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MISSING

The Canadian Engineer

WEEKLY

ESTABLISHED 1893

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The Canadian Engineer

ESTABLISHED 1893.

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CIVIL, MECHANICAL, STRUCTURAL, ELECTRICAL, MARINE AND MINING ENGINEER, THE SURVEYOR, THE MANUFACTURER, AND THE CONTRACTOR.

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TORONTO, CANADA, JANUARY 14, 1910.

CONTENTS OF THIS ISSUE.

ALKALI AND CONCRETE.

In the great Western plains of Canada timber is scarce and expensive. Many have looked to concrete to take its place, being considered cheaper and more lasting. The Reclamation Service of the United States has noticed that in alkali districts concrete very quickly disintegrates, and since districts from Winnipeg west to the Rockies are supplied by alkali waters, it is a question of great interest to our Canadian engineers doing work in the West.

In a paper read before the American Society for Testing Materials, Mr. Jewett mentioned one concrete culvert through which alkali water had been passing for about three months. On examination it was found that the concrete under the water was much softer than that above, and the concrete just at the water line was softer still.

An analysis of the water was as follows:—

	Milligrams per litre.
Calcium sulphate ($Ca SO_4$)	1.690
Magnesium sulphate ($Mg SO_4$)	6.870
Basic magnesium carbonate ($MgH_2 CO_2$)	.305
Magnesium chloride ($Mg Cl_2$)	.192
Potassium chloride ($K Cl$)	.20
Total solids	9.077
Weight after ignition	8.855
Loss on ignition	.222

From the analysis and the presence of a large amount of magnesium sulphate it would appear disintegration was caused in a manner similar to the disintegration by sea water.

In the case of sea water it is supposed that the lime of the cement decomposes the magnesic salts present in the water and the lime goes into solution and the magnesia is deposited in its stead, causing disintegration because of its greater bulk.

The solution of the problem will, from the engineer's point of view, be good construction. The placing of a surface coat compact and close. The selection of good water, sand and gravel high in silica.

For the chemist and the cement manufacturer other difficulties will arise.

THE ENGINEER'S EDUCATION.

If there is to be a profession of engineering as distinguished from the trade of engineering the education of the professional man must be broad and inclusive, such as will develop men of sufficient breadth and grasp to control large engineering works.

The engineering-contractor must know of cost systems and centrifugal pumps. He must know the mechanic of materials as well as the management of men.

The engineer-president of a railway must know of signalling as well as of bridges and of traffic charges as well as alignment and gradients. He must be a chemist in reference to the quality of water for his locomotives and a mechanic in reference to his rolling stock.

As managing-engineer of a hydro-electric proposition he must know structural work as well as hydraulics and electricity.

The highest knowledge and skill are required in the professional man, and if his influence is to be felt he must take time and opportunity to develop an enthusiasm for good professional work and a devotion to high ideals, which will compel recognition of engineering with the other professions.

THE PROFESSION OF ENGINEERING IN THE UNITED STATES.

In the United States there are nineteen thousand engineers who are members of the four great national societies of engineers. Twelve of the smaller societies have thirteen thousand members. Twenty-three local engineering societies in different cities of the United States report a membership of eight thousand six hundred. A great body of men, these, exerting an influence in every municipality of the land.

A professional spirit is developing among engineers in the United States. This new spirit is partly due to the large number of engineers, but it is also largely due to the great body of engineers who, although they meet in the Engineering Building in New York in independent organizations, yet work together harmoniously, and stand by each other to work for the common good and to advance and dignify the engineering profession.

Under one roof in New York there are grouped fifteen societies of enigineering or allied arts. A common home makes a common interest, and engineers meeting on a common plane unite and strengthen and advance their art.

They live together in peace and harmony. They have brought their books together into a single library open to the profession. The meetings are held in the same building and in the same auditorium and lecture hall.

It is a good example for other countries to follow.

THE CANADIAN CLAY-WORKER.

Volume I., No. 1, of the Canadian Clay-Worker came into being during the last month of 1909. The Canadian Manufacturer Publishing Co., the publishers; J. C. Armer, B.A.Sc., the editor, and D. O. McKinnon, the business manager, are to be congratulated upon so successful a first issue. The presswork, the class of advertisements and the character of the editorial matter are all good, and the Clay-Worker will appeal very strongly to those interested in the output of Canadian clay beds.

This is the first attempt that has been made to carry on an educational campaign as to the use, advantage and possibilities of a six million dollar industry—the Canadian clay beds.

The Canadian Clay-Worker will keep just in advance of the clay-working industry in Canada, and we wish it success.

PRECIPITATION FOR DECEMBER 1909.

The precipitation of the month exceeded the average from Eastern Saskatchewan to Eastern Ontario, also in the Gulf of St. Lawrence and eastern portions of the Maritime Provinces, while elsewhere in Canada, with local exceptions, the fall was deficient. The snowfall in Southern Manitoba and South-eastern Saskatchewan was exceptionally heavy, being in some localities more than five times the normal quantity; in Ontario also, and especially in counties contiguous to Lake Huron and the Georgian Bay, the snowfall was heavy.

Depth of Snow.

At the close of the month, the ground was covered with snow from Saskatchewan to the Maritime Provinces. No reports have been received as to the depth of snow in British Columbia, but it is evident that the higher levels were snow covered to a considerable extent.

Saskatchewan was covered by from 2 to 16 inches, and in Manitoba the depth was generally more than 10 inches.

Ontario had a mantle of snow varying from 1 to over 24 inches, and Quebec was snow covered to a depth of from 7 to 19 inches.

In the Maritime Provinces the depth was generally about 10 inches, but in Prince Edward Island there was a depth of about 36 inches, while over the greater part of the Mainland of Nova Scotia the covering was from 3 to 9 inches.

Thickness of Ice.

Thickness of ice is reported as follows:—

Western Provinces.—Battleford, 24 inches; Medicine Hat, 14 inches; Swift Current, 22 inches; Qu'Appelle, 16 inches; Minnedosa, 16 inches.

Ontario.—Port Arthur, 3 inches; Clinton, 9 inches; Strathroy, 12 inches; London, 9 inches; Port Stanley, 6 inches; Port Burwell, 6 inches; Brantford, 10 inches; Georgetown, 9 inches; Renfrew, 8 inches; Ottawa, 6 inches.

Maritime Provinces.—Chatham, 5 inches; Yarmouth, 3 inches; Sydney, 4 inches; Charlottetown, 2 inches.

The table shows for fifteen stations included in the report of the Meteorological Office, Toronto, the total precipitation of these stations for December.

Ten inches of snow is calculated as being the equivalent of one inch of rain.

Station	Depth in inches	Departure from the average of twenty years
Calgary, Alta.	0.50	— 0.04
Edmonton, Alta.	0.30	— 0.50
Swift Current, Sask.	0.30	— 0.42
Winnipeg, Man.	4.00	+ 3.28
Port Stanley, Ont.	3.00	— 0.08
Toronto, Ont.	2.65	+ 0.26
Parry Sound, Ont.	6.30	+ 1.64
Ottawa, Ont.	1.60	— 0.91
Kingston, Ont.	3.10	+ 0.26
Montreal, Que.	1.90	— 1.92
Quebec, Que.	1.90	— 1.26
Chatham, N.B.	3.90	+ 0.72
Halifax, N.S.	2.80	— 2.89
Victoria, B.C.	3.75	— 2.52
Kamloops, B.C.	0.30	— 0.50

The mineral output of British Columbia still increases. In 1908 it was valued at $23,851,000 and in 1909 at $24,426,500. This is made up of $14,774,500 metallic minerals and the balance non-metallic, as coal, coke, building materials, etc.

THE

Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

TYPHOID AND POLLUTED DRINKING WATER.

Those who have studied the history of typhoid epidemics in cities are unanimous in concluding the cause to be **"Sewage-polluted drinking water."**

This is amply proven in the cases of both European and American cities, where, after means have been taken to purify the water, typhoid has practically ceased to exist.

London, Berlin, Hamburg, Breslau, Zuric, Lawrence, Mass., and a host of other places have shown a marked decrease in the typhoid rate with the installation of suitable filtration plants.

The degree of a typhoid epidemic is in proportion to the number of typhoid germs in the water supply On the assumption that a person discharges seven ounces of fæces per day, he also discharges 200,000,000,000 bacteria per day. The number of bacteria in sewage is so great that a large river is affected by the sewage discharge of even a small village.

* "Taking the population of Lowell in 1892 at 85,000, and the average daily flow of the Merrimac at 6,000 cubic feet per second, and assuming that 200,000,000,000 bacteria are discharged daily in the sewage from each person, they would increase the number in the river by 1,160 per c.c., or about 300,000 in an ordinary glass of water.

"The average number found in the water eight miles below, at the intake of the Lawrence waterworks, was more than six times as great as this, due in part to the sewage of other cities higher up.

Faeces of people suffering from typhoid fever contain the germs of that disease. What proportion of the total number of bacetria in such faeces are injurious is not known; but assuming that one-fourth only of the total number are typhoid germs, and supposing the faeces of one person only to be mixed with the whole daily average flow of the river, it would put one typhoid germ into every glass of water at the Lawrence intake, and at low water several times as many proportionately would be added. This should give some conception of the dilution required to make a polluted water safe.

Pittsburg and Alleghany, taking their water supplies from below the outlets of some of their own sewers, have suffered severely (103.2 and 127.4 deaths from typhoid annually per 100,000 population in 1888 to 1892.)

Wheeling, W. Va., with similar conditions in 1890, was even worse, with a death rate from typhoid of 345 per 100,000, while Albany had only comparatively mild epidemics from the less directly and grossly polluted Hudson. Lawrence and Lowell, taking their water from the Merrimac, both had for many years continued excessive rates, increasing gradually with increasing pollution; and the city having the most polluted source had the higher rate.

Chicago has for years suffered from typhoid fever, the rate fluctuating with the degree of pollution of the lake. An unusually large discharge of the river results in a higher death rate. Upon abandoning the shore intake near the mouth of the river in 1892, the typhoid fever death rate fell 60 per cent.

Every case of typhoid is not directly due to drinking infected water. The first number of cases directly due to polluted water are generally followed by contact cases, due to carelessness in isolation. That some cases happen with people who have never drunk the tap water is no evidence that the origin of the epidemic is not due to polluted water. It is fair to say that all cases are either directly or indirectly due to the polluted water.

The broad fact that cities with polluted water supplies, as a rule, have high typhoid death rates and cities with good water do not (except in the occasional cases of milk epidemics) is the best evidence of the danger from bad water.

* Filtration of Public Water Supplies (Hazen).

OSHAWA SEWAGE DISPOSAL.

The town of Oshawa have lately had a scheme accepted by the Provincial Board of Health for the purification of sewage on the modern recognized system of removal of solids by sedimentation tanks and production of a non-putrescible effluent by percolating biological filters.

We have had drawn to our attention a letter published in a local Oshawa paper by presumably one of the residents, who undertakes to pose as a sanitary critic and expert. His knowledge upon the subject appears to be summed up in a total contempt for all modern methods of dealing with sewage disposal. Here is a sample of the hot air and bluff which he hands out to his fellow-citizens: "If the town council will agree to pay the expense I will undertake to produce seventeen different methods of handling sewage, all up to date, from seventeen different and eminent engineers, and have them all endorsed by the Provincial Board of Health in seventeen days."

We take the liberty of calling this "hot air and bluff," because the writer must know before hand that there is not the slightest chance of his offer being accepted by the council; and, therefore, there is no chance of proving the correctness of his statement.

We would not like to deny that this evidently widely-read and experienced citizen in sewage disposal is fully acquainted with seventeen up-to-date methods of handling sewage, and also that he can immediately put his finger upon the seventeen eminent engineers, who are individually prepared to run his seventeen different

schemes (all up to date). This is just what we would expect from Oshawa, as we understand there have been something like seventeen engineers already employed in Oshawa in reporting from time to time on water supply.

We, however, must doubt the clairvoyant power of this citizen, who can so easily read the minds of the members of the Provincial Board of Health at even such a short distance as Oshawa from the Ontario Parliament Buildings.

He states that the scheme proposed should alienate the support of the hard-headed business men of Oshawa. We must certainly conclude that if the correspondent's letter has the effect of alienating the scheme and finds favor with the business men of Oshawa, their heads are much harder and thicker than any we have come up against.

There is, however, a serious side to this letter in the fact that it is penned by a medical man (presumably scientific man). We would expect such a person to give a scientific lead to his brother-citizens instead of indulging in what is nothing more than sentimental tommy-rot, bolstered up by trifling bluff.

CORRESPONDENCE.

We are in receipt of a letter from Ottawa referring to an article in last week's issue dealing with the typhoid epidemic in Montreal.

Our correspondent has to complain that our views therein expressed are not in accordance with modern practice, and fault is especially found with the reference to anaerobic conditions being suggested at periods when the surface of the water is covered with ice.

Enclosed with the letter is a printed form setting forth the usual personal precautions which should be taken against typhoid, all of which we cordially agree with. The letter concludes with the statement: "Water has its dangers, but get after the milk and the houseflies and proper isolation of cases." There is nothing in the latter sentence that we can quarrel with generally.

In Montreal, however, we have an annual typhoid epidemic occurring in the winter season, just when there are no flies to get after. Milk may be, and is often, the cause of small, isolated epidemics affecting a number of people depending upon some contaminated milk supply. But when a number of cases are spread generally over a town, and that number is far in excess of the usual endemic number, it is only possible to look to the water supply as the primary cause.

Even in cases where milk is the cause, the milk, as a rule, receives the infection from contact with contaminated water.

Of course, apart from the first or primary cause, it it admitted that many subsequent cases are the result of improper personal precautions and lack of isolation.—Ed. San. Rev.

MONTREAL'S WATER SUPPLY.

We publish a paper on the history and development of the water supply of Montreal, contributed to the City Improvement League by Mr. George Janin, chief engineer and superintendent of the city of Montreal Waterworks.

This should be of interest at the present time, when a serious typhoid epidemic in that city is being ascribed to an impure water supply.

That portion of the paper which deals with proposals for future improvement will be read with interest.

Mr. Janin has very little to say in favor of any scheme for bringing water from the Laurentian Mountains. He says: "The legend of the lucid water of the Laurentides Lakes will have to be laid to one side, because its price would be extravagant, or its quality (leaving aside its quantity) would not certainly be superior to the actual supply." On the other hand, Mr. Janin has faith in the St. Lawrence River water, and proposes to spend $100,000 this year in extending the city intake to mid-stream.

It is stated that bacteriological analysis show 75 per cent. less bacteria in the water at the proposed new intake than are found in the present aqueduct. The number of bacteria in either case, however, is not given.

