.

It is the firm conviction of the writer that, taking into consideration all of the conditions surrounding the men whose duty it is to run an engine, the care of the machinery, the looking out for train order, block, and interlocking signals, the graduation of power for grades and curves, taking water at speed, station stops, and a great many other exacting requirements, the placing upon them of the responsibility of correctly interpreting a combination of signal indications which takes a variety of mental operations, is a long step away from safe practice. It would seem much safer to give the indications by one blade, which, if need be, can have four positions with corresponding night indications, four appearing to cover all present requirements, the blade pointing to the right of the signal mast as seen by an approaching train whose movement is to be governed by it:—

(1) Horizontal position, red light at night; (2) vertical position upward, green light at night; (3) inclined upward at 45°, a red and green light at night; (4) inclined downward at 45°, a yellow light at night.

The corresponding indications would then be as follows: (1) "Stop" signal; (2) Clear signal: "Proceed," next signal is also in position to be passed, being either clear or at caution; (3) Caution signal: "Proceed at such speed as will admit of stopping at next signal, which may be at stop or at caution"; (4) Caution signal: "Proceed at such limited speed as is safe to take a diverging route from the main line from this junction or cross-over."

As discriminating between semaphores for interlocking and those for automatic block signals, there can be placed upon the mast a bracket projecting to the left, whose outer end shall have the same relation to the mast that the outer end of the semaphore casting has to the left of the mast for interlocked signals, and on the outer end of which a white light can be placed at night as a marker. For automatic block semaphores this bracket can be projected further to the left so that its outer end will appear to be materially further from the mast than is the semaphore casting upon that side and on the outer end of which a white light can be placed at night as a marker.

It is believed that such an arrangement of signals as this can be made to cover all of the necessary moves in territory where high speed is permitted and that in terminals or other points where the speed is necessarily limited, as compared with that on the open road, a dwarf signal indication can be given on the ground at the foot of or below the high speed signal to meet any additional requirements as to movements of trains at such points.

It will be seen from the above that the mental operations which the high speed runner would be obliged to carry out are limited to not more than four at the instant that he observes the signal, his rule being: (1) stop if a red light or a horizontal blade is displayed; (2) proceed if a green light or vertical blade is displayed; (3) reduce speed as is necessary if a red and green light is displayed, or the blade is pointing 45° upwardly; (4) reduce speed if a yellow light is displayed or the blade is pointing 45° downward.

Having got his train under control, he then has ample time to further consider the movements which correspond with the kind of signal and with the location on the road.

### Relation of Headlights to Signals

As a matter of information in connection with the use of interlocking and block signals in the United States, the following statement will prove most interesting.

During the last two years, a wave of legislation has passed over the United States having for its aim the compulsory use of electric headlights on locomotives and, although the railway managements presented the strongest arguments against such a requirement, many of the States passed the bill and made it a law.

There is no doubt but that the use of the electric headlight largely diminishes the distinctive character of night indications of block and interlocked signals. On lines of single track the condition will be serious enough but where there are two or more main running tracks the electric light blinds the runner of an approaching train on an adjoining track so that for an appreciable time after having met the train the eye cannot tell one colored light from another. It is a question still undetermined whether the continued repetition of this blinding effect will not seriously impair the vision and thus reduce the period of the runners' safe employment on lines where the highest speed trains are guided wholly by block and interlocked signals. While there is no chance for a repeal of this law for one or two years in those states where it has been adopted it is hoped that other states will not follow their example and that experience will lead in due time to the elimination of this unfortunate and even dangerous legal requirement.

### Summary

Summarizing the situation as regards interlocking in America: (1) application of power interlocking is rapidly increasing; (2) electro-pneumatic and purely electric systems are superseding all other forms of power interlocking; (3) the track circuit, with electric locking, is superseding mechanical detector bars; (4) all forms of electric locking are being generally used in connection with heavily worked terminals and in heavy traffic territories; (5) diagrams for facilitating the full utilization of tracks along passenger platforms are not used in the United States.

## THE NATIONAL GOOD ROADS CONGRESS.

The Third National Good Roads Congress was held at Niagara Falls, N.Y., July 28th, 29th and 30th, 1910. Mayor Anthony C. Douglass, of Niagara Falls, made the address of welcome, to which President A. C. Jackson of the association responded, and then he introduced Congressman William Sulzer of New York, vice-president, as the presiding officer. Congressman Sulzer made an address of some length, both instructive and eloquent.

Hon. Wm. Sulzer in his address urged better roads. For years he has been an earnest advocate of good road building. Good roads mean progress and prosperity, a benefit to the people who live in the cities, an advantage to the people who live in the country, and it will help every section of our vast domain. Good roads, like good streets, make every habitation along them most desirable; they enhance the value of farm lands, facilitate transportation and add untold wealth to the producers and consumers of the country; they are the milestones marking the advance of civilization; they economize time, give labor a lift, and make millions in money; they save wear and tear and worry and waste; beautify the country—bring it in touch with the city; they aid the social and the religious and the educational and the industrial progress of the people; they make better homes and happier hearthsides; they are the avenues of trade, the highways of commerce, the mail routes of information, and the agencies of speedy information; they mean the economical transportation of marketable products—the maximum burden at the minimum cost; they are the ligaments that bind the country together in thrift and industry and intelligence and patriotism; they promote social intercourse, prevent intellectual stagnation, and increase the happiness and the prosperity of our producing masses; they contribute to the glory of the country, give employment to our idle workmen, distribute the necessaries of life—the products of the fields and the forests and the factories—encourage energy and husbandry, inculcate love for our scenic wonders, and make mankind better and greater and grander.

### Lessen Cost of Living.

One of the crying needs in this country, especially in the south and the west, is better roads. The establishment of good roads would in a great measure solve the question of the high price of the necessaries of life and the increasing cost of living—which is beginning to make life a struggle for existence. By reducing the cost of transportation it would enable the farmer to market his produce at a lower price and at a larger profit at the same time. It would bring communities closer and in touch with the centers of population, thereby facilitating the commerce of ideas as well as of material products.

When we consider that the agricultural production alone of the United States for the past eleven years totals $70,000,000,000, a sum that staggers the imagination, and that it cost more to take this product from the farm to the railway station than from such station to the American and European markets; and when the saving in cost of moving this product of agriculture over good highways instead of bad would have built a million miles of good roads, the incalculable waste of bad roads in this country is shown to be of such enormous proportions as to demand immediate reformation and the exercise of the wisest statesmanship, but great as is the loss to transportation, mercantile, industrial, and farming interests, incomparably greater is the material loss to the women and children and the social life, a matter as important as civilization itself. The truth of the declaration of Charles Sumner fifty years ago, that "the two greatest forces for the advancement of civilization are the schoolmaster and good roads," is emphasized by the experience of the intervening years and points to the wisdom of a union of the educational, commercial, transportation, and industrial interests of our country in aggressive action for the immediate building of permanent good roads.

## BETTER ROADS AND HOW TO GET THEM.

**B. F. Yoakum, Chairman of The St. Louis and St. Francisco Railway.**

Your organization stands for a duty sadly neglected by the Government. Good roads mean more for the people at large than any other public works, and add more to the comfort and upbuilding of the country. They are of national importance.

Government statistics tell us that it costs our farmers 15 cents more to haul one ton one mile in this country than it costs in European countries. The products of the farms of the United States last year amounted to approximately 250 million tons. The Government shows the average haul of a ton was 9 miles. This difference of 15 cents a ton per mile represents an additional cost of $1.35 a ton for an average haul of 9 miles. Estimating that two-thirds of the agricultural products of last year were hauled away from the farms, there would have been a saving to the American farmers of $225,000,000 if our roads had been up to the standard of European roads, not including their back haul of supplies from the stations to the farms. They would also have saved large sums in the cost of replacing and repairing harness, wagons, etc., and in the investment and care of extra draught stock.

The only way to get good roads is to fight for them. Your organization can do its work most effectively by keeping before the people in as many ways as possible the importance of making money by making better roads. It is not a sentimental proposition, but purely a business one * * *

**Are Behind the Times.**

The members of your association know these plain and simple things I have stated. But the way to get good roads is to make all the people know them and keep them constantly in mind. The transportation system which carries our food and clothing from maker to user is part railroad and part country road. One part is as necessary as the other. Your organization in its support of the betterment of our public highways should talk in millions instead of thousands. The advocates of better roads are behind the times and will have to spend money by the millions to catch up, and the people who are to enjoy and benefit by these improvements should be educated to understand what good roads mean to them and what they will cost.

The agricultural people of the country are beginning to realize their own situation. They are commencing seriously to study economic questions. They are beginning to figure their time as worth money. When your association places the facts before the owners of the six million farms, who represent, according to government estimates, including their families, nearly one-third of our population, and gets them to realize what good roads mean to them, we will then have good roads. They will vote for men as public servants who will encourage and vote to help along the work of getting good roads. The duty of the National Good Roads Association is of greater importance to-day to the future growth of the country than it has ever been before.

It is to good roads that this country must look largely for its future growth and development.

**Too Much Hammering.**

The railroad business of the country has been attacked from so many different standpoints that we are not going to have for many years such an era of railroad construction as we have enjoyed heretofore. The improvement which can come nearest taking the place of railroads in the development of the country lying back from existing railroads is good public highways. Illustrations of this you can now see in many sections of the country and will see many more evidences of it as different communities begin to realize how hard it is for railroad builders to find new money to build new railroads into new countries.

One instance I have in mind which illustrates the situation: In the county in which San Antonio, Texas, is located, there have not been any new railroads constructed for several years. The splendid old German town of Fredericksburg has had a purse of $100,000 hung up for a long time to give to the first railroad that would build into its thriving and rich country, but no takers, although several have tried it and found it impossible to finance even a short road between San Antonio and Fredericksburg. The people of that town are now turning their attention to the next best thing, which is to build a highway over which heir products and their commerce can be hauled most economically and their automobiles convey passengers more promptly. This is only one of the many instances throughout the country, as we still have many towns more than fifty miles from a railroad * * *

**Something Worth While.**

If we build 100,000 miles of public highways annually for ten years, and give to this country 1,000,000 miles of good public roads at an average cost of $3,000 per values, none can foretell. We will be engaging in a national development, the advantages of which in economies, commerce, comforts and enhanced and values, none can foretell. We will be accomplishing something worth while. This work if carried on by counties and townships as at present will be very slow. It should be encouraged under a broad comprehensive plan outlined by the Federal Government, co-operating with the States. The Agricultural Department of the Government is in sympathy with all things that tend to improve our public road system * * *

**What Must Be Done.**

If you will strengthen your association through a strong concrete organization of working forces in each state, and will interest the Congressmen and State authorities by getting them to realize that one of the most effective ways to promote the growth of the country and expand its agricultural development is through the encouragement of better roads, in the course of a few years we will have a system of public highways second to none in the world. Every dollar saved through this economy goes directly to the pockets of the producers. On the basis of the Government's estimate of the present excess cost of 15 cents a ton for hauling in this country, as compared with European countries, improved roads would have meant to the farmers on last year's crop an additional $225,000,000, which would have increased their $8,750,000,000 crop to $10,000,000,000. When we take into consideration that this additional saving would have gone to the agricultural people, who are both the greatest producers of wealth and the greatest purchasing power of this nation, it means more than the public men of this country who are studying economic questions have considered. What your association should work for is better roads, and finding ways and means of getting them.