Mr. Janin goes on to say: "Actually, the city council has ordered that, for the period of one year, samples of water taken from the old intake and from the new one should be analyzed. I have no doubt that the conclusions will establish that the new intake will be an improvement so important that, for a certain time at least, it will satisfy the hygienic requirements until filtration becomes absolutely necessary."

This is certainly one of the most curious and interesting paragraphs we have yet met with penned by an engineer. We almost confess that we would rather not understand it, if it means what it says. "I have no doubt that the conclusions will establish," etc. Before ever the analyses are made Mr. Janin's mind is made up. As in a dream he can see the result of all the year's analyses proving a hygienic acceptable water. Surely we have read somewhere that it is the duty of an engineer to only form an opinion upon the quality of a potable water based upon a chemical and biological analysis. But here we have the opinion first ("I have no doubt"); the analyses will follow.

But "the improvement so important." How long will it last? "For a time at least." Cannot Mr. Janin be also certain of the length of time? That phrase "at least," will surely bother the people of Montreal. Will it satisfy hygienic requirements for one year, two years, or, say, ten years? But a limit is stated—"until filtration becomes absolutely necessary."

What does this mean? We say we would rather not understand, but we must and can only understand that even after the new intake is provided filtration will follow if typhoid epidemics persist in continuing. Why is it that no improvement can be reached except through tragedy and suffering? Why is it that you cannot make people see the benefit of pure water until their families are thinned out by disease?

We could excuse Mr. Janin and his policy "of taking a chance" if we did not know that he has all the data and statistics to refer to, showing that all towns using untreated raw river water have suffered from typhoid, and that all towns treating raw river water by filtration have immediately reduced the typhoid rate.

Analyses have to be made for one year. Let us trust that, if the bacteriologists find the first sample to show a number of colonies over and above the accepted number allowed for potable water, that they will stop and not waste the remaining 364 days in playing with the water and producing a lot of useless averages which mean practically nothing. **A water is no better than its worst analysis,** just as a chair is no stronger than its weakest link.

In conclusion Mr. Janin states: "I have admitted the usefulness of a filter sooner or later." If Mr. Janin will only cross out the word "later" and substitute "the sooner the better," he will satisfy us and bring himself into line with all the leading authorities upon the question of treating raw river waters in order to render them safe and beyond suspicion.

THE WATER SUPPLY PROBLEM OF MONTREAL.

By George Janin, Chief Engineer and Superintendent of the City of Montreal Water Works.

The water supply of the city, with the exception of St. Denis, Delorimier, St. Henry, St. Cunegonde and Mount Royal Wards is under the control of the municipal administration, which owns the aqueduct and imposes a rate for payment. The above said wards and the suburbs are supplied from a private company, the Montreal Water and Power Company.

The area included in the limits administered by the city corporation is about 10,000 acres, containing a population of 390,000 souls, not counting any of the large suburban municipalities, which are not separated from the city by any natural boundary but really form part of the city, and which, if annexed to the city, as they soon must be, would bring the population to 500,000 souls.

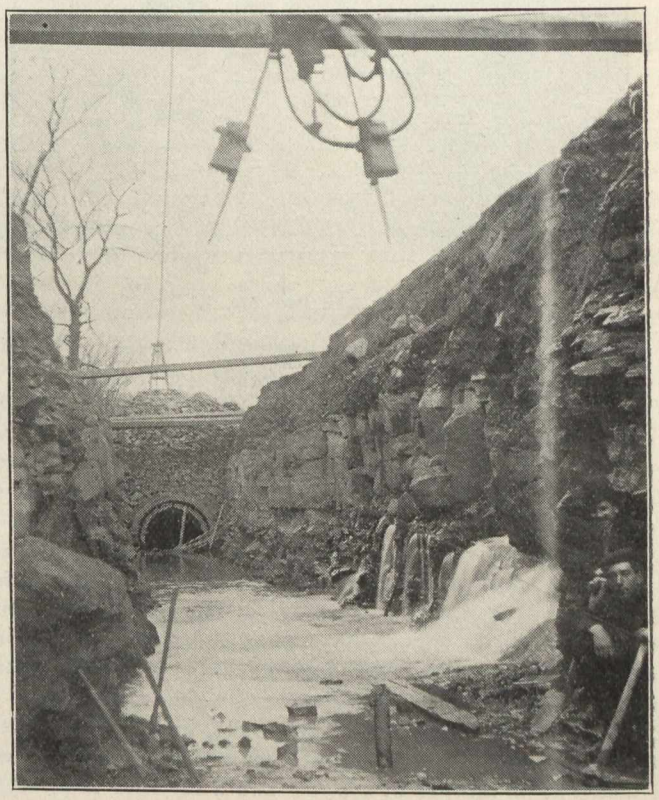
As for all old cities, the aqueduct of Montreal had a very modest beginning. Towards 1,800 the water from springs was diverted from Mount Royal and distributed through some of the streets of the city in wooden pipes. In 1815 this precarious supply was replaced by a system of distribution of water pumped from the river and raised into tanks containing 240,000 Imperial gallons. In 1845 the city bought this system from a private company, after which an epoch of progress was begun by the construction of a reservoir containing 3,000,000 Imperial gallons and situated at that time outside of the city at a place called "Côte à Baron." This reservoir, now abandoned, has been turned into an ornamental fountain in one of the squares of the city (St. Louis Square).

The time had now arrived when the intake from the river, in the middle of the harbor, and consequently exposed to all sorts of pollutions, could no longer be used with hygienic safety to supply a city full of future promise and anxious for the health of its inhabitants. As early as 1847 it had been proposed to take water at the Lachine Rapids, above the city, and to make use of the power of these rapids to raise the water, but this scheme, and others similar, were not seriously considered until 1853, when the city council concluded to confer upon Mr. T. C. Keefer, civil engineer, the duty of preparing plans for an aqueduct capable of supplying 5,000,000 Imperial gallons daily. The study of this project, its examination by consulting engineers, etc., postponed the beginning of its construction to the year 1853, and its termination to the year 1854.

The system then established included an open canal 4¾ miles long, having its entrance about one mile above the Lachine Rapids, at an elevation of 37 feet above the level of the harbor of Montreal. The dimensions of the canal were 40 feet wide at the water surface and 8 feet deep.

At the time of its construction this canal supplied more than sufficient water to develop 300 horse-power, and to raise 200 feet above the level of the water in the harbor 5,000,000 Imperial gallons of water, being at the rate of 40 Imperial gallons per capita for a population double what it was then (60,000). At the end of that canal were situated the settling basin and the wheel house, about as they stand to-day. The hydraulic motive power was utilized by two breast wheels working six pumps to raise the water to a reservoir situated on the slope of Mount Royal along McTavish Street, forming the present low level reservoir, which is but an enlargement of the original one. That reservoir had then a capacity of 15,000,000 Imperial gallons.

The whole of this system had been well devised for the quality and quantity of water necessary for a limited future, sufficient in fact for a population double what it was then; but the rapid increase of population, which has nearly increased ten times since, and the inconveniences produced by the severity of our winters on the wheels, have necessarily obliged the authorities of the water works to substitute turbines for breast wheels, and also to construct an auxiliary steam plant, with a view to replacing hydraulic power during the times of low water in summer, and during the winter on



Showing Infiltration Through Rock.

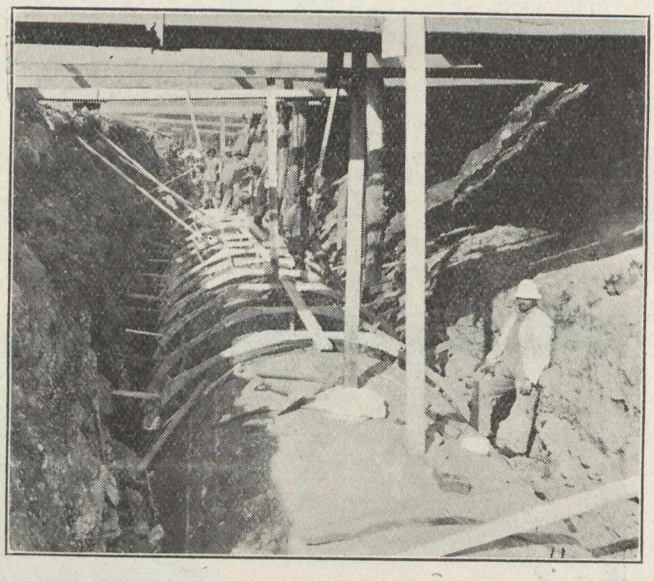
account of ice, frazil, etc. The steam plant was also found to be necessary to provide for the insufficiency of the water power, when the consumption of water by the city exceeded that for which provision had been made when the canal was constructed.

Meanwhile the increasing population of the city was extending itself upon the heights situated east of Mount Royal, at an altitude too great to be supplied by the system whose summit was at the McTavish Reservoir.

This state of things necessitated the establishment of the present high level system, that is, the construction of the reservoir at midway on the mountain slope, and of a pumping station to carry the water from the low level system to the high level distributing service, to a height of 422 feet above the level of water in the harbor. A Worthington steam pump, with a daily capacity of 500,000 Imperial gallons, was then sufficient to supply the high level system.

As the changes were being made to the low level machinery, as mentioned above, several schemes were prepared to put

the aqueduct in condition to supply the wants of the rapidly increasing population without necessitating the resort to the expensive use of steam. All of these schemes had in view one of two objects; the increase of water power or the substitution of a gravity supply. Montreal is not advantageously situated to make use of this latter scheme. Built upon an island, bordered on one side by the St. Lawrence River,—



Looking East from Sta. 161.

whose width precludes any idea of viaduct of syphon to bring water supply on this side,—on the other side it is bordered by a branch of the Ottawa River and adjacent to another island, formed by the same river dividing itself into two branches, not so wide as the St. Lawrence River, but of sufficient width to make the bringing across of a gravity adqueduct very expensive.

The first scheme was to find north of the city a water supply taken a sufficient altitude (that is, more than 425 feet above the St. Lawrence), adequate to the present and future wants of the city. The ridge of the Laurentian Mountains, whose first summit is situated more than 30 miles from Montreal, was the only spot where such a water supply could be found. Surveys and levels were made, and established the fact that a water supply could be taken from Lake Ouareau, situated at an altitude of 450 feet and a distance of about 60 miles from Montreal, but the estimated costs (nearly 25 millions) of such an undertaking prevented the further study of it. Consideration of the gravity plan was consequently superseded by the study of a sufficient hydraulic power system. While on this question I would like to add that it is my opinion that the scheme of carrying water from the Laurentian Lakes would result in difficulties other than the supposed heavy cost. The water would be sure to be actually contaminated in a country where on the watershed supplying the lakes are scattered villages, farms, mills, forests, where timber cutting on a large scale is constantly going on, employing a large number of men and horses; and numbers of the creeks run nearly dry in summer and would only supply at the chosen locality impure waters.

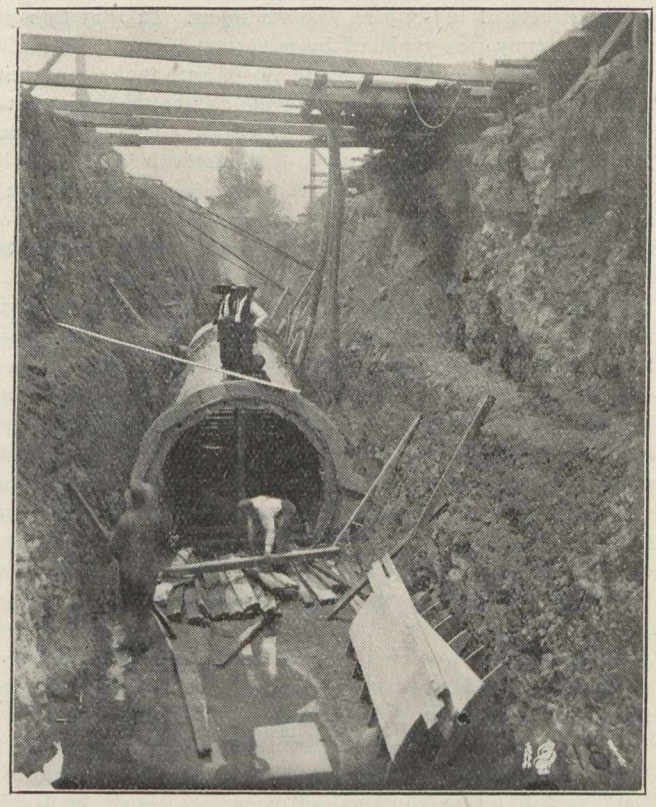
At the time this project was being considered the causes of pollution which I have just spoken of were almost nil, or in any case it would have been possible for the City of Montreal at comparatively small cost, to have secured control of the whole water shed and thus stop all causes of pollution; to-day the expropriation of all this territory would make it seem unreasonable to consider the project, unless no other means existed of furnishing Montreal with a water supply under conditions of price more reasonable.

The legend of the "lucid water of the Laurentides lakes" will therefore have to be laid to one side, because its price would be extravagant or its quality, (leaving aside its quantity), would not certainly be superior to the actual supply. I would remark in passing that the pollution of the Laurentian Lakes is so notorious that Professor Girdwood himself in his testimony before the Royal Commission recently declared that members of his family had contracted typhoid fever during the sojourn in that region from having used water from these lakes.

These and many other considerations were the causes which led to preference being given to the plan of the superintendent then in charge of the water works, Mr. Louis Lesage. This scheme was simply to carry the entrance of the aqueduct 3,000 feet up the river and to make it 130 feet wide at the water surface, 78 feet wide at bottom, and 14 feet deep.

These dimensions would have provided sufficient power to supply 30,000,000 Imperial gallons. In 1877 the construcion of works on this plan was begun, the new entrance of the aqueduct was made, and the aqueduct was dug 130 feet wide and 14 feet deep, for 4,800 feet in length, as it stands to-day. The cost of the work and the successive change of the heads of the Department prevented its continuation, and this accounts for the periodical growth of the steam plant, as it stands now, with five pumps (45 million gallons capacity.)

However, the beginning of enlargement had a favorable effect on the water in the aqueduct and the formation of ice,



Looking west from Sta. 202, June 16, 1908. Showing mould in place for purpose of receiving concrete.

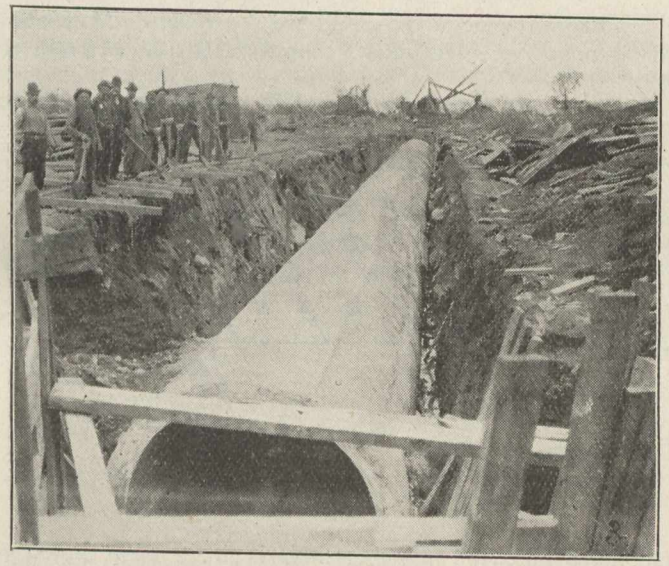
in such a way as to better protect the efficiency of the hydraulic pumps.

In 1878, the low level reservoir (McTavish) having become insufficient, it was enlarged so as to bring its capacity to 37,000,000 Imperial gallons. In 1889 the population fed by the high level system had increased so much that a new

steam pump of 2,500,000 gallons' capacity had to be provided for this district. The increase in the population was still going on, and the necessity of ensuring its supply against any uncertainty led me to have the city council provide for the installation of a pump operated by electric power, which pump, of a capacity of 5,000,000 gallons, is at present in use. The old steam plant being kept as a duplicate in case of emergency.

The successive changes which I have attempted to explain to my best ability have placed the Montreal Water Works in a position to provide a daily average water supply of about 45,000,000 Imperial gallons, which is sufficient for the present population.

Thus since 10 years, that is, from about the time of my arrival at the head of the department, the needs of the water supply have increased so rapidly that we have hardly had time to keep up with it by the successive additions of pumps and boilers, thus increasing the expensive steam plant without however losing sight of the scheme of utilizing the water power and thus diminish the cost of pumping. This scheme though abandoned for 23 years, I considered it a



Conduit on May 24th, 1908.

favorable opportunity to bring it to light again with improvements.

In fact, two things had struck me, on my taking the management of the department; first, the anomaly of spending coal for the pumping instead of utilizing the important water power which could be developed by the difference in the level of the river at the entrance of the aqueduct above the rapids and below the foot of the rapids at the tail race.

20. The inconvenience from a hygienic point of view of drawing water for domestic needs from the shore of the river where it is exposed to pollution in so many ways; and the other inconvenience which consisted in conducting this doubtful water in the pumps, by an open canal 27,000 feet long, crossed by many bridges where farm animals, etc., pass.

These considerations brought me back naturally to the scheme of the enlargement of the aqueduct.

The first scheme planned about 30 years ago did not really consist in an enlargement of the aqueduct but in the building of a new one alongside of the present one.

This disposition calling for the buying of a large tract of land next to the aqueduct offered but little inconvenience at the time it was being proposed, but nowadays it would be ruinous.

That is why, together with my devoted and capable assistant, Mr. T. W. Lesage, I have studied the means of enlarging the aqueduct on our own ground. Such a disposition involves the necessity of providing for the supply of the pumps, at least for a time, by another canal than by the aqueduct itself. From this there was only one step to decide upon the building not of a temporary supplying canal, but of a permanent covered conduit prolonged to the middle of the river, where it would draw and conduct to the pumps very different water from that which has entered so far in the open canal. Owing to the construction of this conduit the actual canal is to be widened and deepened so as to produce a sufficient water power to pump all the water necessary to the needs of the city for one generation at least, thus economizing each year thousands of dollars for the purchase of coal. Thus $90,000.00 were spent for coal last year.

The only expense of this scheme which can be charged to the improvement of the quality of the water, will be the cost of the extension of the conduit to the middle of the river which would hardly exceed $100,000 dollars.

Thus, next year, when this extension to mid-stream will have been made, if it were established by official and unquestionable declarations that the water thus drawn and conducted was not of good quality, it would be time to take the means of installing a filter plant, and even in that case, the expense of $100,000 which I mentioned above, would not have been wasted, for the water from the middle of the river would be unquestionably filtered more easily than that which comes in the open canal at present which is strongly colored and muddy and would necessitate a larger filtration area and be consequently more expensive to build and maintain.

But until further studies have proved the contrary, I remain convinced that for some years to come there will be no necessity for filtration after the completion of my scheme.

There has been much discussion lately about the comparative value of the waters of the St. Lawrence and the Ottawa, and public opinion has been left under the impression that the water furnished to the city through the aqueduct, presumably from Ottawa River sources, was so much contaminated that it offered a public danger and that the improvements which are actually being executed would bring no remedy to the state of affairs. All these exaggerations are due to the fact of being based on a false assumption. In order that you may easily follow the explanations I shall give you on this subject, I have had placed before you a map of the Island of Montreal on which the courses of the St. Lawrence and the Ottawa Rivers are clearly visible and also a sketch showing the aqueduct as primitively constructed, also the lateral conduit as recently finished and its extension to the middle of the river as it will be when completed next year. You can see on that map how the waters of the two rivers cross Lake St. Louis and descend to the Lachine Rapids with fluctuations in flow according to the seasons, but never mix together. You may remark also that the north bank of Lake St. Louis which is the most generally washed by the waters of the Ottawa, is also the most thickly inhabited, and therefore offers the most pollution so that from a hasty and superficial observation, one might think that the waters so polluted are inevitably those which supply the actual entrance of the Montreal aqueduct. But a more attentive inspection, like the one I beg of you to make with me, will show you at the foot of Lake St. Louis on that same north bank, a large funnel over 1,500 feet wide formed by the entrance of the Lachine Canal into which rush the greater part, if not the

whole, of the polluted shore waters which are thus drained into the canal and fall into the Montreal harbor without passing through our aqueduct.

Now you will also notice on this map, two points marked one in red and the other in blue, and also a blue cross. These points indicate the places where the samples of water have been taken by the commission on whose report was based the more recent and more ardent criticism against the Montreal water supply. The blue cross indicates the place in the river from which the prolonged conduit which forms a part of what is graciously called the Janin Scheme, will draw next year the water supply for Montreal. From that place, samples of water have been taken in 1906 by the bacteriologists of the city who have declared in their report, dated January, 1907, that these samples contained 75 per cent. less bacterial than the samples taken in the canal of the aqueduct.

Actually the city council has ordered, that, for the period of one year, samples of water taken from the old intake and from the new one, should be analysed. I have no doubt that the conclusions will establish that the new intake will be an improvement so important that, for a certain time at least, it will satisfy the hygienic requirements, until filtration becomes absolutely necessary.

Now, if you will kindly notice the distance between the two points, blue and red, and the blue cross marked on the map, that is 18 miles, you will be convinced that this distance, covered by Lake St. Louis, forms, an immense sedimentation basin and permits us to say that the doubtful quality of the samples taken at that distance from the present and from the future intake of the aqueduct does not justify the pessimistic opinion which has spread in the public mind against the Montreal Water Supply.

This great city is placed under natural conditions almost unique to provide itself with water from one of the greatest rivers of the world; a river which in fact is but a succession of lakes forming immense sedimentation basins, and also falls and gigantic rapids aerating its waters; a river whose banks will be for a long time to come, inhabited only by a comparatively spare population to which it will be easy to impose laws against the pollution of the water supplies; without regard to that same marvellous river which offers us just a few miles from our pumping station, an important power that my scheme means to utilize for the pumping of the said water.

During recent years, in discussing the Montreal Water Supply, allusion has often been made to the great cities of the United States which are provided, at the cost of millions, with filtration plants or who have drawn their water supplies from hundreds of miles, forgetting to say that these cities are very far from being in the conditions that I have just showed for Montreal, and that they were absolutely obliged to have recourse to those expensive means, for, instead of having within their reach our beautiful St. Lawrence, such cities as for example St. Louis, Ms., and Cincinnati, Ohio, have only streams of polluted mud, or cities like Boston and New York the undrinkable sea water.

PROBLEMS IN APPLIED STATICS.

T. R. Loudon, B.A.Sc.
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This series of problems began in the issue for the week, October 22nd, 1909. It is assumed that the reader either has an elementary knowledge of the subject of Statics, or is in a position to read some text on such theory.

Take moments about the point P (the intersection of LK and KD).

$$\Sigma M = M_{AM} + M_{ML} + M_{LK} + M_{KD} + M_{DC} + M_{CB} + M_{BA} = 0.$$

$$4{,}000.20 + ML.\frac{20}{\sqrt{3}} + 0 + 0 - 1{,}000.5 - 1{,}000.10 - 1{,}000.15 = 0.$$

$$ML = -50{,}000\frac{\sqrt{3}}{20.} = -2{,}500\sqrt{3}.$$

From the negative result we see that the M_{ML} about P is negative. ML must, therefore, act away from the

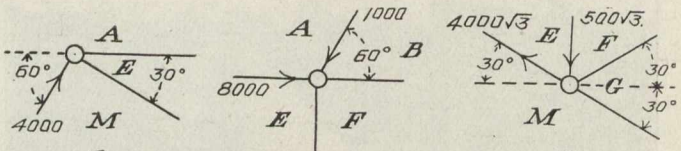


Fig. 110. Fig. 111. Fig. 112.

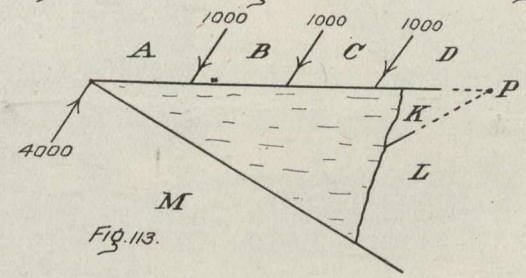


Fig. 113.

section; i.e., the member ML is in tension $2{,}500\sqrt{3}$ pounds.

Consider the Point GMLH.

$$\Sigma X = X_{GM} + X_{ML} + X_{LH} + X_{HG} = 0.$$

$$-3{,}500\sqrt{3}.\cos 30^\circ + 2{,}500\sqrt{3}.\cos 30^\circ + LH\cos 30^\circ + 0 = 0.$$

$$LH = 1{,}000\sqrt{3}.$$

The member LH is evidently in tension $1{,}000\sqrt{3}$ pounds.

$$\Sigma Y = Y_{GM} + Y_{ML} + Y_{LH} + Y_{HG} = 0.$$

$$3{,}500\sqrt{3}.\sin 30^\circ - 2{,}500\sqrt{3}.\sin 30^\circ + 1{,}000\sqrt{3}.\sin 30^\circ + HG = 0.$$

$$\tfrac{1}{2}(3{,}500\sqrt{3} - 2{,}500\sqrt{3} + 1{,}000\sqrt{3}) + HG = 0.$$

$$HG = -1{,}000\sqrt{3}.$$

The member HG is in compression $1{,}000\sqrt{3}$ pounds.

By considering the points CBFGHJ, DCJK, and KJHL, the stresses in the remaining members may be found.

Graphical Solution.

It is advisable in this problem to first construct a separate Vector Polygon for each set of forces considered, and then draw the Stress Diagram rather than try to follow the Vector Polygons on a Stress Diagram, as was done in the case of the Queen Post Truss.

Assuming that the effective Abutment Reactions have been found, Fig. 114 is the Statical Diagram for **the point MAE**, Fig. 115 being the corresponding Vector Polygon from which it is seen that the force AE acts

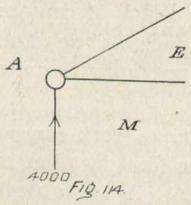


Fig. 114.

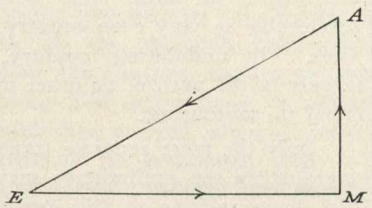


Fig. 115.

against the point and the force EM away from the point. The magnitudes of the forces AE and EM will be given by scaling AE and EM (Fig. 115). The member AE is, therefore, in Compression and the member EM in Tension.

In the following discussion it will be merely necessary to show whether the various members are in tension or compression, since finding the magnitudes of these stresses from the figures can only be done by either scaling the lengths of the lines; which is impracticable, for the printed polygons are not of a size suitable to any particular scale; or, by applying geometrical reasoning to the figures, which may easily be done by the reader.

It is, of course, always best for the reader to construct the polygons or figures for himself, using some convenient scale.

Consider the point EABF. Fig. 116 is the Statical Diagram for the forces acting at this point. From the Vector Polygon (Fig. 117) it is seen that the forces BF

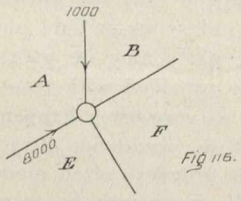


Fig. 116.

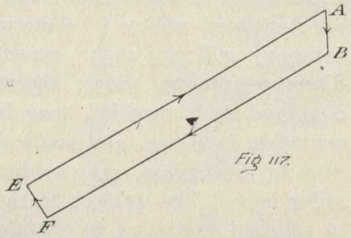


Fig. 117.

and FE both act against the point. The members BF and FE are, therefore, in Compression.

Considering the forces acting at the point MEFG (Statical Diagrams, Fig. 118). From the Vector Polygon (Fig. 119), it is seen that both the forces FG and GM act away from the point, the members FG and GM being, in consequence, in Tension. (The reader will

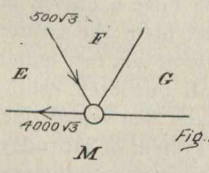


Fig. 118.

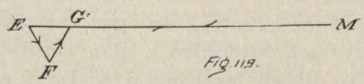


Fig. 119.

notice that the Vector Polygon reads ME, EF, FG, and GM. This last line GM coincides with the first line ME, the sense mark of ME having been placed above and that of GM below.)

Consider, next, the point CDKJ (Statical Diagram, Fig. 120). The forces acting at this point are CD (known), and DK, KJ, and JC, all unknown. Since there are three unknowns at this point, it is impossible to construct a Vector Polygon as the problem now stands. JC and DK, however, have the same lines of action. Their resultant will, therefore, act in this same line.

Replace JC and DK by their resultant R_1 as indicated in Statical Diagram, Fig. 121. Constructing the Vector Polygon for this new set of forces, which only contains two unknown, it is seen from Fig. 122 that the force KJ acts against the point. The member KJ

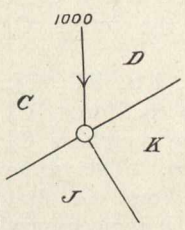


Fig. 120.