Canadians were well represented at the Congress. On the second day of the Congress W. A. McLean, Provincial Commissioner of Highways, Toronto, suggested that it would be better to spend millions in good roads than on canals and railways. He believed that within a short time the farmers would realize that the automobile was their greatest blessing, and that better roads would follow. He said the auto provided the cheapest mode of hauling produce.

W. J. Trethewey, Toronto Board of Trade, believed York County would in three years have the best system of roads in America. He said the automobile would prove the farmers' greatest help, all produce being carried in auto trucks soon.

J. F. Beam, Welland, said the Government aid to good roads was not sufficient at present. He advocated building good roads running north, south, east and west throughout the Province, which would be crossed by roads built under the regular country conditions.

## ENGINEERING SOCIETIES.

**CANADIAN SOCIETY OF CIVIL ENGINEERS.**—413 Dorchester Street West, Montreal. President, Col. H. N. Ruttan; Secretary, Professor C. H. McLeod.

Chairman, L. A. Vallee; Secretary, Hugh O'Donnell, P.O. Box 115, Quebec. Meetings held twice a month at Room 40, City Hall.

TORONTO BRANCH—
96 King Street West, Toronto. Chairman, A. W. Campbell; Secretary, P. Gillespie, Engineering Building, Toronto University, Toronto. Meets last Thursday of the month.

MANITOBA BRANCH—
Chairman, J. E. Schwitzer; Secretary, E. Brydone Jack. Meets first and third Fridays of each month, October to April, in University of Manitoba, Winnipeg.

VANCOUVER BRANCH—
Chairman, Geo. H. Webster; Secretary, H. K. Dutcher, 40-41 Flack Block, Vancouver. Meets in Engineering Department, University

OTTAWA BRANCH—
Chairman, W. J. Stewart, Ottawa; S. J. Chapleau, Resident Engineer's Office, Department of Public Works

**MUNICIPAL ASSOCIATIONS.**

ONTARIO MUNICIPAL ASSOCIATION.—President, Mr. George Geddes, Mayor, St. Thomas, Ont.; Secretary-Treasurer, Mr. K. W. McKay, County Clerk, St. Thomas, Ontario.

UNION OF ALBERTA MUNICIPALITIES.—President, H. H. Gaetz, Red Deer, Alta., Secretary-Treasurer, John T. Hall, Medicine Hat, Alta.

THE UNION OF CANADIAN MUNICIPALITIES.—President, W. Sanford Evans, Mayor of Winnipeg; Hon. Secretary-Treasurer, W. D. Lighthall, K.C., ex-Mayor of Westmount.

THE UNION OF NEW BRUNSWICK MUNICIPALITIES.—President, Mayor Reilly, Moncton; Hon. Secretary-Treasurer, J. W. McCready, City Clerk, Fredericton.

UNION OF NOVA SCOTIA MUNICIPALITIES.—President, Mr. A. E. McMahon, Warden, King's Co., Kentville, N.S.; Secretary, A. Roberts, Bridgewater, N.S.

UNION OF SASKATCHEWAN MUNICIPALITIES.—President, Mayor Hopkins, Saskatoon; Secretary, Mr. J. Kelso Hunter, City Clerk, Regina, Sask.

**CANADIAN TECHNICAL SOCIETIES.**

ALBERTA ASSOCIATION OF ARCHITECTS.—President, E. C. Hopkins, Edmonton; Secretary, H. M. Widdington, Strathcona, Alberta.

ASSOCIATION OF SASKATCHEWAN LAND SURVEYORS.—President, J. L. R. Parsons, Regina; Secretary-Treasurer, M. B. Weeks, Regina

ASTRONOMICAL SOCIETY OF SASKATCHEWAN.—President, N. McMurchy; Secretary, Mr. McClung, Regina.

BRITISH COLUMBIA LAND SURVEYORS' ASSOCIATION.—President, W. S. Drewry, Nelson, B.C.; Secretary-Treasurer, S. A. Roberts, Victoria, B.C.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.—President, Charles Kelly, Chatham, Ont.; Secretary, W. A. Crockett, Mount Hamilton, Ont.

CANADIAN CEMENT AND CONCRETE ASSOCIATION.—President, Peter Gillespie, Toronto, Ont.; Vice-President, Gustave Kahn, Toronto; Secretary-Treasurer, R. E. W. Hagarty, 662 Euclid Ave., Toronto.

CANADIAN CLAY PRODUCTS' MANUFACTURERS' ASSOCIATION.—President, W. McCredie; Secretary-Treasurer, D. O. McKinnon, Toronto.

CANADIAN ELECTRICAL ASSOCIATION.—President, N. W. Ryerson, Niagara Falls; Secretary, T. S. Young, Canadian Electrical News, Toronto.

CANADIAN FORESTRY ASSOCIATION.—President, Thomas Southworth, Toronto; Secretary, James Lawler, 11 Queen's Park, Toronto.

CANADIAN GAS ASSOCIATION.—J. Keillor, Secretary-Treasurer, Hamilton, Ont.

CANADIAN INDEPENDENT TELEPHONE ASSOCIATION.—President, W. Doan, M.D., Harrietsville, Ont.; Secretary-Treasurer, Francis Dagger, 21 Richmond Street West, Toronto.

CANADIAN MINING INSTITUTE.—Windsor Hotel, Montreal. President, Dr. Frank D. Adams, McGill University, Montreal; Secretary, H. Mortimer-Lamb, Montreal

CANADIAN RAILWAY CLUB.—President, H. H. Vaughan; Secretary, James Powell, P.O. Box 7, St. Lambert, near Montreal, P.Q.

CANADIAN STREET RAILWAY ASSOCIATION.—President, D. McDonald, Manager, Montreal Street Railway; Secretary, Acton Burrows, 157 Bay Street, Toronto.

CANADIAN SOCIETY OF FOREST ENGINEERS.—President, Dr. Fernow, Toronto; Secretary, F. W. H. Jacombe, Ottawa.

CENTRAL RAILWAY AND ENGINEERING CLUB.—Toronto, President, J. Duguid; Secretary, C. L. Worth, 409 Union Station. Meets third Tuesday each month except June, July, August.

DOMINION LAND SURVEYORS.—President, Thos. Fawcett, Niagara Falls; Secretary-Treasurer, A. W. Ashton, Ottawa.

EDMONTON ENGINEERING SOCIETY.—President, Dr. Martin Murphy; Secretary, B. F. Mitchell, City Engineer's Office, Edmonton, Alberta.

ENGINEERING SOCIETY, TORONTO UNIVERSITY.—President, A. D. Campbell; Corresponding Secretary, A. H. Munroe.

ENGINEER'S CLUB OF TORONTO.—96 King Street West. President, C. M. Canniff; Secretary R. B. Wolsey. Meeting every Thursday evening during the fall and winter months.

INSTITUTION OF ELECTRICAL ENGINEERS.—President, Dr. G. Kapp; Secretary, P. F. Rowell, Victoria Embankment, London, W.C.; Hon. Secretary-Treasurer for Canada, Lawford Grant, Power Building, Montreal, Que.

INSTITUTION OF MINING AND METALLURGY.—President, Edgar Taylor; Secretary, C. McDermid, London, England. Canadian Members of Council:—Prof. F. D. Adams, J. B. Porter, H. E. T. Haultain, and W. H. Miller, and Messrs. W. H. Trewartha-James and J. B. Tyrrell.

MANITOBA LAND SURVEYORS.—President, George McPhillips; Secretary-Treasurer, C. G. Chataway, Winnipeg, Man.

NOVA SCOTIA MINING SOCIETY.—President, T. J. Brown, Sydney Mines, C.B.; Secretary, A. A. Hayward.

NOVA SCOTIA SOCIETY OF ENGINEERS, HALIFAX.—President, S. Fenn; Secretary, J. Lorne Allan, 15 Victoria Road, Halifax, N.S.

ONTARIO PROVINCIAL GOOD ROADS ASSOCIATION.—President, W. H. Pugsley, Richmond Hill, Ont.; Secretary, J. E. Farewell, Whitby, Ont.

ONTARIO LAND SURVEYORS' ASSOCIATION.—President, H. W. Selby; Secretary, Killaly Gamble, 703 Temple Building, Toronto.

ROYAL ARCHITECTURAL INSTITUTE OF CANADA.—President, F. S. Baker, F.R.I.B.A., Toronto, Ont.; Hon. Secretary, Alcide Chausse, No. 5 Beaver Hall Square, Montreal, Que.

ROYAL ASTRONOMICAL SOCIETY.—President, Prof. Alfred T. de Lury, Toronto; Secretary, J. R. Collins, Toronto.

UNDERGRADUATE SOCIETY OF APPLIED SCIENCE, McGILL UNIVERSITY.—President, H. P. Ray; Secretary, J. P. McRae.

WESTERN CANADA IRRIGATION ASSOCIATION.—President, A. M. Grace, Medicine Hat, Alta.; Secretary-Treasurer, John T. Hall, Brandon, Man.

WESTERN CANADA RAILWAY CLUB.—President, Grant Hall; Secretary, W. H. Rosevear, 199 Chestnut Street, Winnipeg, Man. Second Monday, except June, July and August, at Winnipeg.

**AMERICAN TECHNICAL SOCIETIES.**

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS (TORONTO BRANCH).—W. H. Eisenbeis, Secretary, 1207 Traders' Bank Building.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—President, John P. Canty, Fitchburg, Mass.; Secretary, T. F. Patterson, Boston & Maine Railway, Concord, N.H.

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION.—President, L. C. Fritch, Chief Engineer, Chicago G. W. Railway; Secretary, E. H. Fritch, 962-3 Monadnock Block, Chicago, Ill.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Secretary, C. W. Hunt, 220 West 57th Street, New York, N.Y. First and third Wednesday, except July and August, at New York.

AMERICAN SOCIETY OF ENGINEERING-CONTRACTORS.—President, George W. Jackson, contractor, Chicago; Secretary, Daniel J. Hauer, Park Row Building, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—29 West 39th Street, New York. President, Jesse M. Smith; Secretary, Calvin W. Rice.

WESTERN SOCIETY OF ENGINEERS.—1735 Monadnock Block, Chicago, Ill. J. W. Alvord, President; J. H. Warder, Secretary.

## COMING MEETINGS.

NEW YORK CEMENT SHOW.—December 14-20, 1910. First annual convention in Madison Square Garden, New York. Under the management of the Cement Products Exhibition Company, 115 Adams St., Chicago.

CHICAGO CEMENT SHOW.—February 15-23, 1911. Fourth annual exhibition, at the Coliseum, Chicago, Ill. Under the management of the Cement Products Exhibition Company, 115 Adams St., Chicago.

THE ROYAL ARCHITECTURAL INSTITUTE OF CANADA.—August 24-27. Annual meeting at Winnipeg, Man. Alcide Chausse, Hon. Secretary, 5 Beaver Hall Square, Montreal, Que.

NEW ENGLAND WATER WORKS ASSOCIATION.—September 21-23. Annual meeting, Rochester, N.Y. Willard Kent, Secretary, Narragansett Pier, R.I.

AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—October 11-16. Seventeenth annual convention, Erie, Pa. Prescott Folwell, Secretary, 239 W. 39th Street, New York, N.Y.

NATIONAL MUNICIPAL LEAGUE.—November 14-18. Annual meeting, Buffalo, N.Y. Clinton Rogers Woodruff, Secretary, North American Building, Philadelphia, Pa.

UNION OF CANADIAN MUNICIPALITIES.—August 31st to September 2nd. Tenth annual convention, Toronto, Ont. Secretary, W. D. Lighthall, K.C., Westmount, Que.; Assistant Secretary, G. S. Wilson, 107 St. James Street, Montreal, Que.

INTERNATIONAL MUNICIPAL CONGRESS AND EXPOSITION.—September 18-30, 1911, at Chicago, Ill. Curt. M. Treat, Secretary, 1107-8 Great Northern Building, Chicago.

NATIONAL IRRIGATION CONGRESS.—Eighteenth Annual, September 26-30, 1910, Pueblo, Colorado. Secretary, Arthur Hooker, Spokane, Wash.

TORONTO, CANADA, AUG. 4, 1910.

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## CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

The twenty-first annual convention of the Canadian Association of Stationary Engineers opened at Victoria Hall, Berlin, Ont., July 26, with a representative attendance of delegates from all parts of the Province. The usual exhibit of machine articles was the feature of the convention, and attracted the attention of the delegates.

Among the exhibitors were the Garlock Packing Co., Hamilton; Power and Engineer, New York; I. E. Shantz Co., Berlin; Manufacturing and Publishing, Toronto; Dunlop Tire and Rubber Goods Co., Toronto; Goldie & McCulloch, Galt; Dart Union Co., Bice Regulator Co., London; Peiler & McKenzie, Montreal; Diamond Grate Bar Co., Berlin; Jenkins Bros., Montreal; Canadian Fairbanks Co., Montreal; Lunkenheimer Co., Cincinnati; Dearborn Drug and Chemical Co., Chicago; Canadian Steam Boiler and Equipment Co., Toronto; Francis Duffy, Kingston; Quaker City Rubber Co., Pittsburg; Strong, Carlisle and Hammond Co., Cleveland; Twin City Oil Co., Berlin, and The Power House, Toronto.

The officers in charge of the exhibition were as follows:

President—W. R. Stewart, Jenkins Bros., Montreal.

First Vice-President—G. E. Fisher, Canadian Fairbanks Co., of London.

Second Vice-President—E. A. Hetherington, Goldie & McCulloch, Galt.

Treasurer—H. C. Austen, Dunlop Tire and Rubber Goods Co., Toronto.

Secretary—J. B. Goff, Dart Union Co., Toronto.

His Worship Mayor Hahn extended a civic welcome, and Superintendent E. J. Philip, of the local lighting plant, Past President, also welcomed the visitors in behalf of Berlin Union No. 9. The addresses of welcome were responded to by President Chas. Kelly, Chatham, and Secretary W. A. Crockett. During the afternoon the reports of the officers were presented showing the progress made by the association during the year.

The following officers were elected for 1910-11: President, J. J. Haig, Guelph (acclamation); vice-president, W. Norris, London (acclamation); treasurer, A. M. Wickens, Toronto; conductor, J. A. Robertson, Stratford (acclamation); doorkeeper, H. R. Clarke, Hamilton; secretary, W. A. Crockett, Mount Hamilton (acclamation).

It was unanimously decided to hold the next annual convention in Stratford in 1911.

The appointment of the delegates to the next biennial convention was left to the executive after the plebiscite had been taken by the members.

The Exhibitors' Association elected the following officers:—President, John B. Goff, Toronto; first vice-president, E. Hetherington, Galt; second vice-president, H. L. Peiler, Montreal; secretary, Gordon C. Keith, Toronto; assistant secretary, D. O. McKinnon, Toronto; treasurer, G. E. Fisher, London; superintendent of exhibits, W. R. Stavert, Montreal.

## DRY DOCK SUBSIDIES.

The question of dry docks in Canada, the extent to which they should be subsidized, and their location, in causing the Canadian Government considerable anxiety.

At the recent session the Subsidy Act, in relation to these docks, was amended so as to increase the amount which the Government could pay by way of annual subsidy, to 3½ per cent. The tenure, also, was extended.

Since then there have been numerous applications, and the tendency is to get into the higher classes. There is some apprehension, however, lest the business be overdone.

Quebec, backed by strong shipping interests, wants a dock on the Levis side, though the plans have not actually been filed. The Minister of Public Works has practically promised one to St. John. Both of these would be of the first class carrying an annual subsidy on outlay up to $4,000,000. The Halifax dock, subsidized under the old arrangement, will seek a renewal of the subsidy under the new conditions.

Vickers, Son, and Maxim, as previously stated, changed their plan from a second to a first-class dock, at Montreal, and it is intimated pretty strongly that they will build this or nothing. The essential condition is, of course, the subsidy.

### Subsidies Already Granted.

Sault Ste. Marie has secured a subsidy for its dock. Collingwood has one already; Vancouver has just been subsidized, and one is assured for the Grand Trunk Pacific at Prince Rupert.

In many cases the docks would be operated in connection with shipbuilding, and the industry, it would seem, would either be stimulated or else considerable capital will be sunk in the undertakings.

### Montreal Versus Quebec.

The rival claims of Quebec and Montreal, and the question of whether there is room for two first-class plants on the St. Lawrence, have, it is learned, loomed up in the Cabinet discussion. Nothing, at all events, will be done till September.

The engineer representing Vickers, Son, and Maxim, who has been here for about a month, has been so assured, and is sailing for home.

## ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

**Copies of these orders may be secured from the Canadian Engineer for a small fee.**

11161—July 14—Authorizing the Petrolea Electric Light, Heat, Power and Gas Company to lay a gas pipe under the track of the M.C.R. at Centre Street, Petrolea.

11162—June 27—Amending Order No. 9726, dated February 25th, 1 authorizing the Corporation of the City of Brantford to construct a bridge on South Market Street, Brantford, by substituting the words "Niagara, St. Catharines and Toronto" for the words "Toronto, Niagara and Western," where they occur in the recital and operative parts of the said Order.

11163—July 13—Amending Order No. 10169, dated December 8th, 1909, by striking out the words "or in connection with any obligation on the part of the C.P.R. Co. to contribute to the cost of the work," in the preamble of the said Order.

11164—July 14—Extending the time for the construction of an overhead bridge by the G.T.R. at highway between Cons. 1 and 2, Township of King, until September 1st, 1910.

11165—July 14—Ordering the G.T.R. Co. to establish and maintain a suitable farm crossing across the farm of Thadde Desilets, parish of St. Celestin, P.Q.

11166—July 14—Authorizing the Township of Orillia to construct a high way crossing over the G.T.R. at Severn Bridge Station, Ontario.

11167—July 14—Dismissing the application of Leon. Lamontagne, of St. Malachie, P.Q., for a farm crossing over the National Transcontinental Railway.

11168—July 14—Dismissing the application of the residents of Norva Ont., for an Order directing the G.T.R. to stop its train No. 9, leaving Toronto at 7 p.m., at Norval.

11169—July 14—Extending the time for the construction of a bridge to carry the tracks of the Toronto Street Railway and the highway over the tracks of the G.T.R., C.P.R., and C.N.R., at Queen Street East, Toronto, Ont., until July 1st, 1911.

11170—July 16—Approving the Standard Freight Tariffs of the Crow's Nest Southern Railway Co., the Manitoba Great Northern Railway Co., and the Bedlington & Nelson Railway Co.

11171—July 15—Amending Order No. 10419, dated May 2nd, 1910, by deleting from the Order all the words after the word "approved" and inserting in lieu thereof the following: "Subject, however, to the conditions (a) that if the construction of the said railway involves the crossing of the Stave River Road, an application or applications to the Board for permission to make such crossing or crossings shall first be made and

(Continued on page 152).

# CONSTRUCTION NEWS SECTION

**Readers will confer a great favor by sending in news items from time to time. We are particularly eager to get notes regarding engineering work in hand and projected, contracts awarded, changes in staffs, etc. Printed forms for the purpose will be furnished upon application.**

## TENDERS PENDING.

**In addition to those in this issue.**

Further information may be had from the issues of The Canadian Engineer referred to.

| Place of Work. | Tenders Close. | Issue of. | Page. |
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| Quebec, Que., bridge | Sept. 1. | June 30. | 56 |
| Colchester, Ont., pier extension | Aug. 9. | July 14. | 54 |
| Winnipeg, Man., underground cable | Sept. 1. | July 21. | 54 |
| Port Felix, N.S., wharf | Aug. 15. | July 21. | 85 |
| Dover, N.S., wharf | Aug. 15. | July 21. | 85 |
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| Winnipeg, Man., drilling machinery | Aug. 25. | July 28. | 54 |
| London, Ont., pumping equipment | Aug. 8. | July 28. | 54 |
| Toronto, Ont., concrete viaduct | Aug. 9. | July 28. | 53 |
| Toronto, Ont., steel viaduct | Sept. 6. | July 28. | 53 |
| Swift Current, Sask., sewers | Aug. 21. | July 28. | 114 |
| Sedley, Sask., hall and fire station | Sept. 1. | July 28. | 114 |
| Estevan, Sask., lighting and sewerage | Aug. 24. | July 28. | 114 |
| Beaverton, Ont., electric wiring | Aug. 10. | July 28. | 114 |
| Aylmer, Que., wharf | Aug. 15. | July 28. | 114 |
| Red Deer, Alta., schoolhouse | Aug. 12. | July 28. | 116 |

## TENDERS.

**Yarmouth, N.S.**—Tenders will be received until August 11th for the construction of a brick engine house. Hiram Goudey, Town Clerk.