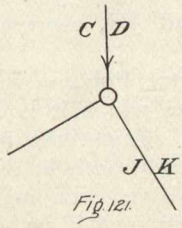


Fig. 121.

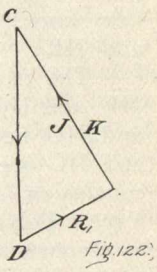


Fig. 122.

is, therefore, in Compression. (The magnitude of the resultant R_1 gives no information of value.)

Consider the point JKLH (Statical Diagram, Fig. 123). Since KL and LH also have the same line of action, their resultant will act in that line. Replacing KL and LH by their resultant R_2, a condition such as shown in Statical Diagram, Fig. 124, is arrived at. Con-

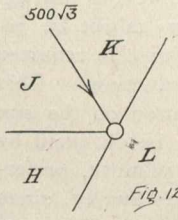


Fig. 123.

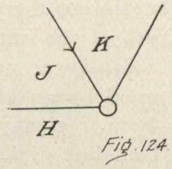


Fig. 124.

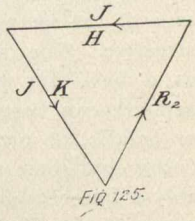


Fig. 125.

structing the Vector Polygon for this last set of forces, it is seen from Fig. 125 that HJ acts away from the point, thereby showing that the member HJ is in Tension.

Coming back to the point GFBCJH (Statical Diagram, Fig. 126), it is seen that there are now merely two unknowns, so that the Vector Polygon for the forces acting at this point may be constructed.

The Vector Polygon (Fig. 127) may be begun by representing the forces GF, FB, and BC, but it is then seen that the unknown force CJ intervenes between BC and the next known force JH; so that, for the time being, Bow's Notation will have to be dropped.

From C (Fig. 127) draw a dotted line to represent the known force JH, placing the letters J and H beside

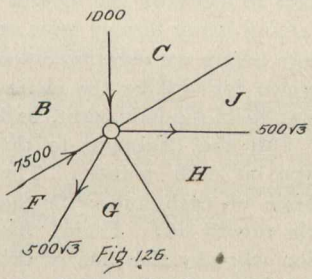


Fig. 126.

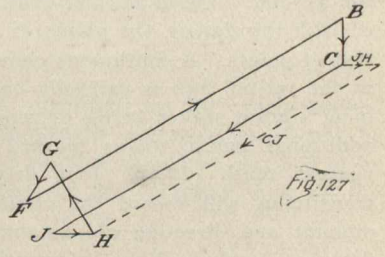


Fig. 127.

the line to indicate which force it represents. From the termination of this last dotted line is drawn another dotted line to represent the known line of action of the force CJ. Also, since the Vector Polygon must close, a line is drawn from the initial point G to represent the known line of action of the force HG, this last line intersecting the second dotted line CJ at H. The Vector Polygon should then read: GF, FB, BC, JH (dotted line), CJ (dotted line), and HG. It is evident that Bow's Notation will apply to the line representing the force HG, therefore, the line is drawn in full.

Now that all the forces are known at the point being considered, it is possible to go back and reconstruct the Vector Polygon, using Bow's Notation throughout.

From C (Fig. 127) draw CJ equal and parallel to the dotted line CJ. The line joining J to H is then equal and parallel to the dotted line JH. It is evident that these new lines, CJ and JH, represent fully the forces CJ and JH.

The new Vector Polygon reads: GF, FB, BC, CJ, JH, and HG, from which it is seen that the forces CJ and HG both act against the point. The members CJ and HG are evidently both in compression. (This same conclusion could have been arrived at from the first Vector Polygon, but, as will be seen later, it is necessary to reconstruct the polygon, using Bow's Notation if the Stress Diagram is to be drawn.)

RAILROAD LOCATION.

W. C. Swan, B.A.Sc.

II.

In considering the actual preliminary survey, a few details of the methods of beginning the survey might be instructive. The true azimuth of the initial course is required as a basis for further calculation and reduction. This azimuth can best be obtained by an observation on the sun or polaris, or preferably both. It may also be obtained by tieing into some reliable land line of known azimuth, preferably a line established by the Dominion Lands Survey, since many of the Provincial Lands survey lines are very unreliable. A datum plane for the levels must also be established. Dominion Geographer James White's book of "Altitudes in Canada" will be found a most useful and convenient reference as a means of obtaining a starting point with the levels. Therein is contained a list of altitudes referred to mean sea levels as datum, of all railway points, and of the principal rivers and lakes of Canada.

Preliminary Survey.

The reconnaissance survey will have confined the best location line to a given belt of country; in the preliminary survey the line is made to follow the particular ground within this belt which seems best adapted to the construction of a railway. This preliminary line is run in a series of chords or straight lines, changes in direction being introduced to fit the ground. These angular changes of direction are measured with the transit, the points of set-up being termed hubs or transit points. A continuous change begun with station 0+00 at the intitial hub is carefully carried forward by the chainmen, station stakes being driven at each 100-foot point, and additional guard stakes marked with the chainage to the nearest tenth of one foot driven at hub points. The transitman will record the chainage of each hub with the amount and direction of the angle turned off. From this data can be derived the information whereby the plan of the line as actually laid down in the field can be plotted in the office. The profile of the ground is fixed by the levels. The leveller will take readings at each station point and at all intermediate points where breaks occur in the general lay of the ground. Lastly, by means of cross-sections or contours, the topographer will make a careful determination of the natural run of the ground on either side of centre line to given distances depending on the nature of the country. He will also locate with reference to the centre line all river-banks, roads, drainage ditches, and in settled districts the position of all buildings within these fixed limits. In rough country where abrupt changes in the ground occur, the cross-section method can be used to best advantage since contour lines would lie too close to one another in such country, giving a plan likely to be somewhat confusing because of a multiplicity of lines. Nor will the contour method be as serviceable in very even country because of a lack of contour lines. In undulating country, however, such as we find largely in the prairie, no other method of topography is quite equal to contouring.

Only the most accurate transit and chainage work can be tolerated on the preliminary survey since the final location is laid down relative to this preliminary line. A great deal of time, however, is often spent in unnecessary detail and accuracy in laying down the preliminary line to fit precisely particular sections of the ground. The preliminary survey should be sufficient to mark one route as being superior to all others. Should give a definite idea of ruling grades and curvature. It is also advisable to complete the preliminary survey. of the entire proposed route since one section of a final location might be run to give easy curvature and light gradients, while at some other section of the line it would, for the same cost per mile, be utterly impossible to maintain these high standard of grades and curves.

The rate at which the preliminary surveys should be pushed through will depend entirely upon the nature of the country. The rate at which it is put through is often another question. In heavy bush a mile to a mile and a quarter is good work with a party of five or six axemen, while in open country, five to six miles constitutes a very fair day's work. In very rough mountainous country 3,000 feet of line run might represent a very hard and heavy day's labor, while in open country under most favorable circumstances seven or eight miles is occasionally run in one day. Through a very short-sighted policy it sometimes happens that the railway company will not make expenditures unless immediate and direct results be shown therefor; the party may be poorly equipped with supplies, may be poorly provided with transportation facilities, and lastly the men as very often happens may be underpaid, salaries being such as would not attract abler men. The answer to the rate of progress often made in railroad surveying is contained in the foregoing sentence.

Before passing from the subject of preliminary surveys it would be well to consider briefly the methods employed in plotting the work in the office. The preliminary profile will be plotted on regular "profile paper." On it should be noted all watercourses with proposed opening, the nature of the country, wooded or otherwise, and the positions of all bench marks established. There is no alternative method of profile plotting. In preparing plans, however, we have a choice of methods. The scale of the plan will depend upon the nature of the country. In open easy country a scale of 400 feet equal 1 inch, will give a plan amply large for all purposes, while in rough localities a scale of 100 feet or 200 feet equal one inch, will be found more satisfactory. The system of latitudes and departures will be found most accurate and satisfactory in plotting the preliminary and other plans. It entails somewhat more work than does the "protractor" system, but errors are local not accumulative, as is the case with this latter method. Weather conditions will appreciably affect the plan paper causing shrinkage or lengthening when the atmosphere is alternately dry or humid. The draughtsman should be careful not to allow errors to creep in from this source.

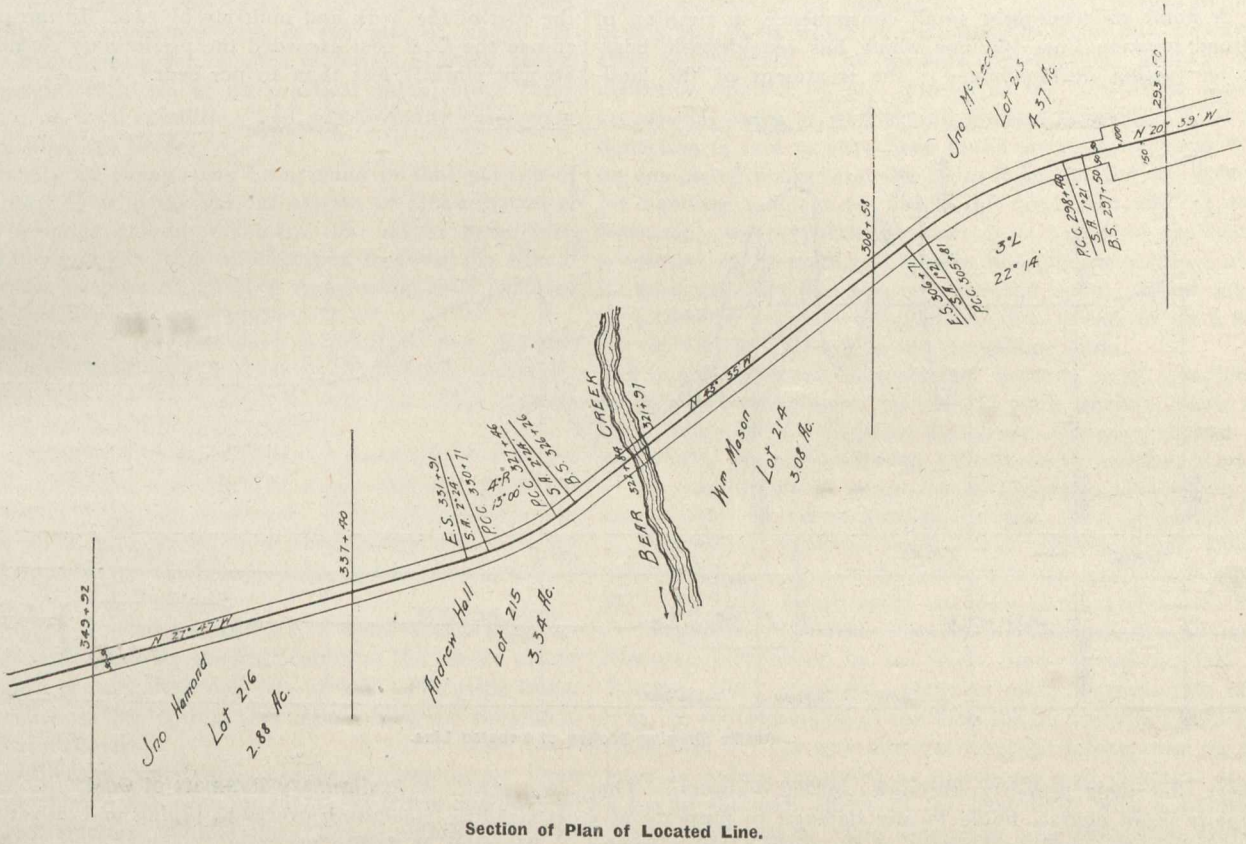
Final Location.

Let us now suppose the preliminary survey completed to the satisfaction of the engineer. There remains to be run

now, only the final location line. Some very good location work has been done by laying down in the field, tangents to fit the ground, joining up the extremities with suitable curves. A much more reliable and more rapid method of obtaining a final location line has since come into general use, known as "projected location." With all the available information plotted on the preliminary plan, the engineer studies out this plan and profile, thus enabling him to lay down or project upon his plan the best possible line desired, always keeping well in mind the requirements of the completed road, low initial cost and cheapness in operation. In light open country it will be found to best advantage to locate or lay down on the plan the tangents best suited to fit the ground, connecting them up with easy curves. In rough country on the contrary it will be found more advantageous to fit the ground with the best suited curves, linking them up with tangents. This projected line which is now laid down in the field is called the location line. Frequently in rough country where errors in chainage creep in so readily it is found necessary to rerun sections of the location line to get the best suited ground. Such rerunning of line will be done most economically with the survey party in the field, and should not if available, be left for correction to a small revision party which later may be put in the field. Revision should be reduced to a minimum in a well located line.

The location line will be laid out in a manner similar to that employed on the preliminary line with possibly one exception,—all tangents are joined up with regular railway curves. The levels will be taken as before, the leveller as well as transitman, booking any information which is likely to be of value later in obtaining a preliminary estimate of cost or such as may be of value in construction. The topographer should locate all land lines intersected by the location line, should obtain the lot numbers and names of owners at the same time fixing the position of all buildings lying within the proposed right-of-way. He should further give particular attention to determining with reference to centre line the position of all water courses likely to have a bearing on the construction of the line.

Plan and profile should be made of the final location line embracing all of the above information. The Dominion Railway Commission require that plan and profile of final location filed shall be to a horizontal or plan scale of 400′ = 1″ and a vertical scale of 20′ = 1″. On the plan there shall be shown the beginning and ending of each curve with its degree and total angle of curvature, the width of the right-of-way, all varying widths being indicated, the "plus" of every intersecting land line, lot numbers, owner's names, and area of the proposed right-of-way to be taken, the position of all buildings within the right-of-way, and all watercourses of consequence. A book of reference must be compiled giving all right-of-way information. This book of reference is usually attached to one end of the plan. The profile must show all grades and alignment notes, must indicate the nature of the country, and the proposed openings for all watercourses. High water levels for all important watercourses should be marked. All such plans and profiles should be certified to by the president or vice-president of the company, and by the company's engineer.



Section of Plan of Located Line.

Grades.