**Musquodoboit Harbor, N.S.**—Tenders will be received until August 9th for dredging. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

**Digby, N.S.**—Tenders will be received until August 10th for electric light fixtures, wiring, etc., for the Public Building. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

**Montreal, Que.**—Tenders will be received until Aug. 10th for the illumination and decoration of the city hall. L. N. Senecal, Secretary, Board of Commissioners Office.

**Montreal, Que.**—Tenders will be received until August 20th for the construction of a Young Men's Christian Association. Ross & McFarlane, 1 Belmont Street.

**Montmagny, Que.**—Tenders will be received until August 29th for wharf extension. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

**Dundalk, Ont.**—Tenders will be received until August 15th for the erection of a reinforced concrete bridge over the Saugeen River. I. Traynor, township engineer.

**Fort William, Ont.**—Tenders will be received until August 5th for grading Ernestine Street. H. S. Hancock, city engineer.

**Manion, Ont.**—Tenders will be received until August 17th for Rudsdale Creek improvement and municipal drain, Township of Bathurst. J. H. Moore, C.L.S. & C.E., Smith's Falls.

**Oshawa, Ont.**—Tenders will be received until August 18th for the construction of 4,000 lineal feet of pavement. (Advertisement in The Canadian Engineer). Frank Chappell, town engineer.

**Toronto, Ont.**—Tenders will be received until August 15th for sewers and sidewalk. Barber & Young, York Township engineers. (Advertisement in The Canadian Engineer.)

**Toronto, Ont.**—Tenders will be received until August 9th for pole supplies, punch and shear, concrete mixer, steel bars and crushed stone. G. R. Geary (Mayor), Chairman, Board of Control.

**Toronto, Ont.**—Tenders will be received until August 15th for the various trades required in the erection of buildings in connection with the General Hospital. Darling & Pearson, Architects, 2 Leader Lane.

**Toronto, Ont.**—Tenders will be received until August 10th for the erection of a fire-proof building. Curry & Sparling, 90 Yonge Street.

**Toronto, Ont.**—Tenders will be received until Aug. 16th for the construction of asphalt pavement and grading of Davenport Road and St. Clarence St. G. R. Geary, (Mayor).

**Toronto, Ont.**—Tenders will be received until Aug. 10th for the construction of a fire-proof building on Melinda St. Architects, Curry & Sparling, 90 Yonge St.

**Elkhorn, Man.**—Tenders will be received until August 8th for the erection of a six-room school building. C. R. Duxbury, secretary-treasurer, School Board.

**Fortier, Man.**—Tenders will be received until August 15th for the construction of a school building. Walter Laurens, secretary-treasurer.

**Portage la Prairie, Man.**—Tenders will be received until August 5th for the erection of a branch house of the Hart-Parr Company. Charles H. Mounsey, architect and structural engineer, Saskatchewan Ave.

**Souris, Man.**—Tenders will be received until August 15th for the erection of Public building. R. C. Desrochers, secretary, Department of Public Works.

**Winnipeg, Man.**—Tenders will be received until August 4th for supply of labor and material required for the erection of two suburban police stations. M. Peterson, secretary, Board of Control Office.

**Winnipeg, Man.**—Tenders will be received for the supply of gasoline and drums. Manitoba Elevator Commission, 279 Garry St.

**Battleford, Sask.**—Tenders will be received until August 22nd for the construction of a post office building. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

**Battleford, Sask.**—Tenders will be received until August 22nd for the construction of a post office building. R. C. Desrochers, secretary, Department of Public Works, Ottawa, Ont.

**Moose Jaw, Sask.**—Tenders will be received until August 15th for laying approximately 63,000 square feet concrete walks, 9,000 lineal feet combined curb and gutter, 6,000 square feet of concrete crossings and six miles of wooden sidewalk. J. M. Wilson, city engineer. (Advertisement in The Canadian Engineer).

**Moose Jaw, Sask.**—Tenders will be received until August 15th for supplying and laying 3,286 lineal feet of six-inch and 700 lineal feet of 12-inch cast iron water mains. J. M. Wilson, city engineer. (Advertisement in The Canadian Engineer).

**Moose Jaw, Sask.**—Tenders will be received until August 15th for supplying of material for the laying of cast iron water main. J. M. Wilson, city engineer. (Advertisement in the Canadian Engineer).

**Moose Jaw, Sask.**—Tenders will be received until August 15th for the construction of approximately 63,000 sq. ft. of concrete sidewalk. J. M. Wilson, city engineer. (Advertisement in The Canadian Engineer).

**Weyburn, Sask.**—Tenders will be received until August 9th for the following electrical equipment: One Cross compound engine; condenser, feed water heater and piping; one

250 K.W. alternating current generator with exciter switchboard, etc. Geo. Ross, secretary-treasurer.

**High River, Alta.**—Tenders will be received until Aug. 9th for the construction of approximately 3,000 square yards of cement sidewalk. Geo. E. Mack, Secretary-Treasurer.

**High River, Alta.**—Tenders will be received until Aug. 9th for approximately 800 barrels of Portland cement. Geo. E. Mack, Secretary-Treasurer.

**Lethbridge, Alta.**—Tenders will be received until Aug. 15th, for the erection of the Fleetwood school. H. M. and W. A. Whiddington, Architects, 211 Sherlock Bldg.

**New Westminster, Alta.**—Tenders will be received until Aug. 8th for grading, street paving, laying of concrete sidewalks and construction of storm-water sewers for Columbia Street. W. A. Duncan, City Clerk.

**Pincher Creek, Alta.**—Tenders will be received until August 10th for the erection of a Separate school. Woods & Steel, engineers.

**Vancouver, B.C.**—Tenders will be called for the paving of Westminster Road from Prince Edward Street to Westminster Avenue, as per the engineer's report and specifications.

**Vancouver. B.C.**—Tenders will be called for the construction of a 300-foot wharf at the foot of Balsam Street. The estimated cost of the work is $9,040. At the outer end there will be an extension 64 feet square.

## CONTRACTS AWARDED.

**Coaticook, Que.**—Contract for the 100-foot reinforced concrete arch over the Coaticook River was awarded to Helmer & Winstanley, of Morrisburg, Ont., for $5,000. Other bidders were W. J. Welch, Coaticook, Que., $5,125; the Laurentian Engineering and Construction Co., Montreal, $6,900.

**Montreal, Que.**—The Eastern Canada Steel & Iron Works have secured the contract for the steel of the new building for the Quebec Ry. Light, Heat & Power Co. The contract amounts to about $90,000.

**Montreal, Que.**—Contracts were awarded for the construction of the new annex to the Windsor Street Station, of the Canadian Pacific Railway, at figures which show that when completed the superstructure will probably cost not much less than $1,500,000. The contract for the steel work was awarded to the Dominion Bridge Company, at a figure approximating $25,000. The masonry and general contract for the building was awarded to Mr. C. E. Deakin, at a price a trifle less than $1,000,000.

**Hamilton, Ont.**—The firm of D. Dick & Sons. Welland has secured the immense contract of the Oliver Chilled Plow Works.

**Harriston, Ont.**—The contract for the Minto Township drain was awarded to D. B. Campbell, of Strathroy, for $5,939. Other bidders were: Daniel Shea, Egerton, $5,711, and Crowley & McDonald, Rostock, $6,987.

**Port Arthur, Ont.**—The contract for the reinforced concrete bridge over Current River was awarded to Seaman & Penniman, Port Arthur, Ont., for $17,792.75. Stewart & Hewitson tendered at $20,687.10.

**Toronto Ont.**—The contract for the superstructure of the Black River bridge was awarded to the lowest bidder, James Vance, New Hamburg, for $1,093; other tenders being $1,900, $1,608, $1,500, $1,514.

The contract for the substructure was awarded to the lowest bidder, Jesse Winger, Edgeley. The cost on the basis of the engineer's estimate will be $1,528, other tenders being $2,586 and $1,836. Barber & Young, Engineers.

**Welland, Ont.**—The contract for the erection of the Peters Brotherhood Overalls Company's factory has been let to A. E. Mason. The contract will amount to about $12,000.

**St. Boniface, Man.**—Contract for the construction of a trunk sewer was let to A. C. Van Horenbuck at $110,134.60. Other bidders were:

| | |
|---|---|
| Kelley & Fry, Winnipeg | $134,594.00 |
| Guilbault & Co., St. Boniface | 144,379.51 |
| M. A. Pigott & Sons, Hamilton, Ont. | 125,889.80 |
| National Paving, Winnipeg | 129,766.90 |
| Rigby & Kellet, Winnipeg | 110,071.90 |
| Jackson & Son, Winnipeg | 125,465.46 |

**Winnipeg, Man.**—Contract for bakery building, J. Woodman, architect, was awarded to The Shepley Construction Co. at $37,300. Other bidders and their prices were as follows:

| | |
|---|---|
| Wallace & Akins | $37,500 |
| Wm. Garson | 37,800 |
| John McQuarrin | 38,600 |
| Johnson & Tusin | 38,200 |
| Clayton Bros. | 37,650 |
| W. J. Davidson | 39,000 |

**Winnipeg, Man.**—The contract for the big hotel to be built by the McLaren Brothers of the Strathcona Hotel at the north-west corner of Main and Rupert Streets, to cost $175,000, has been let. C. W. Sharp & Son are the successful tenderers. The new hotel will be seven storeys high and will extend 70 feet on Main Street and 132 feet on Rupert Street. There will be 161 rooms for the accommodation of guests.

**Regina, Sask.**—The contract for 34 dozen combination screw and timber braces for trunk sewer work has been let to Mussens, Ltd., Montreal.

**Regina, Sask.**—The successful tenders for telephone exchange construction were at:—Scott, F. Somerville, Box 32, Regina, $1,810; Humboldt, Simpson & Craig, Virden, Man., $1,938; Vonda, Simpson & Craig, Virden, Man., $1,800; Davidson, Simpson & Craig, Virden, Man., $1,850; Outlook, Stanley L. Ross, Regina, Sask., $1,870; Broadview, Stanley L. Ross, Regina, Sask., $1,970; Whitewood, Stanley L. Ross, Regina, Sask., $2,123; Carlyle, Stanley L. Ross, Regina, Sask., $1,990.

**Swift Current, Sask.**—The contract for tile pipe has been awarded to Blackmer and Post Pipe Co., St. Louis, U.S.A., $10,082.78, and for water mains to Munderloh & Co., Ltd., Montreal. 2-inch, $16.42 per 100 feet; 3-inch, $25.87 per 100 feet; 4-inch, $38.82 per 100 feet; 6-inch, $63.70 per 100 feet; 8-inch, $100.55 per 100 feet; 10-inch, $177.16 per 100 feet. Specials, 15 cents per lb.

**Yorkton, Sask.**—The contract for the construction of sewers was awarded to N. B. McInnis of Regina for the following prices: 2,900 feet of 20-in. sewer complete at $2.35 per foot; 3,200 feet of 15-in sewer complete at $2.35 per foot; 1,700 feet of 10-in. sewer complete at $1.60 per foot; 2,800 feet of 8-in. sewer complete at $1.25 per foot. Price for manholes per vertical foot $6.50.

J. M. Christie of Yorkton was awarded the contract for the disposal works exclusive of distributing apparatus and valves at $6,450.

**Edmonton, Alta.**—The greater portion of the contract has been let by the C. P. R. for the high level bridge connecting Strathcona and Edmonton. John Gunn & Sons, Winnipeg, were the successful tenderers for the substructure; the superstructure will be let later on. The bridge will cost over a million dollars when completed. The C. P. R., Dominion Government, the Alberta Government, and two cities are concerned in putting up the cost.

**Prince Rupert, B.C.**—Contract for the supply of lumber for plank roadway was awarded to the Westholme Lumber Co., Ltd., Prince Rupert, B.C. $12 per M. feet spruce, f.o.b. wharf, free storage. $16.50 per M. feet fir, f.o.b. scow at wharf, free wharfage, or $18 per M. feet delivered anywhere in city where teams can haul. Other bidders and their prices were as follows: The Canadian Pacific Sulphite Pulp Co., Ltd., Swanson Bay, B.C., $14.95 per M. f.o.b. wharf, spruce. H. A. Sprague, Prince Rupert, B.C., $14.25 per M. spruce, f.o.b. wharf; $17.50 per M. fir, f.o.b. wharf. Fred E. Hunt, Prince Rupert, B.C., $16.50 per M. spruce, f.o.b. wharf; $20.50 per M. fir, f.o.b. wharf. Wm. T. Robinson, Prince Rupert, B.C., $13.50 per M. spruce. Vancouver Lumber Co., Vancouver, B.C., $20.25 per M. fir, f.o.b. wharf. Flewin & Sons, Ltd., Port Simpson, B.C., $13.50 per M. spruce, on scow at dock.

**Vancouver, B.C.**—R. S. Blome & Co. were awarded the contract for the paving of Davie Street from Granville to Denman with granitoid paving, at a tendered price of $103,000, at the board of works meeting yesterday afternoon. M. P. Cotton & Co. were the only other tenderers for this work, they having given a price on concrete paving of $90,000. This tender was not considered as the specifications called for granitoid paving.

Duncan McGillivray was awarded the contract for the construction of the Salisbury Drive slip at the foot of Salisbury Drive. The following tenders were received and considered: Duncan McGillivray, $2,425; Peterson & Parr, $2,990; Ironsides, Rannie & Campbell, $2,995; Armstrong, Morrison & Co., $3,200; G. R. Webster, $3,325.

The following tenders for sewer pipe were received and referred to the engineer for tabulation, and will be presented at the next meeting.

Evans, Coleman and Evans.—4-in. 12c, 6-in. 18¾c, 8-in. 27 2-5c, 10-in. 41c, 12-in. 60¼c, 14-in. 81c, 15-in. —, 16-in. $1.06, 18-in. $1.31¾, 20-in. $1.35½, 24-in. $2.33.

Dominion Glazed Cement Pipe Co.—4-in. 12c, 6-in. 17c, 8-in. 25c, 10-in. 39c, 12-in. 50c, 14-in. 75, 15-in. —, 16-in. 95c, 18-in. $1.20, 20-in. $1.50, 24-in. $2.25.

Gardiner, Johnson & Co.—4-in. 12c, 6-in. 20¼c, 8-in. 31c, 10-in. 43c, 12-in. 55½c, 14-in. —, 15-in. 80c, 16-in. $1.00, 18-in. $1.41, 20-in. $1.64, 24-in. $2.31.

**Manchester, Eng.**—Messrs. Royce, Limited, of Trafford Park, Manchester, have received an order from the Daily Telegraph Paper Mills, Dartford, Kent, for a gantry and electrical overhead crane with jib attachment for unloading and stacking bales of paper pulp. The span of the crane is 110 feet.

## RAILWAYS—STEAM AND ELECTRIC.

**Montreal, Que.**—The Bondholders' Protection Committee of the Quebec and Lake St. John Railway meeting in London, Eng., recommend the acceptance of the improved offer by the Canadian Northern Railway.

**London, Ont.**—It is proposed to electrify the London and Port Stanley Railway. Engineer Roberts is of the opinion that the road could be electrified and maintained on 60 per cent. of the gross receipts, while it takes 75 and 80 per cent. of the gross receipts to operate the steam roads. It is an excellent roadbed and the line is direct. With overhead wires and the Catenary construction the cars ought to be able to make at least 60 miles an hour. Running limited cars under such conditions and allowing for stops at St. Thomas, it ought not to take any more than thirty-five minutes to get to Port Stanley. The electrification of the L. & P. S. Railway is considered here as an absolute necessity to meet the competition of the Traction Company's line which in its freedom from dirt and with its cool cars has made a sad cut into the steam line's trade.

**Moose Jaw, Sask.**—The first move towards the actual construction of the Moose Jaw street railway was made last week when the railway company awarded to the Kettle River Paving and Construction Co., which is now paving the main street, the contract of laying the ties in the paved area.

**Calgary, Alta.**—H. McLeod, manager of the Canadian Northern Railway, says the Grand Trunk Pacific will enter Calgary along the right-of-way of the C. N. R. There will be a big joint station. Mr. McLeod says his company are preparing to spend $1,500,000 on the station, right-of-way and construction in Calgary. Negotiations with the city council are now being carried on, but it is understood that the final consent of the G. T. P. to the arrangement has not yet been obtained.

**North Portal, Sask.**—Messrs. Peterson and Nicholson have arrived here with their grading outfit. They will commence work on the C. P. R. line from Craven along the shore of East Mountain Lake.

## LIGHT, HEAT AND POWER.

**St. John, N.B.**—After a meeting held here, July 26th, it was announced that progress had been made in the negotiations for the transfer of the interests in the Grand Falls Power Company, at Grand Falls, N.B., to a company in which Sir Wm. Van Horne is interested. Among those present were Barton E. Kingman and Harry McLoughlin, of New York, members of the Grand Falls Power Company: James Robinson, ex-M.P. of Millerton, N.B.; A. J. Gregory, K.C., of Fredericton, and J. A. Brock, of Montreal.

**Fredericton, N.B.**—Fredericton Gaslight Company will cease manufacturing gas and commencing with August 1st. Fredericton will be without a gas supply. It is stated, however, that the gasometers will be fully charged and will give a sufficient supply of gas to last all the present consumers for several days. Arrangements have been made for work to go on without delay till the preparations for furnishing a 24-hour electric service, and early this autumn the company expects to commence furnishing an all-day as well as an all-night electric service.

**St. Catharines, Ont.**—The City Council gave the third reading to a by-law granting a franchise to the Ontario Power Company to pole the streets, string wires and distribute electric energy throughout the city. The by-law was passed in accordance with the will of the people recently expressed at the polls. This will give opposition to the Lincoln subsidiary of the Cataract Company.

## BY-LAWS AND FINANCE.

**Abernethy, Sask.**—$2,500 local improvements debentures.

**Thamesville, Ont.**—This municipality has issued $10,000 worth of debentures for waterworks.

**Barton Township, Ont.**—Debentures for waterworks amounting to $19,000 were issued.

**Minto Township, Ont.**—Sold debentures for drainage amounting to $4,693.

**North Bay, Ont.**—Debentures for sewerage were issued amounting to $65,835.

**Dauphin, Man.**—This municipality has sold debentures for school and local improvements amounting to $12,000.

The Municipality of Spallumcheen, B.C., has sold debentures for waterworks and electric light amounting to $19,000.

## MISCELLANEOUS.

**Moncton, N.B.**—The Fire and Light Committee have recommended that a new fire hall be built and equipped.

**London Ont.**—The natural gas situation in London is developing rapidly. It was stated that the City Gas Company had already closed a deal with the Natural Gas Syndicate which is endeavoring to close a bargain with the city and that natural gas would be here within three months. Nine carloads of pipe for piping natural gas in the immediate vicinity of the city, and within the limits, have arrived here, and are being unloaded.

**Ottawa, Ont.**—Capt. J. F. Bernier, of the Steamer Arctic, has set out on his trip to the far north with the intention of making the northwest passage. He has sent from Chateau Bay to the Department of Marine and Fisheries a programme of his proposed voyage which is as follows: From Chateau Bay he will sail for Albert Harbor, Pond's Inlet, from here he proceeds to Beechy Island. The next place of call will be Dealy Island, next Winter Harbor, and from there he will go to Herschell Island.

**West Toronto. Ont.**—The Foundation Co., Limited, of Montreal. Que., have commenced work on reinforced concrete tanks for the Queen City Oil Co.

**Victoria B.C.**—The British Columbia Marine Railway Company is notifying the Ottawa Government that it proposes to put in a suitable shipbuilding plant and will submit a tender for the construction of a Canadian cruiser of the British type at Esquimalt. The cruiser to be constructed on this coast, the first of the vessels for this coast of Canada, will be similar in type to the British scout cruisers laid down in 1908-9 for the home navy, the Bristol, Glasgow, Liverpool, Gloucester, Newcastle and Bellona. The displacement of these vessels is about 3,500 tons. They are engined with turbine machinery, four being equipped with Parsons and one with Curtis turbines The armament is two six-inch guns and four 4.7 guns. The British Columbia Marine Railway Company is to move its Vancouver shipyards in the near future from their present location to a site selected near the Second Narrows, where a larger slipway will be put in and the plant is to be increased, new machinery and equipment being ordered.