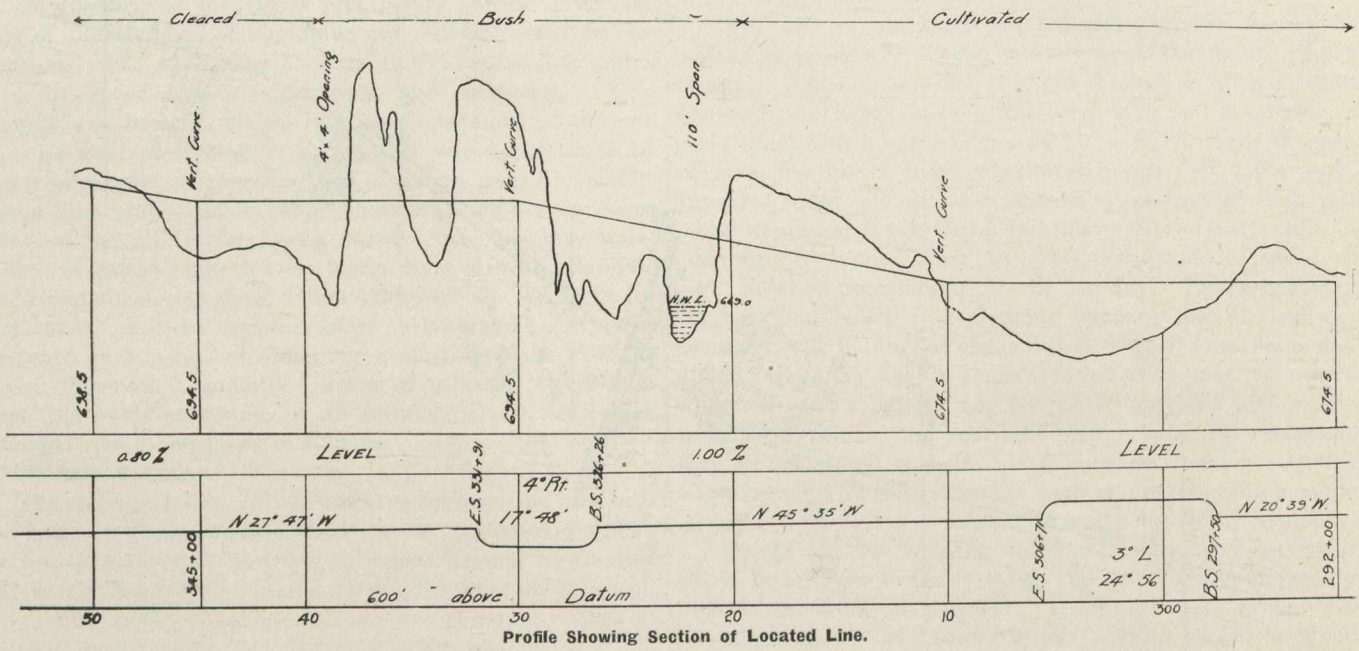
A few remarks with regard to selecting the grade lines. It is usual in construction work to aim at as nearly as possible a balance between excavation and embankment quantities. But just as the lack of material from a cutting does not necessitate a low embankment and heavy grades, neither should good grades be sacrificed in an endeavor to prevent the wasting of material from cuttings. As regards changes of grade, it may be said definitely the summit of a grade

*A minimum distance of 300 feet should be left between curves of opposite direction, while 500 feet is the minimum allowable distance between two curves of the same direction.

should never occur in an embankment nor should the foot of a grade ever occur in a cutting.

Before leaving the question of final location, a few remarks on the standard railroad of to-day will not come amiss. The maximum degree of curvature for this class of road shall be three degrees per 100 feet of curve, all curves of sharpness exceeding 1° per 100′ of length being eased off to their tangents by means of the spiral or transition curve.* The maximum grade shall be 0.4′ per 100′ of length, and shall be compensated for curvature at the rate of 0.04′ per 100′ for degree of curve. The 0.4 per cent. grade represents practically a level line where this ruling grade comes within station ground limits, since the locomotive which can start its train on the level can maintain a speed of 15 miles per hour against this grade. Velocity grades exceeding the ruling grade are not objectionable where such are unavoidable. They are, however, worthy of considerable study by the engineer before making use of the same in his work.

A point of seemingly small consequence in running of railroad location lines but one which has considerable bearing on further developments is the treatment of the land-



Profile Showing Section of Located Line.

owners and their property, through settled districts. The company is, of course, liable to any damage to property accompanying the carrying forward of the survey, but a great many petty and unnecessary annoyances are often heaped upon the property owners through carelessness and disrespect. Landowners through whose property surveys may be carried should be treated with courtesy and respect, by the chief and party, while allowance should be made for the ignorance of the average property owner of such matters, and patience exercised therewith. The members of the location party are probably the first representatives of the railroad company with whom the landowner meets. His first impressions, the most lasting, will be formed from his acquaintance with the location party, and he will base his opinions accordingly. Careful treatment of property and courtesy towards the owners will make the work of the right-of-way agent much easier and more pleasant, and is a matter of economy worthy of consideration by the company. A story is told of a location party which was running line through a certain farmer's property. The farmer who was naturally inquisitive as to why these men should be on his property, went out to make enquiries of them. The chief answered him curtly that he held in his pocket a paper which gave him the right to enter in upon any property, public or private, at such time as suited him. The farmer made no reply, turned on his heel and sauntered back to the barnyard. Here he untied his bull and turned him loose into the field. The bull made straight for the party who perceived him only in time to shin up some nearby trees. The men after waiting vainly for some time in hopes the bull would retire, shouted to the farmer to come and take the animal away. The farmer who could evidently appreciate the joke, shouted back the suggestion that the chief show his paper to the bull.

Es imating.

In closing, we give the details of a preliminary estimate of 100 miles of line actually located and constructed. Preliminary estimates are invariably exceeded. A solution to the difficulty might be found by applying in moderation the method of estimating machine shop work. Carefully estimate the cost of the work and multiply by two. In the present instance the final cost exceeded the preliminary estimate by an amount slightly less than 10 per cent.

Preliminary Estimate of Cost.

(a) Grading (including overhaul, piping and culverts).	
50 miles at $1,650 per mile	$82,500.00
30 miles at $3,500 per mile	105,000.00
20 miles at $6,000 per mile	120,000.00
(b) Right-of-way.—	
520 acres at $200	104,000.00
(c) Rails, fastenings and ties.—	
11,500 gross tons rails and fastenings at $35.	402,500.00
271,000 ties at 40c.	108,000.00
100 miles of tracklaying at $300 per mile	30,000.00
(d) Ballasting.—	
300,000 cubic yards at 35c.	105,000.00
(e) Crossing plank, sign boards, cattle guards.—	
70,000 F.B.M. hemlock at $30	2,100.00
8,000 F.B.M. pine at $40	320,000
(f) Fencing.—	
68,000 rods at 85c.	57,800.00
640 gates at $5	3,200.00
(g) Bridge steel and masonry.—	
300,000 lbs. steel at 5c.	15,000.00

copy of the tenth edition, which to quote the preface, has been made necessary by the "extensive use of plain concrete and the introduction of reinforced concrete."

The book covers a broad field, yet sufficient detail is given to make it clear on all points. The general arrangement of the matter and the very complete index renders it invaluable as a book of reference.

The first seven chapters are chiefly devoted to the characteristics and physical qualities of building stones, brick, cements, and concrete aggregates. The methods of testing and the durability and strength of these materials has been taken up very completely, and considerable space has also been given to the rules for proportioning concrete. A short description of the methods of manufacture and the physical qualities of the "sand-lime" brick is given. A considerable number of examples of costs of raw materials and costs of labor, mixing, and placing of concrete are quoted. We note however that in many cases costs of labor have been given without the very necessary item of the rate of wages per day. The quotations given on such materials as brick, stone, gravel, cement, etc., are of no practical value, since these will depend on local conditions and will in many cases only serve to mislead the reader.

Practically no change has been made in that portion of the book dealing with the various classes of stone masonry. There is however one improvement that might have been made. Reproductions from photographs to show the effects of the various methods of dressing stone would have been far more effective than the cuts given.

It is in the chapters devoted to concrete that the real additions to the book have been made, and this is especially true of the chapters on reinforced concrete. The general theories are stated clearly and concisely.

The applications of the theories of earth pressure to the design of reinforced concrete retaining walls are discussed and the various theories compared. The illustrations are especially good, practically all of them being reproductions of actual walls which have been used by the American railroads.

The space devoted to arches has been considerably increased so as to illustrate the application of the elastic theory to the design of reinforced concrete arches. Professor Baker has succeeded in presenting this rather complex subject in a very clear manner.

The subject of foundations has been given ample space to allow a thorough discussion of the various methods of securing satisfactory foundations. The building of cofferdams and the methods of sinking caissons and other devices necessary for deep or difficult foundation work are described. It is to be regretted, however, that under the heading of piling only slight mention has been made of reinforced concrete piles. While it is only recently that these have been used to any extent on this continent, there is no doubt that they have been successfully used in Europe for some time. A more complete description of the various patented piles, and the methods of driving them, together with some authentic figures as to their capacity would be a valuable addition to the book.—R. E. C. C.

Concrete Steel Construction (Part I.) Buildings.—By C. A. P. Turner, M. Am. Soc. C.E. Farnham Printing and Stationery Company, Minneapolis, Minn. 305 pp. Price $20.

That this work is not primarily intended for use in schools might be inferred from it sprice, but it is worth it to those commercially engaged in the concrete industry. It is not the production of the class room or the laboratory but is essentially the work of a man who has constructed concrete buildings with floor area totalling several hundred acres. The author is well known as the inventor of the "mushroom system" of concrete construction. He has a wide acquaintance with the literature of concrete but is not a prolific writer.

In the work under review he compares the different styles of floor construction and of beam and column reinforcement and gives the results of his experience with many systems. The fearless manner in which he criticises some of the formulæ in common use is quite refreshing. In general he finds little more use for the various mechanical bond reinforcing bars than for a second roof on a building. There is only a brief discussion of theory and the working formulæ adopted by the author are simplified to the utmost at the expense of a slight loss of accuracy.

One object of the work is to explain the "mushroom system." In this has been evolved a distinctive type of concrete construction as opposed to the commoner type of floor beams and joists which is analogous to wood and structural steel construction. The formulæ for bending moment and deflection applied by Mr. Turner to the mushroom system are special cases of well known general formulæ. That for deflection is said to have been found accurate by many tests on completed floors, and the claim is made that the formula for bending moment by which the floor slab and its reinforcement are proportioned since it is based on the elastic properties of the materials may be accepted as accurate when its mate for deflection may be depended upon. In the mushroom system accurate computation thus seems to be a very simple matter contrary to the prevailing ideas.

In the treatment of centreing, bending steel, concreting at various temperatures, the cost of work, surface finish and many other subjects, every paragraph contains shrewd observations, the result of long experience in building work.

A poor system of nomenclature has been adopted for the illustrations, or rather several systems. How is anyone but a spiritualistic medium to find out without much trouble that "Figure C" is to be found next in order to "Figure 28." An index would make the work more useful.—F. B.

Canadian Almanac.—The 1910 edition of the Canadian Almanac just issued by the Copp Clark Company, Ltd., of Toronto, Ont., price 50c., contains many features that mark it as the most valuable of the long list of Almanacs published since 1848. The new almanac contains information on subjects as widely separated as astronomy and mining. It has a list of the post offices of the Dominion, with a wealth of postal information. The Dominion and Provincial Governments; the tariff; the banks of the Dominion and their branches; life assurance companies, and general information regarding the securities of Canada, and price movements on the stock exchanges are given. In addition, there are complete lists of the clergy of all denominations, of the county and township officers, educational institutions and societies. With each almanac is given a valuable map of the Nipissing district, showing the silver regions.

Specification Data.—Specification Data, Ltd., Toronto, and 171 St. James Street, Montreal. Specification Data will be published on the loose leaf system, containing about four hundred pages 9 × 13 inches and will be bound in leather, thus presenting an attractive appearance. A copy will be presented free of cost to architects, to government, civic and railway engineers, and their several construction departments. The chief contractors throughout Canada will also be supplied.

It will contain skeleton specifications, important professional information and data indexed under the proper trade titles in the sequence usually followed by architects and

engineers in compiling specifications, all of which has had the supervision of some of the best men in the profession. It will also conain technical information regarding materials and builders' specialties furnished by manufacturers and dealers, giving detail drawings, dimensions, approximate weights, etc. It will contain no mere display advertising, but such as will conform to the scope and purpose of the work, which is to be essentially a book of reference for architects and engineers.

"Specification Data" is, as its name implies, a systematic compilation of data required by architects in writing specifications. No man would depend upon his memory for all that he requires in compiling specifications for an extensive building, therefore such a work as "Specification Data" is almost indispensable to the profession, and over one hundred of the principal architects of the Dominion have already expressed their satisfaction at the prospect of having a copy furnished them.

The idea underlying this work is that of combining this indispensable information of a professional character with all available data as to various materials and building specialties in the market, and the names of manufacturers and dealers from whom such materials may be obtained. The names and addresses of Canadian manufacturers and dealers in building supplies of any importance, will be found in the directory portion of our book, whether they are advertisers or not.

Portland Cement.—By A. C. Davis, F.C.S., Assoc. Inst. C.E. Published by Woodford, Fawcett & Company, office, Stone Trades Journal, 36-38 Southampton Street, Strand, W.C.

The second edition of this work has been revised and enlarged to such an extent that it may be considered as practically a new work. From the pen of so well-known and experienced a cement manufacturer as Mr. Davis something in the nature of a standard work upon the science and practice of cement manufacture might be looked for, and a perusal of the volume, which runs to some 500 pages, certainly seems to confirm the anticipation.

As the title denotes, the author confines the work to a consideration of the manufacture, testing and uses of Portland cement, and does not, as is usually the case in existing British and American works on this subject, treat of calcareous cements generally—nor of the technicalities of the manufacture in particular.

While the cement manufacturer will naturally appreciate the exhaustive manner in which the process of manufacture is explained, and the various methods of burning, grinding and testing are dealt with, the engineer, architect and consumer generally will find much that is of interest in the sections relating to the testing and uses of Portland cement and the qualities necessary to ensure the permanent efficiency of concrete.

The book is copiously and carefully indexed, and contains details of the British and principal foreign standard specifications. It is a massive work, beautifully printed on excellent paper in the best style, while the numerous illustrations are splendidly executed, and form an elaborate and helpful addition to the letterpress, the preparation and compilation of which bears magnificent tribute to the ability and industry of the author.

Hydro-Electric Development and Engineering.—By Frank Koester. Published by D Van Nostrand Co., New York; 454 pages, 500 illustrations. Price, $5 net.

The book contains a comprehensive review of the more recent developments in the design of hydro-electric plants, discussing all phases of the work from the investigation and engineering of a proposition to its final construction. The value of the book is enhanced by the international nature of its data, which represents the most advanced American and European practice. The book is divided into parts and chapters, of which just one deals with the complete development of the power plant, discussing the investigation of the proposition, the laws of Hydraulics, Dams, Headraces and Penstocks, with chapters on the general design and selection of turbines, generators and switching equipment. The power plant arrangement is ably treated, with illustrations from latest construction.