The Board of Trade report on railway accidents in the United Kingdom shows that in 1,264,800,000 passengers' journeys only one passenger lost his life in an accident to the train on which he was traveling. This was the first case for a period of 20 months. The number of injured, 290, is low compared with the average of previous years.

## PERSONAL.

**Mr. L. W. Klingner,** of New York, has been transferred to Toronto, taking charge of Toronto work for the Foundation Co., Limited, of Montreal.

**Mr. J. R. Cosgrave,** of New Westminster, B.C., has been appointed district engineer for North Vancouver.

**Mr. E. F. Atkins** was elected president and manager of the Westinghouse Company, succeeding Mr. George F. Westinghouse. Mr. Edward M. Herr was elected vice-president of the company, with Mr. Robert Mather as chairman of the board of directors.

**Mr. J. P. Fillingham,** until recently assistant superintendent of the Reo Factory at Lansing, Mich., has been appointed general superintendent of the Reo Motor Car Co. of Canada, Limited, at St. Catharines, to succeed Mr. D. B. Hamilton, resigned. Mr. Fillingham, who has been for the past ten years engaged in the manufacture of automobiles designed by R. B. Olds, is a native of Canada, and received his early mechanical training in the Waterous Engine Works of Brantford. Mr. Fillingham's return to his former home will be welcomed by his many friends in manufacturing circles throughout the province.

In order to take care of the increasing demand throughout the Dominion for the Reo Thirty, the directors have decided to increase the capacity of the Canadian plant. Additional ground in the vicinity of the factory has been purchased and on it will be erected a modern two-storey brick building, 90 x 100 feet. Work on the erection will be begun at once, and it is planned to have the new building ready for occupancy by October 1st. Machine tools to the value of $20,000 have been purchased for installation in the new plant, and orders for material sufficient to build 600 four-cylinder cars have been placed. A majority of the orders for raw material are being placed with Canadian firms, which clearly shows the remarkable progress made in this branch of special work by Canadian mills.

**Mr. C. J. White,** of Toronto, has left for Prince Rupert, B.C., where he will represent several manufacturing firms for the sale of machinery of all kinds. Mr. White has had an extensive experience as salesman and should prove to be a good representative in the new country.

**Mr. Rodolphe C. Desrochers,** who for some years has been assistant secretary of the Department of Public Works has been promoted to the position of secretary of the department rendered vacant by the death of the late Napoleon Tessier. The appointment has just been announced. Mr. Desrochers entered the service in January, 1902, and became assistant secretary in 1906. He is regarded as eminently qualified for the position and for some months has been doing the work of it.

## ORDERS OF THE RAILWAY COMMISSIONERS

(Continued from page 145).

its leave obtained; and (b) that wherever the Applicant Company's track or right-of-way encroaches on the said road, the road shall be put in as good a condition as before the said construction commenced, to the satisfaction of the road superintendent."

11172—July 13—Authorizing the C.N.O.R. to cross the track of the G.T.R. near Ottawa.

11173—July 27—Authorizing the C.N.O.R. to cross Victoria Street by means of an overhead bridge, Colborne, Ontario, the village to close up that part of Queen Street east of the right-of-way.

11174—June 27—Relieving the Michigan Central R. R. Co. of maintaining a watchman at the crossing .71 miles east of Woodslee Station, as required by Order No. 10072, dated June 22nd, 1910.

11175—July 15—Authorizing the City of Toronto to construct two sewers under the tracks of the G.T.R. at the intersection of Keele Street and Indian Road, Toronto.

11176—July 15—Authorizing the city of Port Arthur to lay and maintain an 18" sewer under the tracks of the C.P.R. at Clarke Street, Port Arthur, Ontario.

11177—July 20—Authorizing the Sherwin-Williams Paint Co. to lay a 6" pipe under the C.P.R. at intersection of Atwater Avenue and St. Patrick Street, Montreal.

11178—July 19—Authorizing the Queen City Oil Co. to lay and maintain across the right-of-way lands and track of the G.T.R., at Muskoka Wharf, Ont., a two-inch iron pipe for unloading tank cars of naphtha, gasoline or oil into the storage tanks of the applicant.

11179—July 20—Authorizing the Petrolea Electric Light, Heat, Power & Gas Co. to lay and maintain a gas pipe under the G.T.R. track on original side road between Lots 12 and 13, original survey of Township of Enniskillen County, Lambton, Ont.

11180—July 21—Authorizing the town of Maisonneuve to erect, place and maintain wires across the tracks of the Montreal Terminal Railway at Bennett Avenue, Maisonneuve, P.Q.

11181—11182—July 10—Authorizing the water commissioners of the city of London, to erect, place and maintain electric wires across the tracks of the London & Port Stanley Railway Co., at Simcoe Street and Grey Street, London, Ontario.

11183 to 11192—July 19—Authorizing the Municipal Corporation of the city of St. Thomas to erect, place and maintain wires across the tracks of the G.T.R. at Alma Street; the M.C.R. at Metcalf Street, and Railway Street, the G.N.W. Telegraph Co., at Alma Street, Palm Street, Wellington Street, Elm Street, and the London & Port Stanley Railway at Elm Street, Wellington Street, and Palm Street, in the city of St. Thomas Ontario.

11193 to 11197—July 20—Authorizing the water commissioners of the city of London, Ont., to erect, place and maintain electric wires across the tracks of the C.P.R. at Adelaide Street, the London & Lake Erie Railway & Transportation Co., at Grand Avenue and Grey Street, and the M.C.R R. at Bathurst Street, (twice) in the city of London, Ontario.

11199—July 21—Authorizing the Saraguay Electric & Water Co., to erect, place and maintain wires across the tracks of the C.P.R. on Ontario Street, East, Montreal.

11200—July 15—Authorizing the Montreal, Light Heat & Power Co. to erect, place and maintain its wires across the tracks of the G.T.R., at Broadway, near 21st Avenue, Lachine, P.Q.

11201—July 14—Authorizing the Seymour Power and Electric Co., Ltd. to erect, place and maintain electric transmission wires across the wires of the Bell Telephone Company, at Lot 13, Con. 1, Township of Thurlow County of Hastings, Ontario.

11202—July 21—Authorizing the Seymour Power and Electric Co., Ltd. to erect, place and maintain its electric transmissioin wires across the tracks of the Midland Division of the G.T.R., at Lots 8 and 9, Con. 2, Township of Thurlow, County of Hastings, Ont.

11203 to 11212—July 14—Authorizing the Hydro-Electric Power Commission to erect, place, and maintain its transmission wires across the Bell Telephone Co., the Toronto Power Co., and the G.T.R., in the Township of East Flamboro, West Flamboro, Etobicoke, Pelham, Nelson, Toronto, Stamford, Gainsboro, and Bay Street, Hamilton, Ontario.

11213—Particulars later.

11214—July 15—Approving the location of the C.P.R. branch line from Estevan to Forward, Sask.

11215—July 19—Authorizing the G.T.R. Co. to construct, maintain and operate a branch line into the premises of the Laprairie Brick Co., Laprairie, P.Q.

11216—July 19—Authorizing the C.P.R. to construct, maintain and operate four additional sidings across Tarte Avenue, Foster St., Wallace St., Blair Avenue, Daly Avenue, Langevin St., Tuper St., Township of Wardner, B.C.

11217—July 19—Approving amended agreement between the Bell Telephone Co., and the Hazeldean Rural Telephone Co., dated October 6th, 1909, approved by Order 8583, dated November 5th, 1909.

11218—July 19—Relieving the C.P.R. from providing further protection at Zorra Street Crossing, Beachville, Ontario, and rescinding Order No. 11136, dated July 8th, 1910.

11219—July 18—Rescinding Order No. 8768, dated November 28th, 1909, re highway crossing of C.P.R. at Mackey St., Township of Head, Ont.

11220—July 18—Authorizing the city of Fort William at its own expense, to construct and maintain a subway over the Street Railway at James Street, Fort William.

11221—July 19—Authorizing the G.T.R. to construct an additional or passing track across and upon Victoria and Ontario Streets, Colborne, Ont.

11222—July 19—Approving road diversion of G.T.P. Railway in S. W. ¼ Sec. 1-53-27, W. 4 M. District of North Alberta.

11223—July 19—Approving C.N.R. plan of proposed structure at Station 2467, Section 5, Division "A," mileage 218.6, Township of Pickering, Ont.

11224—July 19—Authorizing the C.P.R. to construct its railway across and divert the highways on its Macleod to Lethbridge Revision of its Crow's Nest Branch from mileage 0 to 30.7, being from west boundary of Section 36, Township 8, Range 22 W. 4 M., to the east boundary of Section 12-9-26 W. 4 M.

11225—July 20—Relieving the Temiscouata Ry. Co., from providing further protection at the crossing at mileage 33, south of St. Louis Station, P.Q.

11226—July 21—Authorizing the G.T.P. Branch Lines Co., to connect its Melville-Yorkton Branch with the C.P.R. Northwestern Branch at Yorkton, Sask.

11227—July 21—Authorizing the C.P.R. to construct its railway across road allowance between Sections 8 and 9-15-33, W.P.M., at Wapella, Sask.

11228—July 21—Authorizing, subject to conditions of agreement between the Lethbridge Brewing & Milling Co., et al, dated 11th April, 1910, and the C.P.R., the construction, maintenance and operation of an industrial spur across the road allowance between the N.W. ¼ of Section 29-12-9, W. 4 M. and N.W. ¼ Section 30-12-5, W. 4 M., Medicine Hat, Alta.

11229—July 21—Authorizing the C.P.R. to construct, maintain, and operate an industrial spur, across Scarth and Cornwall Streets, Regina, Sask.

11230—July 19—Authorizing the C.N.O.R. to operate their trains over the crossing of the C.P.R. (Arcola Branch) without their first being brought to a stop.

11231—July 21—Amending Order No. 11093, dated June 28th, 1910, by substituting the word "Dovercourt" for the word "Davenport," one of the streets to be crossed where it appears in the recital of the Order.

11232—July 19—Authorizing the G.T.R. to construct, maintain, and operate a branch line into the premises of the Western Canada Foundry Co., Wingham, Ontario.

11233—July 19—Authorizing the G.T.R. to construct, maintain and operate a branch line in to the premises of the Imperial Rattan Co., in the City of Stratford and across Brunswick Street, in said city.

11234—July 19—Authorizing the C.P.R. to construct, maintain and operate an industrial spur for the Taylor Lumber Co., in Lot 1870, Gl. Kootenay District, B.C., said spur leading northerly from the North Star Branch Railway.

11235—July 19—Approving temporarily the form of agreement between the Bell Telephone Co. and the Alnwick Rural Telephone Co., dated June 15th, 1910, for the interchange of messages or service.

11236—July 19—Approving temporarily the form of agreement between the Bell Telephone Co. and the West Williams Rural Telephone Co., dated June 23rd, 1910, for the interchange of messages and service.

11237—July 15—Authorizing C.P.R. to construct Bridge 80.5, over Duck Creek, Sirdar Section, Western Division.

11238—July 15—Authorizing C.P.R. to construct bridge 19.82 over Didgeguash River, N.B.S. Railway.

11239—July 15—Granting leave to the City of Fernie to erect, place and maintain its electric light wires across the tracks of the C.P.R., at Fernie, B.C.

11240—July 15—Authorizing C.P.R. to construct bridge No. 84.1 over

Little Creek, Windsor Section, Ontario Division.

11241—July 15—Authorizing the C.P.R. to reconstruct bridge No. 41 9 over the St. Lawrence River, on the Farnham Section.

11242—July 15—Approving of the location of the C.P.R. station at Shepard, Alta.

11243—July 15—Authorizing the St. Mary's Wood Specialty Co., to lay a drain at its own expense along the industrial spur of the C.P.R., at St. Mary's, Ontario, and that all costs, etc., be borne and paid by the Applicant, that the said drain shall be kept in good working order by the Applicants, and not to obstruct, or in any way interfere with the use and enjoyment of the C.P.R. tracks by that Company, and rescinding Order No. 11127, dated July 12th, 1910.

11244—July 15—Approving the interlocking plant of the G.T.R. to be installed at Lynden Junction, Ontario.

11245—July 15—Authorizing the C.P.R. to construct industrial spur across the Blackfoot Trail, and across Block 5, in the City of Calgary, Alta.

11246—July 14—Authorizing the C.P.R. to contsruct, maintain, and operate a branch line commencing on spur track already constructed at the western boundary of Lot 3, in Block 67, of subdivision of part of Section 15-24-1, W. 5 M.

11247—July 14—Authorizing the C.P.R. to construct, maintain, and operate an extension to the industrial spur of the Port Haney Brick Co., in Lot 398, Section 17, Township 12, E.C.M., at Haney, B.C.

## MARKET CONDITIONS.

Montreal, Aug. 3rd, 1910.

A sale of ten thousand tons of basic iron to a middleman was made by a Valley interest at fourteen dollars, Valley, in the United States. This is a new level. Railroads have placed some fair orders, including four thousand six hundred tons of structural material by the Chicago & Northwestern. The New York Central has taken figures on 10,000 tons for the New York Terminal Improvements. The National Railways of Mexico have ordered 2,600 cars from the American Car & Foundry Co., which will require about 10,000 tons of plates. The structural fabricators are busy in nearly all parts of the country, but low prices are being made on the steel, particularly in eastern territory and on export business. The American Bridge Company expects to operate to about ninety per cent of its capacity during the remainder of the year.

Some prompt foundry iron in small lots is reported as having change hands during the week on the basis of $14.25, that price holding at present. Not a single new inquiry for Bessemer was reported during the week. The last known sale of malleable to be reported was at $15, Valley furnace, but this price has been merely nominal for the past several weeks. The rate of production of pig iron in the Pittsburg territory about held its own for the last week of the month. The Baltimore & Ohio has closed its 1910 equipment programme by placing an order for goldolas with the Pressed Steel Car Company. This makes a total of 6,500 new cars ordered by the road since May 1st.

Demand for track supplies is fair. Notwithstanding talk of curtailment of improvement by the railroads, no stop orders have been received by any of the Pittsburg mills on orders placed. Mills are not getting a great deal of business in merchant pipe, but the scattered buying from day to day runs up a fair tonnage. Prices on line pipe have not been as good as they were last fall, but have been fairly satisfactory to any mill which can keep going steadily.

The market on black and galvanized sheets is evidently rounding up into shape for some concrete announcement by the leading interest. Black sheets continue to be shaded about $3 a ton, and galvanized about $4.

Notwithstanding the demands of the steel car companies, the plate mills are experiencing a July lull. Prices are softer and sales are more frequent at reductions.

Acting in accordance with their policy of maintaining as close differential between mill and store prices as possible, Chicago jobbers of structural steel reduced store quotations on beams, channels, Bessemer bars and plates, 10 cents per hundred each. Business in structural steel has been uniformly and consistently good during the season and reduction therefore comes somewhat of a surprise. Railroads are taking more interest in bars, plates and machinery.

President Curry of the Canadian Car Corporation states that the present year is the greatest ever known in the history of Canadian car building but from present indications he considered that the year 1911 will even make this year's record look small. When the Canadian Car Corporation has completed the orders now on hand, it will have delivered 12,000 cars, which is some 4,000 cars in excess of the combined output of the various plants now included in the car consolidation.

The pig iron situation in Canada is most uninteresting and very little is going on while prices continue unchanged practically throughout the entire list, as follows:—

**Antimony.**—The market is steady at 8c. to 8¼c.

**Bar Iron and Steel.**—The market holds dull and steady. Bar iron. $1.90 per 100 pounds; best refined horseshoe, $2.15; forged iron, $2.05; mild steel, $1.90; sleigh shoe steel, $1.90 for 1 x ⅜-base; tire steel, $2.00 for 1 x ⅜-base; toe calk steel, $2.40; machine steel, iron finish, $1.95; imported, $2.20

**Building Paper.**—Tar paper, 7, 10, or 16 ounces, $1.80 per 100 pounds; felt paper, $2.75 per 100 pounds; tar sheathing, 40c. per roll of 400 square feet; dry sheathing, No. 1, 30 to 40c. per roll of 400 square feet; tarred year will be the largest in the history of the country. Prices on foreign fibre, 55c. per roll; dry fibre, 45c. (See Roofing; also Tar and Pitch). (164).

**Cement.**—Canadian cement is quotable, as follows, in car lots, f.o.b., Montreal:—$1.30 to $1.40 per 350-lb. bbl., in 4 cotton bags, adding 10c. for each bag. Good bags re-purchased at 10c. each. Paper bags cost 2½ cents extra, or 10c. per bbl. weight.

**Chain.**—The market is unchanged, being now per 100 lbs., as follows:—¼-in., $5.30; 5-16-in., $4.70; ⅜-in., $3.90; 7-16-in., $3.65; ½-in., $3.55; 9-16-in., $3.45; ⅝-in., $3.40; ¾-in., $3.35; ⅞-in., $3.35; 1-in., $3.35.

**Coal and Coke.**—Anthracite, egg, stove or chestnut coal, $6.75 per ton, net; furnace coal, $6.50, net. Bituminous or soft coal: Run of mine, Nova Scotia coal, carload lots, basis, Montreal, $3.85 to $4 per ton; cannel coal, $9 per ton; coke, single ton, $5; large lots, special rates, approximately $4 f.o.b., cars, Montreal

**Copper.**—Prices are strong at 13¾ to 14c.

**Explosives and Accessories.**—Dynamite, 50-lb. cases, 40 per cent. proof, 15c. in single case lots, Montreal. Blasting powder, 25-lb. kegs, $2.25 per keg. Special quotations on large lots of dynamite and powder. Detonator caps, case lots, containing 10,000, 75c. per 100; broken lots, $1; electric blasting apparatus:—Batteries, 1 to 10 holes, $15; 1 to 20 holes, $25; 1 to 30 holes, $35; 1 to 40 holes, $50. Wire, leading, 1c. per foot; connecting, 50c. per lb. Fuses, platinum, single strength, per 100 fuses:—4-ft. wires, $3; 6-ft. wires, $3.54; 8-ft. wires, $4.08; 10-ft. wires, $5.

**Galvanized Iron.**—The market is steady. Prices, basis, 28-gauge, are:—Queen's Head, $4.10; Colborne Crown, $3.85; Apollo, 10¾ oz., $4.05. Add 25c. to above figures for less than case lots; 26-gauge is 25c. less than 28-gauge, American 28-gauge and English 26 are equivalents, as are American 10¾ oz., and English 28-gauge.

**Galvanized Pipe.**—(See Pipe, Wrought and Galvanized).

**Iron.**—The market is steady and prices unchanged. Following are the prices, on cars, ex-wharf, Montreal:—No. 1 Summerlee, $20.50 to $20.75 per ton; selected Summerlee, $20 to $20.25; soft Summerlee, $19.50 to $19.75; Carron, special, $20 to $20.50; soft, $19.50 to $20; Clarence, $17.25 to $17.50; Cleveland, $17.25 to $17.50 per ton.

**Laths.**—See Lumber, etc.

**Lead.**—Prices are easier, at $3.35 to $3.45.

**Lead Wool.**—$10.50 per hundred, $200 per ton, f.o.b., factory.

**Lumber, Etc.**—Prices on lumber are for car lots, to contractors, at mill points, carrying a freight of $1.50. Red pine, mill culls out, $18 to $22 per 1,000 feet; white pine, mill culls, $16 to $17. Spruce, 1-in. by 4-in. and up, $15 to $17 per 1,000 ft.; mill culls, $12 to $14. Hemlock, log run, culls out, $13 to $15. Railway Ties; Standard Railway Ties, hemlock or cedar, 35 to 45c. each, on a 5c. rate to Montreal. Telegraph Poles: Seven-inch top, cedar poles, 25-ft. poles, $1.35 to $1.50 each; 30-ft., $1.75 to $2; 35-ft., $2.75 to $3.25 each, at manufacturers' points, with 5c. freight rate to Montreal. Laths: Quotations per 1,000 laths, at points carring $1.50 freight rate to Montreal, $2 to $3. Shingles: Cedar shingles, same conditions as laths, X. $1.50; XX, 2.50; XXX, $3.

**Nails.**—Demand for nails is steady and prices are: $2.40. per keg for cut, and $2.35 for wire, base prices. Wire roofing nails, 5c. lb.

**Paints.**—Roof, barn and fence paint, 90c. per gallon; girder, bridge, and structural paint for steel or iron—shop or field—$1.20 per gallon, in barrels; liquid red lead in gallon cans, $1.75 per gallon.