Part II. deals with the design and construction of high-tension transmission lines, substations and protective apparatus, discussing the most recent features in the design of this equipment.

Part III. contains a comprehensive description of eight typical hydro-electric plants of modern design, of which one is in Canada, one in the United States, one in Mexico, and five are in different parts of Europe. The work is profusely illustrated, is well written, and contains a large amount of information, with several new features of design which are of value, and should prove of use to those interested in the design of hydro-electric plants.—F. A. G.

Heavy Electrical Engineering.—By H. M. Hobart. Published by Archibald Constable Co., Limited, London, and Copp, Clark Co., Limited, Toronto. 338 pages, 188 illustrations, 101 tables. Price, $4.80 net.

The word "heavy" in the title distinguishes the book from other works on electrical engineering. The routine descriptive material and the elementary generalities regarding electricity and magnetism have been omitted, their place being taken by an introductory chapter discussing the units used throughout the book, the relation of heat to temperature and the transformation of energy. The author continues by fully discussing the overall efficiency of generating stations and the relation between coal consumption and the outgoing electrical energy. This is followed by a discussion on the correct combining of component pieces of apparatus, as steam-raising plant, piston engines, steam turbines, condensing plant, and electric generating plant, for efficient service in aggregates denoted as generating stations, the design of which is taken up in detail. High-tension power transmission lines, both overhead and underground, are discussed in detail, and a chapter is devoted to the high-tension, continuous current system, which is pointed out as forced idea, and unreasonable for transmission of large amounts of power and high voltages. Considerable space is devoted to electric traction calculations, traction motors, and the electrification of railways, the engineering features of which are fully discussed. Although design details are omitted, the whole book is arranged for the use of the designing engineer, and contains a large amount of data presented in the form of curves, tables and diagrams, which are fully discussed in the text. The work is crowded with illustrations and practical examples, based evidently upon the author's experience and data obtained from a large number of generating stations. The treatment throughout is interesting, and should prove of use to designing and constructing engineers.—F. A. G.

PUBLICATIONS RECEIVED.

Westinghouse Diary for 1910.—The Canadian Westinghouse Co., of Hamilton, Ont., are distributing handsome leather-bound, vest pocket size diaries for 1910. Besides much technical and general information of great value, there are maps and calendars which those obtaining copies will often appreciate.

Geology and Economic Minerals of Canada.—By G. A. Young. Published by the Department of Mines, Ottawa, Canada. Size, 6 x 9, pages 150. Introduction written by R. W. Brock.

Report on a Comprehensive Plan for Systematic Civic Improvements in Toronto.—Issued by the Toronto Guild of Civic Art. 9 x 12, 50 pages. W. S. B. Armstrong, secretary, 96 King Street West, Toronto.

Gas Firing.—By Ernest Schmatolla. Published by Hughes & Harber, Longton, Stokes-on-Trent, Eng. A lecture given before the English Ceramic Society.

Concrete in Railroad Construction.—Published by the Atlas Cement Co., 30 Broad Street, New York. Price, $1. Size, 6½ x 8½; pages, 230. A treatise on concrete for railroad engineers and contractors.

Polar Planimeter.—By Frank J. Gray. Published by St. Bride's Press, 24 Bride Lane, Fleet Street, London. Price, 35 cents. Size, 5 x 7; pages, 60. A simple treatise, telling how to use and operate the planimeter.

Cost-keeping and Management Engineering.—By Halbert P. Gillette and Richard T. Dana. The Myron C. Clark Publishing Co., Chicago. Price, $3. Size, 6 x 9; pages, 350. A treatise for engineers, contractors and superintendents engaged in the management of engineering construction.

CATALOGUES.

Feed-Water Filtration.—An interesting treatise on the removal of organic matter, sediment, lubricating oils, etc., from the boiler feed-water in power plants and on the removal of any matter in mechanical suspension in liquids, as accomplished by the publishers, James Beggs & Co., 109 Liberty Street, New York, U.S.A., from whom copies may be obtained on request.

Water Softening and Purifying for Steam-raising and Industrial Purposes is a forty-page booklet, replete with valuable data and illustrations. It is published by the Paterson Engineering Co., Limited, of London, Eng., who are represented in Canada by Messrs. Laurie & Lamb, 211-212 Board of Trade Building, Montreal, Que.

Gas Kilns.—A fifteen-page booklet, with line drawings and illustrations relating to gas kilns, shaft kilns, with generator gas firing, is being distributed by Ernest Schmatolla, metallurgical engineer, 150 Nassau Street, New York city, who was recently awarded the contract for installing a producer gas-fired lime kiln at Lethbridge, Alta.

Reinforced Concrete Construction for Buildings and Bridges is the title of a booklet devoted to the Turner system. Canadian representatives are Clarke & Monds, 36 Toronto Street, Toronto, and J. Woodman, "Free Press" Building, Winnipeg, Man.

Highway Bridges.—Standard plans for reinforced concrete short-span highway bridges, designed by Mr. Wilbur J. Watson, Mem. Am. Soc. C.E., of Cleveland, Ohio, are dealt with in a booklet recently published.

Graphite as a Lubricant.—Every two or three years the Dixon Company publishes "Graphite as a Lubricant," which has become a standard work. Each new edition is thoroughly revised. The present edition is more compact than its predecessors, the idea being to concentrate the information into convenient form. The power house engineer will find the publication of considerable value, since it deals especially with the lubrication and treatment of power house machinery. A complimentary copy will be forwarded upon application to Joseph Dixon Crucible Company, Jersey City, N.J.

ENGINEERING SOCIETIES.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, George A. Mountain; Secretary, Professor C. H. McLeod.

QUEBEC BRANCH—
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, J. G. G. Kerry; Secretary, E. A. James, 62 Church Street, Toronto. Meet last Thursday of the month.

MANITOBA BRANCH—
Chairman, H. N. Ruttan; 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.

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, R. Percy Barnes, Edmonton; Secretary, H. M. Widdington, Strathcona, Alberta.

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, Alfred E. Uren, 62 Church Street, 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 MINING INSTITUTE.—Windsor Hotel, Montreal. President, W. G. Miller, Toronto; 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, C. A. Jefferis; Secretary, C. L. Worth, 409 Union Station. Meets third Tuesday each month except June, July, August.

DOMINION LAND SURVEYORS.—Ottawa, Ont. Secretary, T. Nash.

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

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

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 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, Louis Bolton; Secretary, Killaly Gamble, 703 Temple Building, Toronto.

ROYAL ARCHITECTURAL INSTITUTE OF CANADA.—President, A. F. Dunlop, R.C.A., Montreal, Que.; Hon. Secretary, Alcide Chausse, 5 Beaver Hall Square, Montreal, Que.

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, Wm. McNab, G.T.R., Montreal, Que.; 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. Andrew Allen, President; J. H. Warder, Secretary.

RAILWAY EARNINGS AND STOCK QUOTATIONS

NAME OF COMPANY	Mileage Operated	Capital in Thousands	Par Value	Week Ending	Total Since January 1st, 1909	Total Since January 1st, 1910	Stock Quotations Toronto: Price Jan. 6 '09	Price Dec. 23 '09	Price Jan. 6 '10	Sales Week End'd Jan. 6
Canadian Pacific Railway...	8,920.6	$150,000	$100	Jan 7	$1,098.000	$1,315 000	175½	184	179	180	2
Canadian Northern Rail'y.	3,180	.....	.....	"	145.000	174,900	.....	.....	.....	.....	.....
*Grand Trunk Railway ...	3 536	226,000	100	"	536.240	654,885	*1st. pref. 105½, 3rd pref. 50½, ord'y 20½.				
T. & N. O.....	334	(Gov. Road)	.....	"	.....	.....	.....	.....	.....	221	220¾	.....
†Montreal Street Railway ..	138.3	18,000	100	Jan. 8	67 532	73,085	.....	.....	.....	.....	.....
Toronto Street Railway,...	114	8.000	100	"	65,811	74.415	108	107	127	126½	128	178
Winnipeg Electric	70	6.000	100	"	.....	.....	.....	182½		182	.....
†Halifax Electric.....	13.14	1,400	100	"	3,287	3 555	.....	.....	.....	125	.....	.....

* G.T.R. Stock is not listed on Canadian Exchanges. These prices are quoted on the London Stock Exchange.
† Quoted from Montreal Exchange.

WEEKLY EARNINGS

NAME OF COMPANY	Traffic Returns for Week: Ending	1909	1910	Previous Week
Canadian Pacific Railway.	Jan. 7	$1,098 000	$1,315,000	$2,588.000
Canadian Northern Rail'y..	"	145,300	174,900	325,900
Grand Trunk Railway	"	536,240	654,885	1,140,943
T. & N. O.....	"	.....	.....	54,030
Montreal Street Railway...	Jan. 8	77,532	73,085	74,492
Toronto Street Railway....	"	65,811	,415	.....
Winnipeg Electric.....	"	.....	.....	.....
Halifax Electric	"	3,287	3,555	.....

RAILWAY ACCIDENTS.

For December, 1909, With Comparisons.

Figures compiled by the Canadian Engineer show that thirty-one persons were killed and sixty-five injured on the railways of Canada during the month of December. There is nothing unusual about the accompanying record for that month. Although the number of passengers injured is large, the injuries were not of a serious character in the majority of cases.

Here are the figures for the last six months of 1909, as compiled by The Canadian Engineer:—

Electric Railways—December, 1909

	Killed.	Injured.
Fell off	0	1
Struck	4	5
Run over	3	..
Totals	7	6

Steam Railways—December, 1909

	Employees. Killed.	Inj'd.	Passengers. K.	I.	Others. K.	I.	Total. K.	I.
Trespassing	..	..	..	..	10	2	10	2
Level Crossing....	..	..	..	..	6	..	6	..
Collision	1	1	..	22	..	..	1	23
Fell off	..	..	1	..	..	..	1	..
Shunting	3	2	..	..	..	..	3	2
Boarding Moving Train	..	..	1	..	..	..	1	..
Derailment	..	2	..	30	..	..	..	32
Fell between cars..	1	..	..	..	..	..	1	..
Working on track..	1	..	..	..	..	..	1	..
Totals	6	5	2	52	16	2	24	59

Electric Railways

1909.	Killed.	Injured.
December	7	6
November	18	7
October	2	28
September	7	32
August	3	27
July	5	24
Totals	42	124

Steam Railways

1909.	Passengers. Killed.	Inj'd.	Employees. K.	I.	Others. K.	I.	Total. K.	I.
December	2	52	6	5	16	2	24	59
November	2	1	44	19	21	8	67	28
October	3	4	25	30	11	6	39	40
September	0	5	18	15	15	7	33	27
August	4	5	6	8	22	2	32	15
July	3	12	26	12	22	7	51	31
Totals	14	79	125	89	107	32	246	200

ONTARIO ELECTRIC RAILWAYS.

From week to week we propose to give, on our page devoted to transportation interests, particulars of the equipment, mileage, and other information regarding the railways of Canada, together with a list of the officials. This series of articles commenced in our issue of October 1st.

Previously Given:—

Brantford and Hamilton Railway.
Chatham, Wallaceburg and Erie Railway.
Cornwall Street Railway.
Guelph Radial Railway.
Galt, Preston and Hespeler Railway.
London St. Railway.
International Transit Co., Sault Ste. Marie.
Kingston, Portsmouth & Cataraqui Elec. Ry., Kingston
Toronto & York Radial Railway.
Windsor, Essex & Lake Shore Railway.
Ottawa Electric Railway.
Southwestern Traction Co., London.
Toronto Street Railway.
Niagara, St. Catharines and Toronto Railway.
Peterborough Radial Railway.
Berlin and Waterloo.

TORONTO SUBURBAN STREET RAILWAY COMPANY.

President, Allan H. Royce.
Secretary-treasurer and general manager, G. C. Royce
Chief engineer, S. Gagne.
Purchasing agent, G. C. Royce.
Kind of Road: Trolley.
Suburban and street.
Length of Road, in Miles:
Single track, 9.81.
Character of Service:
Car equipment No., 14.
Type, single truck.
Power of motors, 30 h.p.
Number of motors, 2.
Method of controlling, G. E. controller, K. 10.
Method of braking, hand.
Gauge of tracks, 4-10½.
Weight of rails, 56 Tee, 72 girder.
Power:
Direct and alternating current.
Voltage of transmission, 600.
Trolley voltage, 575.
Frequency of transmission for A. C., 25
Number of phases, 3.

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.

Dorval, Que.—Tenders will be received until 18th January, for the construction of about 6,000 feet of cement sidewalk, in the Town of Dorval. Plans, etc., can be examined at the office of the engineer, V. H. Dupont, 62 St. James Street, Montreal. Alphonse Decary, Secretary-treasurer, Town of Dorval, 415 New York Life Building, Montreal, Que.

Howick, Que.—Tenders will be received up to the 25th January, by the Municipal Council of the Parish of Tres St. Sacrement, in the County of Chateauguay, for the furnishing of the necessary material, and the building of the concrete abutments for the Allen's Corners bridge. Also, the erection of the iron and steel structure for the same bridge. D. R. Hay, Secretary-treasurer, Howick.

Montreal, Que.—Tenders are invited until January 14th, for all trades in the erection of Mill buildings for the Shawinigan Cotton Company, at Shawinigan Falls, Quebec. T. Pringle & Sons, engineers and architects, 419 Coristine Building, Montreal.

Montreal, Que.—Tenders are invited until Monday, January 17th, for

(a) 5,000 feet double jacket cotton fire hose, rubber-lined, 2½ inches in diameter, with couplings, "Higby" thread.

(b) 125 salvage covers.

(c) 1 steam fire engine, capacity 800 U. S. gallons per minute.

(d) 1 75-foot aerial ladder truck.

Specifications may be obtained from the chief of the Fire Department, corner Craig and Chenneville Streets. L. O. David, city clerk

London, Ont.—New tenders will be invited for the electrical equipment required at the power station. The former specifications are said to have contained too many alternative propositions. The machinery required includes transformers, motor generator set, voltage regulators, switchboards, lightning protectors, instruments, arc and incandescent street lighting systems, and E. I. Sifton is the chief electrical engineer.

Midland, Ont.—Tenders are invited until February 1st for the following hydraulic equipment:—

For Generating Station at Big Chute, Severn River:
- Hydraulic Equipment
- Penstocks
- Eectrical Equipment

For 27 Mile Transmission Line:
- Wire
- Insulators
- Crossing Towers

For receiving Station at Midland:
- Electrical Equipment

C. H. & P. H. Mitchell, Traders Bank Building, Toronto, Ontario, are the consulting engineers. Tenders should be addressed to Mr. W. Finlayson, secretary, Simcoe Railway and Power Company, Head Office, Midland, Ontario. (Advertised in The Canadian Engineer).