**Pipe.Cast Iron.**—The market shows a steady tone although demand is on the dull side. Prices are firm, and approximately as follows:—$32 for 6 and 8-inch pipe and larger; $33 for 3-inch and 4-inch at the foundry. Pipe, specials, $3 per 100 pounds. Gas pipe is quoted at about $1 more than the above.

**Pipe.—Wrought and Galvanized.**—Demand is about the same, and the tone is firm, though prices are steady, moderate-sized lots being: ¼-inch, $5.50, with 63 per cent. off for black, and 48 per cent. off for galvanized; ⅜-inch, $5.50, with 59 per cent. off for black, and 44 per cent. off for galvanized; ½-inch, $8.50, with 69 per cent. off for black, and 59 per cent. off for galvanized. The discount on the following is 71½ per cent. off for black, and 61½ per cent. off for galvanized; ¾-inch, $11.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-inch, $27; 2-inch, $36; 2½-inch, $57.50; 3-inch, $75.05; 3½-inch, $95; 4-inch, $108.

**Plates and Sheets.—Steel.**—The market is steady. Quotations are: $2.20 for 3-16; $2.30 for ⅛, and $2.10 for ¼ and thicker; 12-gauge being $2.30; 14-gauge, $2.15; and 16-gauge, $2.10.

**Rails.**—Quotations on steel rails are necessarily only approximate and depend upon specification, quantity and delivery required. A range of rails, per gross ton of 2,240 lbs., f.o.b. mill. Re-laying rails are quoted at $27 to $29 per ton, according to condition of rail and location.

**Railway Ties.**—See lumber, etc.

**Roofing.**—Ready roofing, two-ply, 70c. per roll; three-ply, 95c. per roll of 100 square feet. Roofing tin caps, 6c. lb.; wire roofing nails, 5c. lb. (See Building Paper; Tar and Pitch; Nails, Roofing).

**Rope.**—Prices are steady, at 9c. per lb. for sisal, and 10½c. for Manila. Wire rope, crucible steeel, six-strands, nineteen wires; ¼-in., $2.75; 5-16, $3.75; ⅜, $4.75; ½, $5.25; ⅝, $6.25; ¾, $8; ⅞, $10; 1-in., $12 per 100 feet.

**Spikes.**—Railway spikes are steady, at $2.45 per 100 pounds, base of 5½ x 9-16. Ship spikes are steady at $2.85 per 100 pounds, base of ⅜ x 10-inch, and ⅝ x 12-inch.

**Steel Shafting.**—Prices are steady at the list, less 25 per cent. Demand is on the dull side.

**Telegraph Poles.**—See lumber, etc.

**Tar and Pitch.**—Coal tar, $3.50 per barrel of 40 gallons, weighing about 500 pounds; roofing pitch, No. 1, 70c. per 100 pounds; and No. 2, 55c. per 100 pounds; pine tar, $8.50 per barrel of 40 gallons, and $4.75 per half-barrel; refined coal tar, $4.50 per barrel; pine pitch, $4 per barrel of 180 to 200 pounds. (See building paper, also roofing).

**Tin.**—Prices are firm, at $34 to $34.50.

**Zinc.**—The tone is easy, at 5¾ to 6c.

**CAMP SUPPLIES.**

**Beans.**—Prime pea beans, $2 to $2.25 per bushel.

**Butter.**—Fresh made creamery, 23 to 23½c.

**Canned Goods.**—Per Dozen.—Corn, 80 to 85; peas, $1.05 to $1.15; beans, 85c.; tomatoes, 85 to 90c.; peaches, 2s, $1.65, and 3s, $2.65; pears, 2s, $1.60, and 3s, $2.30; salmon, best brands, 1-lb. talls, $1.87½, and flats, $2.02½; cheaper grades, 95c. to $1.65.

**Cheese.**—The market ranges from 11c. to 11½c., covering all Canadian makes.

**Coffee.**—Mocha, 20 to 25c.; Santos, 15 to 18c.; Rio, 10 to 12c.

**Dried Fruits.**—Currants, Filiatras, 5¾ to 6¼c.; choice, 8 to 9c.; dates 4 to 5c.; raisins, Valentias, 5 to 6½c.; California, seeded, 7½ to 9c.; Evaporated apples, prime, 8 to 8½c.

**Eggs.**—No. 1 eggs are 20 to 21c.; selects, 22 to 25c.

**Flour.**—Manitoba, 1st patents, $5.90 per barrel; 2nd patents, $5.40; strong bakers', $5.20.

**Molasses and Syrup.**—Molasses, New Orleans, 27 to 28c.; Barbadoes 40 to 45c.; Porto Rico, 40 to 43c.; syrup, barrels, 3½c.; 2-lb. tins, 2 dozen to case, $2.50 per case.

**Potatoes.**—Per 90 lbs., good quality, 60 to 70c.

**Rice and Tapioca.**—Rice, grade B., in 100-lb. bags, $2.75 to $2.80; C.C., $2.65. Tapioca, medium pearl, 5½ to 6c.

**Rolled Oats.**—Oatmeal, $2.20 per bag; rolled oats, $2, bags.

**Sugar.**—Granulated, bags, $5.05; yellow, $4.65 to $5. Barrels 5c. above bag prices.

**Tea.**—Japans, 20 to 38c.; Ceylons, 20 to 40c.; Ceylon, greens, 19 to 25c.; China, green, 20 to 50c.; low-grades, down to 15c.

**Fish.**—Salted.—Medium cod, $7 per bbl.; herring, $5.25 per bbl.; salmon, $15.50 per bbl., for red, and $14 for pink. Smoked fish.—Bloaters, $1.10 per large box; haddies, 7½c. per lb.; kippered herring, per box, $1.20 to $1.25.

**Provisions.**—Salt Pork.—$27 to $34 per bbl.; beef, $18 per bbl.; smoked hams, 16 to 20c. per lb.; lard, 16½ to 17½c. for pure, and 12½ to 14c. per lb. for compound.

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Toronto, Aug. 3rd, 1910.

The conclusion of the G.T.R. strike is welcomed by all. Shipments have beer delayed or cancelled. Stock material exhausted and all trades delayed. Prices for building material advanced but they will again be normal.

The following are wholesale prices for Toronto, where not otherwise explained, although for broken quantities higher prices are quoted:

**Antimony.**—Trade is quiet, price unchanged at $8.50.

**Axes.**—Standard makes, double bitted, $8 to $10; single bitted, per dozen, $7 to $9.

**Bar Iron.**—$2.05 to $2.15, base, per 100 lbs., from stock to wholesale dealer. Free movement.

**Bar Mild Steel.**—Per 100 lbs., $2.15 to $2.25. Sleigh shoe and other take same relative advance.

**Boiler Plates.**—¼-inch and heavier, $2.20. Boiler heads 25c. per 100 pounds advance on plate. Tank plate, 3-16-inch, $2.40 per 100 pounds.

**Boiler Tubes.**—Orders continue active. Lap-welded, steel, 1¼-inch, 10c.; 1½-inch, 9c. per 10 foot; 2-inch, $8.50; 2¼-inch, $10; 2½-inch, $10.60; 3-inch, $11 to $11.50; 3½-inch, $18 to $18.50; 4-inch, $19 to $20 per 100 feet.

**Building Paper.**—Plain, 27c. per roll; tarred, 35c. per roll. Demand is moderate.

**Bricks.**—In active movement, with very firm tone. Price at some yards $9 to $9.50, at others, $9.50 to $10 for common. Don Valley pressed brick are in request. Red and buff pressed are worth $18 delivered and $17 at works per 1,000.

**Broken Stone.**—Lime stone, good hard, for roadways or concrete, f.o.b., Schaw station, C.P.R., 75c. until further notice, per ton of 2,000 lbs., 1-inch, 2-inch, or larger, price all the same. Rubble stone, 55c. per ton, Schaw station, and a good deal moving. Broken granite is selling at $3 per ton for good Oshawa.

**Cement.**—Car lots, $1.75 per barrel, without bags. In 1,000 barrel lots $1.60. In smaller parcels $1.90 is asked by city dealers. Bags, 40c. extra. Demand constant.

**Coal.**—The price of anthracite still remains at $6.50 per ton, net, and pea coal at $5.50 per ton. In the United States there is an open market for bituminous coal and a great number of qualities exist. We quote: Youghiogheny lump coal on cars here, $3.75 to $3.80; mine run, $3.65 to $3.70; slack, $2.75 to $2.85; lump coal from other districts, $3.55 to $3.70; mine run 10c. less; slack, $2.60 to $2.70; cannel coal plentiful at $7.50 per ton; cook, Solvey foundry, which is largely used here, quotes at from $5.75 to $6.00; Reynoldsville, $4.90 to $5.10; Connellsville, 72-hour coke, $5.25.

**Copper Ingot.**—A very large volume of business is being done, but the market is weaker at $15.25 to $13.50. Production goes on at a rapid rate.

**Detonator Caps.**—75c. to $1 per 100; case lots, 75c. per 100; broken quantities, $1.

**Dynamite**, per pound 21 to 25c., as to quantity.

**Felt Roofing.**—A very good volume of trade is going on at $1.80 per 100 lbs. as before.

**Fire Bricks.**—English and Scotch, $30 to $35; American, $25 to $35 per 1,000. Fire clay, $8 to $12 per ton.

**Fuses.**—Electric Blasting.—Double strength 4 feet, $4.50; 6 feet, $5; 8 feet, $5.50; 10 feet, $6. Single strength, 4 feet, $3.50; 6 feet, $4; 8 feet, $4.50; 10 feet, $5, per 100 count. Bennett's double tape fuse, $6 per 1,000 feet.

**Iron Chain.**—¼-inch, $5.75; 5-16-inch, $5.15; ⅜-inch, $4.15; 7-16-inch, $3.95; ½-inch, $3.75; 9-16-inch, $3.70; ⅝-inch, $3.55; ¾-inch, $3.45; ⅞-inch, $3.40; 1-inch, $3.40, per 100 lbs.

**Iron Pipe.**—A steady request at former prices:—Black, ¼-inch, $2.03; ⅜-inch, $2.25; ½-inch, $2.63; ¾-inch, $3.28; 1-inch, $4.70; 1¼-inch, $6.41; 1½-inch, $7.70; 2-inch, $10.26; 2½-inch, $16.39; 3-inch, $21.52; 3½-inch, 27.08; 4-inch, $30.78; 4½-inch, $35.75; 5-inch, $39.85; 6-inch, $51.70. Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.43; 1-inch, $6.35; 1¼-inch, $8.66; 1½-inch, $10.40; 2-inch, $13.86, per 100 feet.