Toronto, Ont.—Tenders are invited until Tuesday, January 18th, for the construction of sewers on Dingwall, Albany and Campbell avenues. Mr. C. H. Rust, City Engineer; Mr. G. R. Geary (Mayor) Chairman, Board of Control

Toronto, Ont.—Tenders will be received up to Tuesday, January 18th, for the supply of timber piles and driving of same for the bridge on the extension of Wilton Avenue crossing over the River Don. Specifications may be seen and forms of tender obtained at the office of the city engineer. Joseph Oliver (Mayor), Chairman of Board of Control.

Dauphin, Man.—Tenders for Post Office Fittings, will be received until Monday, January 24. Plans and specifications to be seen on application to Mr. T. H. Richards, Dauphin, and at the Department of Public Works, Ottawa, Ont. Napoleon Tessier, Secretary.

Winnipeg, Man.—Tenders will be received on the 22nd of January for erection of substructure of bridge over the Saskatchewan River at Outlook. Plans and specifications may be seen and forms of proposal obtained at the following offices: A. L. Hertzberg, Division Engineer, Toronto; C. N. Monsarrat, Bridge Engineer, Montreal; N. E. Brooks, Division Engineer, Calgary, Alta.; C. E. Cartwright, Division Engineer, Vancouver, B.C.; and J. E. Schwitzer, Assistant Chief Engineer, Winnipeg, to whom tenders should be addressed.

Winnipeg, Man.—Tenders will be received up to Tuesday, February 15, for the supply and erection of the various portions of the equipment for the terminal station at Winnipeg, and for the turbine governors and gate valves for the generating station. Specifications and plans, etc., may be seen at the office of Messrs. Smith, Kerry & Chace, Confederation Life Building, Toronto, and Carnegie Library Building, Winnipeg. Individual tenders will be received for:—

18. Terminal station.

19 and 20. Step-down transformers and terminal station switching and accessory apparatus.

21. Terminal station, light, heat and power systems.

22. Terminal station, light, heat and power systems

24. Testing transformers and apparatus.

26. Turbine governors (seven).

27A. Two five-foot gate valves.

M. Peterson, Secretary, Board of Control.

Winnipeg, Man.—Tenders will be received until January 22nd, for all trades, for the erection and completion of a solid brick apartment block on Sherbrooke street. Smith & Bruce, architects, 222 McDermot Avenue.

Winnipeg, Man.—Tenders for supply of 120 feet of 26-inch 8-ply elevator belting delivered at the City Quarry, Stony Mountain, will be received up to Friday, January 28th. M. Peterson, Secretary, Board of Control.

Estevan, Sask.—Tenders for Post Office Fittings, Estevan, will be received until Friday, January 21st. Plans and specifications to be seen on application to G. F. Faulkener, Estevan, and at the Department of Public Works, Ottawa, Ont. Napoleon Tessier, Secretary.

New Westminster, B.C.—New tenders will be invited by this municipaltiy for the construction of an incinerator, none of the propositions recently submitted being considered feasible. Mr. S. W. Blackman is the city engineer.

Victoria, B.C.—Adkison, & Dill, contractors, for Times' building, require tenders for excavation, cut stone, electric work, sheet metal and roof, lumber, cement, sand, gravel and iron work. H. S. Griffith, architect, Promis Block.

Gordon, Ala., U.S.A.—Sealed bids will be received until March 15th, for the construction of 51 miles of graded roads in Houston County. The plans and profiles are at the office of Probate Judge, Dothan, Ala., copies of which will be sent upon request. Address W. J. Parish, County Commissioner, Gordon, Ala.

Weatherford, Okla., U.S.A.—The City of Weatherford, will receive sealed bids until Friday, January 28th, for the construction of a concrete septic tank of about 84,000 gallons capacity, two sand filter beds 60′ x 100′ x 3′ - 3″, 32,450′ of 6″, 9,400′ of 8″, 7,770′ of 10″, 4,770′ of 12″, 1,450′ of sewers of the first quality pipe, together with manholes, lampholes and other appurtenances. Also the construction of a water works standpipe 24′ diam. by 40′ high, one 18′ x 72″ high pressure boiler, return tubular, full flush front, an air lift pumping system for five wells, one duplex force pump of about 900,000 gallons capacity, 36,000′ of different size water

mains with valves, hydrants, etc., etc. Plans and specifications are on file with and blanks may be obtained from W. K. Cunningham, City Clerk, Weatherford, Okla., or J. L. O'Hearn, Consulting Civil Engineer, Clinton, Okla.

CONTRACTS AWARDED.

Hamilton, Ont.—The Hamilton Street Railway Company have ordered nine new cars from the Ottawa Car Company, Ottawa.

Hamilton, Ont.—The Smart-Turner Machine Company, Limited, have been awarded the following contracts amongst others:—Hamilton Steel & Iron Company, a duplex pump; McQuary Tanning Company, Owen Sound, a duplex pump; Manitoba Wind Mill and Pump Company, Brandon, a 5-ton hand power travelling crane; Allen Shoemaker, Berlin, a centrifugal pump.

Cobourg, Ont.—For the construction of a tile drain the following tenders were received:—

Successful bidder:—
Samuel Cann, Cobourg, 80c. per foot; build man-holes, flush tank and finish job.

Other bidders:—
Alex. Sharp, Acton, 2,000 feet for $1,767.00
N. B. Horton, Owen Sound $2,500.00
J. H. McKnight Construction Co., Toronto..... $1,900.00
and manholes $45.00 each, junctions 75c. each.
Clement & Curran, Orillia, 2,050 feet..(complete) $3,461.00
Excelsior Constructing & Paving Co., Limited....$1,745.00
Pet. Nicholson, North Bay, per foot..... $1.20
Elliott & Riley, St. Catharines .....(complete) $2,330.00
Jno. F. Connoly, Toronto ..... " $2,400.00

Winnipeg, Man.—John Gunn & Sons of Winnipeg, have been awarded a contract for additions to the piers of the Louise bridge at $13,890.

Victoria, B.C. — Alex. Watson, jr., is building a new steamer 125 ft. long with a 26-ft. beam for the British Columbia Express Company at an estimated cost of $40,000. The Marine Iron Works of Chicago will supply special machinery which cannot be obtained in Canada within the requisite time.

RAILWAYS—STEAM AND ELECTRIC.

St. John, N.B.—Construction work on the east end of the Grand Trunk Pacific, owing to the unusual mild weather, is still going on. In New Brunswick the rails have been laid from Cains River westward as far as Nappadoggan Lake, where in the heart of the great Mirmimachi forest a divisional point has to be established. This work is being done by the Toronto Construction Company and the work will be continued so far as possible during the winter.

Montreal, Que.—At a meeting of the G. T. R. directors on Friday, January 7th, Mr. Charles M. Hays, was officially made president of the system. Mr. E. H. Fitzhugh becomes first vice-president; Mr. Wainwright second vice-president; and M. M. Reynolds third vice-president. Mr. R. S. Logan, who has long been associated with Mr. Hays, is appointed assitant to the president. Mr. Hays retains the general managership.

SEWERAGE AND WATERWORKS.

New Westminster, B.C.—The Richmond water agreement, whereby New Westminster agrees to supply the neighboring municipality with water, has been signed. For $125,000 the city of New Westminster agrees to connect the reservoir at Queen's Park, by a 24-inch steel pipe with the city's waterworks system at Coquitlam lake, and to lay a 12-inch steel pipe from the reservoir to a point near the westerly end of Lulu island, whence the water will be conveyed to the different parts of the municipality of Richmond. The city will keep the pipes in good repair for twenty years.

CEMENT—CONCRETE.

Howick, Que.—For the construction of concrete abutments, for the Allen's Corners bridge, D. R. Hay, secretary-treasurer of the municipal council, Parish of Tres St. Sacrement, invites tenders until January 25th.

Montreal, Que.—V. H. Dupont, 62 St. James Street, has plans and specifications for 6,000 feet of cement sidewalks for the construction of which Alphonse Decary, secretary-treasurer of the Town of Dorval invites tenders until January 18th.

LIGHT, HEAT, AND POWER

Montreal, Que.—The water power in the Rouge River at Huberdeau, P.Q., has been sold to the Arundel Lumber Company, Ltd., of Ottawa, for pulp purposes. A head of 26 feet can be obtained and about 2,500 horse-power and the company owns limits in the river sufficient to supply the mill. Mr. W. E. Bradley, C.E., of Montreal, was instrumental in putting this deal through.

Calgary, Alta.—City Engineer Child, in a recent report to the commissioners, points out the advisability of establishing a new power plant without delay, and suggests a site in Victoria Park as suitable.

Edmonton, Alta.—Walter J. Francis, consulting engineer, of Montreal, has been retained by this city to report on the power plant and other civic utilities.

Revelstoke, B.C.—The city council have decided to enter into a five-year contract to supply the C.P.R. with power from the 1st May, at $2.25 per kilowatt hour for from 75 to 150 h.p. A new power plant is being installed by the municipality.

Pittsburgh, Pa.—Orders have been received at the East Pittsburg shops of the Westinghouse Electric & Manufacturing Company for the early completion of the entire complement of electric locomotives for the New York terminal station of the Pennsylvania Railway. The contract calls for fifty locomotives in single units, to be constructed in accordance with designs made by the department of electric motive power of the Pennsylvania Railway and the engineers of the Westinghouse Company. The engines embody the latest features in electric railway construction and design. They can be operated as a single or double unit, and are said to be the largest vehicles for railroad transportation ever built. Each single locomotive is operated by an electric motor of 2,000 horse power. One of these double locomotives is equal in drawing capacity to three ordinary freight locomotives and will run sixty miles an hour. The Westinghouse Company has already completed and delivered two of the giant locomotives, which in the tests made on the Long Island division of the Pennsylvania Railway fulfilled every expectation. These tests resulted in the order for the completion of the engines, and it is expected that all will be delivered by July 1st, 1910.

PERSONAL.

Mr. W. D. Pender has changed his address from Morinville, Alta., to 234 Colony Street, Winnipeg, Man.

Mr. Willis Chipman, consulting engineer, has moved from 103 Bay Street to larger offices in the Mail Building, Toronto.

Mr. Edward M. Merrill, consulting engineer, has moved his offices to the Toronto General Trust Company's building, Yonge Street, Toronto, from the Lawlor building.

Dr. Ernst J. Lederle, Ph. D., of Lederle & Provost, consulting sanitary engineers, New York City, has been appointed health commissioner for the city of New York.

Messrs. Fullerton & Pierce, surveyors, have opened an office at Haileybury, Ont. Until recently Mr. C. H. Fullerton was government engineer on the new wagon road at Gow Ganda.

Mr. Matthew Jos. Butler, L.L.B., Mem. Can. Soc. C.E., has resigned his position as Deputy Minister of Railways and Canals, Ottawa, to become general manager and second vice-president of the Dominion Iron and Steel and Dominion Coal Companies. Mr. Butler was also chief engineer and chairman of the Intercolonial Railway Board of Management.

Mr. J. Darlington Whitmore, A. M. Can. Soc. C. E., recently resigned his position as city engineer of Moose Jaw, Saskatchewan, to take up private work. He will open an office in Regina, Sask., at the corner of Scarth and Railway Streets, as a consulting, sanitary and municipal engineer, specializing in sewerage, sewage disposal and pure water supply questions. Mr. Whitmore's experience will count for much in his new work.

The Roberts Filter M'f'g Co. announce the removal of their office and works from 30th and Chestnut Streets, Philadelphia, to their new factory building, Sixth Street, Columbia Avenue and B. & O. Railroad, Darby, Philadelphia, Penna.

Mr. Godfroi Langlois, M.P.P., for St. Louis division, Montreal, has been appointed secretary of the Canadian branch of the International Waterways Commission by the Federal Government. Mr. Langlois for the past seven years has been managing director and editor of Le Canada.

Mr. W. L. Lawson, B.A. Sc., a graduate of Toronto University, who has been manager of the Stirling Sugar Factory for some years, was recently appointed to the managership of two other factories under the control of the Great Western Sugar Company, of Denver, Colo., in addition to that which he already holds. Mr. Lawson's address is Stirling, Colo.

Mr. J. W. Coyle, who was connected with the Best American Calorific Company until they retired from business, is now with the Rockwell Furnace Company, making a specialty of oil and gas furnaces for railroad work. Mr. Coyle is an experienced railroad man, having formerly been master blacksmith for the "Lehigh" at Wilkes-Barre, and later in charge of the drop hammer and machine department at the forge shops of the "Reading" at Reading, Pa.

Mr. W. H. Biggar, K.C., formerly general solicitor for the Grand Trunk Railway and the Grand Trunk Pacific, becomes general counsel through changes recently made in the legal department of those roads. The office of general solicitor is abolished. Mr. D'Arcy Tait is appointed solicitor of the Grand Trunk Pacific Railway, with headquarters at Winnipeg. Other appointments in the legal department of the Grand Trunk Railway are:—Mr. M. K. Cowan, K.C., solicitor; Mr. W. E. Foster, assistant solictor.

OBITUARY.

Mr. Basil D. D. Rorison, aged 26 years, a civil engineer on the Detroit River tunnel construction, was instantly killed on Saturday morning, January 8th, by falling down shaft No. 1, at the Canadian approach to the M. C. R. tunnel.

ENGINEERING SOCIETY NOTES.

Canadian Forestry Association.—The annual convention of the above society will be held at Fredericton, N.B., on Wednesday and Thursday, February 23rd and 24th. James W. Lawlor, secretary, Toronto.

The Nova Scotia Society of Engineers.—The regular monthly meeting of this society was held at Halifax, N.S., on Thursday, January 13th, in the Nova Scotia Technical College, when transportation in relation to Nova Scotia was discussed by members from the different parts of the province.

Central Railway and Engineering Club of Canada, Toronto.—The regular monthly meeting of the above club will be held in the Assembly Room, Prince George Hotel, on Tuesday, January 18th, at 8 p.m., when a paper will be read on "Heat Regulation" by J. Bannon, chief engineer, City Hall, Toronto.

Engineers' Club, London, Ont.—Graduates of the School of Practical Science, Toronto resident in or near London, Ontario, have organized a society for engineers in that city. Those interested include:—E. I. Sifton, city electrical engineer, C. Talbot, W. C. Cooper, W. Ferguson, A. C. Spencer, B.A.Sc.; J. A. Stiles, B.A.Sc.; C. Moore B.A.Sc.; L. S. O'Dell, J. Nash, P. G. Delford, B. Haymen, R. H. Cunningham, F. Brickenden, H. Roblin, W. Lawrence, H. Eckert, L. P. York, C. Smith, W. Kelley, R. Pickard, Mr. Fiddes, H. McKenzie, J. McKenzie, C. Flynn and D. Harvey.

Canadian Society of Civil Engineers, Toronto Branch.—The annual meeting of the Toronto branch of the Canadian Society of Civil Engineers was held last Thursday evening, January 6th, when the following officers were elected for 1910: Chairman, Mr. A. W. Campbell, Deputy Minister of Public Works, Ontario; secretary-treasurer, Mr. Peter Gillespie, lecturer in applied mechanics, Toronto University; councillors, Mr. T. S. Scott, assistant city engineer; Mr. T. C. Irving, jun., Mr. O. W. Smith, Mr. N. H. McLeod, and Mr. A. W. Connor. Mr. Cecil B. Smith presided at the meeting, prior to which a dinner was held at the St. Charles.

Engineering Society, Toronto University.—The Ontario member sof the Canadian Manufacturers' Association connected with industries pertaining to engineering are to be entertained at the 21st annual dinner of the Engineering Society at the Faculty of Applied Science of the University of Toronto, to be held on Wednesday, January 19th, in Convocation Hall Annex. It is interesting to note the growth of the Engineering Society since its organization. Professor H. E. T. Haultain, C.E., was its first student president. It had then a membership of 36. Mr. W. D. Black, '09, the present president, reports an enrolment of over 600 hundred members.

Royal Astronomical Society.—The Royal Astronomical Society at the annual meeting last Tuesday evening in Toronto, elected the following officers:—Hon. president, Dr. W. F. King, C.M.G., Ottawa; president, Professor Alfred T. De Lury, Toronto; first vice-president, Professor Louis B. Stewart, Toronto University; second vice-president, Mr. J. S. Plaskett, Ottawa; secretary, Mr. J. R. Collins, Toronto; treasurer, Mr. Charles P. Sparling; recorder, Miss Elsie A. Dent, Toronto; librarian, Mr. A. Sinclair, M.A., Ottawa; curator, Mr. R. S. Duncan. Council, Messrs. Joseph Pope, C.M.G., Ottawa; Rev. I. J. Cavanagh, Montreal; R. M. Stewart, Ottawa; H. B. Collier, Peterborough; Wm. Bruce, Hamilton and A. F. Miller, Toronto; G. Parry Jenkins, Hamilton; Dr. Otto Klotz, Ottawa; Rev. Dr. Marsh, Peterborough; Andrew Elvins, John A. Paterson, K.C., R. F. Stupart, Director, Dominion Meteorological Service, Toronto; Professor Chant and W. B. Musson.

Engineers' Club, Toronto.—A meeting of the Engineers' Club was held last Thursday evening, January 6th, when the resignation of Mr. Willis Chipman, C.E., president-elect, was accepted, Mr. C. M. Caniff succeeding. Mr. A. F. Macallum, city engineer, of Hamilton, was elected first vice-president. Editorial representatives of the Canadian technical press discussed the relations of the engineer to the technical press. The speakers unanimously agreed that there had been a marked improvement in the character of technical literature in Canada during the past few years. The technical press had been a great educational factor, and it was only by the earnest co-operation of the profession that the standard of the literature published could be maintained. The Canadian journals were recognized in other countries as a live force in engineering journalism. The text-book of to-morrow was practically a rehash of the technical press of to-day. K. A. Mackenzie, B.A.Sc., editor of Applied Science, thought the press should lead, not follow, its general object of placing before the engineering world reports and investigations of importance. Others taking part included George Keith, Ivan S. Macdonald, J. C. Armour, E. A. James and A. E. Uren.

MISCELLANEOUS.

Sydney, N.S.—Ratepayers almost unanimously favored the establishment of rolling mills here. The company which proposes to commence construction work in the spring, includes Henry McArel of Glace Bay, C. V. Wetmore and Henry Mitchell of Dominion, and F. A. Crowell of Sydney. Their buildings and plant will probably cost about $550,000.

London, Ont.—Negotiations for the acquisition of the Southwestern Traction line, or the London & Lake Erie Transportation Company, as the new concern is called, by the Grand Valley Railway are under way. Mr. Murray A. Verner of Brantford is president of the Grand Valley.

Toronto, Ont.—A new company, known as the International Tool Steel Company, Limited, was recently incorporated under the Ontario Companies Act to manufacture high grade steel for tools, planes, lathes, drills, cutlery and dental and surgical instruments. The company, which is capitalized at $750,000, has offices in the Traders Bank Building, Toronto, and Mr. John J. Main, vice-president and general manager of the Polson Iron Works is said to be a provisional director. It is thought the works will be located at Welland, Ontario.

Ottawa, Ont.—Engineers representing two big German bridge-constructing firms are now examining the Quebec bridge plans with a view of tendering.

Ottawa, Ont.—Justice Cassels recently awarded compensation amounting to $47,216, with interest, to James W. Brown, who sued the Dominion Government for damages caused by the flooding of some 1,277 acres of land belonging to him on the Qu'Appelle River in Saskatchewan by erecting a dam at Craven, below the junction of the Qu'Appelle River and the outlet of Long Lake, or Last Mountain Lake, for the purpose of improving the navigation of Last Mountain Lake. The effect of the dam, which was erected in January 1906,

was to hold back the waters of the river and cause them to overflow the meadow lands of the defendant, destroying the land for hay purposes, the only use to which they could be put by the defendant. The amount of the compensation is based upon a valuation of $25 an acre for the land flooded, and includes certain other elements of damage sustained by the defendant.

Tofield, Alta.—Grand Trunk Pacific Engineer Tait is making surveys for the proposed water supply plant from Beaver lake to Tofield, two miles. The company will build an elevated tank and roundhouse here.

Lethbridge, Alta.—City Engineer Arnold recently presented to the council his estimate of public works expenditure for 1910. It includes: For street grading, $35,000; for walks, $60,000; water, $28,000; sewers, $35,000; plank walks, $3,500, making a total of $167,500.

Regina, Sask.—The City of Regina invites negotiations with capitalists, for the purpose of obtaining proposals for a special franchise for street car services and gas works, for the city, subject to the right of the city to take over the undertakings at the expiry of a definite term of years, at a price to be fixed by arbitration, or in such other manner as may be agreed on. Mr. Angus Smith, City Engineer.

Detroit, Mich., U.S.A.—Northern Engineering Works, builders of "Northern Cranes," have purchased additional land adjoining their plant on which they are preparing to make extensions of their crane plant.

FINANCING PUBLIC WORKS.

St. Boniface, Man.—The ratepayers will shortly vote on a 200,000 by-law for the construction of a sewer 1½ miles long and 7 feet in diameter.

NEW INTERCOLONIAL LOCOMOTIVES.

Following are the chief dimensions of the ten consolidated locomotives which the Canadian Locomotive Co., Kingston, Ont., is building for the Intercolonial Railway:—

Weight on drivers	148,300 lbs.
Weight, total	164,850 lbs.
Cylinders	21" by 28"
Drivers, Diam.	56"
Boiler, type	Straight top.
Boiler, pressure	200 lbs.
Heating surface, tubes	1,934.6 sq. ft.
Heating surface, firebox	161.1 sq. ft.
Heating surface, total	2,095.7 sq. ft.
Tubes, No. and diam.	236; 2¼"
Tubes, length	14 ft.
Firebox	114" by 41"
Grate area	32.5 sq. ft.
Capacity, water	5,000 imp. gals.
Capacity, coal	10 tons.
Brakes	Westinghouse.
Couplers	Janney.
Headlight	Pyle National Electric.
Steam heat equipment	Safety Car Htg. and Ltg. Co.
Axles	Open-hearth steel.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

8942—November 30—Directing the M.C.R.R. and P.M.R.R. to file with the Board plans showing location of towers, gates, etc., where it intersects side road running between Lots 6 & 7, 5th Concession, at Highgate and Muirkirk Station, Ont.

8943—December 17—Approving detail plan and general layout of A. Q. and W. Railway station building at L'Anse aux Gascons, P.Q.

8944—December 17—Approving plan and general layout of A. Q. and W. Railway station building at Newport, P.Q.

8945—December 17—Authorizing the C.N.R. to place its wires under the wires of the Kaministiquia Power Company, Limited, near Kakabeka, Ont.

8946 to 8957 Inc.—December 17—Authorizing the Nipissing Power Company, Limited, to place its transmission lines across the wires of the Bell Telephone Company at following points:—1½ miles south of North Bay; 7 miles south of Callander; one mile south of Callander; 5 miles south of North Bay; 5 miles south of Callander; 1 mile south of North Bay; 2 miles south of Callander; 3 miles south of Callander; 2 miles south of North Bay; 1 mile south of North Bay; ¾ mile south of Callander; 4 miles south of North Bay; in the Province of Ontario.

8958—December 13—Authorizing the C.P.R. to open for traffic its double track on its main line between Fort William and Winnipeg, Man.

8959—December 18—Authorizing the corporation of the village of Eganville, Renfrew County, Ontario, to construct highway across the C.P.R. 100 feet east of freight shed.

8960—December 18—Authorizing the C.P.R. to divert crossing of Salvage Avenue to proposed crossing of its tracks by Chapman Avenue, Grassy Lake, Alta.

8961—December 15—Authorizing Daly & Morin to lay pipe under the track of the G.T.R. at Lachine, P.Q.

8962—December 17—Approving and sanctioning C.N.R. location of its line of railway from mileage 88 to 119, up North Thompson River from Kamloops, B.C.

8963—December 17—Approving location of C.N.R. line from mile 0 to 7, from Lytton, B.C.

8964—December 17—Authorizing the Manitoba Government Telephones to place its wires across the track of the C.P.R. west of St. Boniface, Man.

8965 and 8966—December 17—Authorizing the C.N.O. Railway to place its wires across the wires of the Bell Telephone Company on Cyrville Rd., at Station 2928-06, and at Forced Rd., Station 2924-54.

8967 and 8968—December 18—Authorizing the Berlin Light Commissioners to place its wires across the track of the G.T.R. at Waterloo Street, Berlin; and on St. Leger Street, Berlin, Ont.

8969—December 9—Authorizing the C.P.R. to lay pipe under the track of the C.N.R. along Boyne Avenue, at Morris, Man.

8970—December 18—Authorizing the C.P.R. to construct extension of the present spur of the Eureka Mineral Claim, Yale District, B.C.

8971—December 18—Authorizing the C.P.R. to construct two spurs in the town of Weyburn, Sask.

8972—December 18—Authorizing the C.P.R. to construct two spurs, at Calgary, Alta., one for Mr. York and the other for the Crown Lumber Company.

8973—December 18—Authorizing the C.P.R. to construct spur for the Leitch Collieries, Limited, at mile 87.11 Crow's Nest Pass branch.

8974 and 8975—December 18—Authorizing the C.P.R. to construct spur near Galloway Station, B.C.; also to construct spur for La Compagnie Jobin, St. Augustin Parish, Portneuf County, P.Q.

8976—December 20—Authorizing the C.N.O. Railway to use for construction purposes only the crossing by its line and tracks of the line and tracks of the G.T.R. (Whitby Branch) near Brooklin, Ont.

8977—December 20—Authorizing the C.P.R. to construct industrial spur through Bls. 200 and 201, Regina, Sask.

8978—December 18—Authorizing the Berlin Light Commissioners to place wires under the track of the G.T.R. at King Street, Berlin, Ont.

8979—December 18—Authorizing the Bell Telephone Company to place its underground wires under the M.C.R.R. at Chippawa St., at Chippawa, Ont.

8980—December 18—Authorizing Chas. Hudson, of Lambton Station, Ont., to work steam shovel on coal dump at or near Lambton Station, on the C.P.R., on Sunday, December 19th, 1909, on account of emergency.

8981—December 20—Authorizing the G.T.R. to construct proposed bridge over Chaudiere River at mile-post 164.1, on 3rd Dist. near Chaudiere Jct.

8982—November 22—Directing that all railway companies weigh all coal carried by them received from foreign countries at the port of entry.

8983—December 20—Approving crossings of the C.N.O. Railway at four streets in the town of Parry Sound, Ont.

8984—December 11—Setting out form of certificate to be used by railways in notifying the Board of assent to and concurrence in a joint tariff, or supplement, applicable between points in Canada.

8985—December 20—Authorizing the Ridgetown Fuel Supply Company to lay gas pipe under track of P.M.R.R. in village of Highgate, Ont.

8986—December 22—Authorizing the Ottawa Electric Company to place its electric wires across track of C.P.R. at southerly side of Rideau River at Billings Bridge, Ont.

8987—December 22—Authorizing the C.N.Q. Railway to construct its line and tracks across public road between Lots 100 and 105, Par. Deschambault, P.Q.

8988 to 8991 Inc.—December 22—Authorizing the C.N.Q. Railway to construct its lines and tracks across public road on Lot 195; to divert public road on Lot 183; across public road on Lot 2; and across public road Lot 26, and Lots 27 and 30, all in the Parish of Deschambault, Portneuf County, P.Q.

8992—December 17—Directing the C.P.R. to make repairs and changes to crossing at mileage 1.90 Artemesia Township, Grey County, Ontario.

8993—December 15—Authorizing the W.E. and Lk. S.R. Railway to maintain and operate its railway along the Gravel Road, Sandwich West Township, Essex County, Ontario.

8994—December 21—Authorizing the Manitoba Government Telephone to place its wires across the C.P.R. 300 ft. north of Purves Station, Man.

8995—December 21—Authorizing the corporation of the Township of Southwold, Ont., to lay pipe under the track of the G.T.R. in Southwold Township, Ontario.

8996—December 22—Authorizing the Dominion Light, Heat & Power Company to cross the C.N.Q. Railway at Pie IX. Street, Maisonneuve, P.Q. (Heidt Drain).

8997—December 21—Authorizing the corporation of Southwold Township, Ontario, to lay drain under G.T.R. (Osborne Drain), Southwold Township, Ontario.

8998—December 21—Granting leave to T. H. Herrington to place telephone line across G.T.R. at Belleville Road Crossing, (Napanee), Richmond Township, Ont.

8999 & 9000—December 21—Authorizing the Bell Telephone Co. to place wires across M.C.R.R. at ¼ mile east of Essex Station, Ont., and the C.N.Q. Railway, Deschambault Parish, Portneuf, P.Q.

9001 to 9004 Inc.—December 22—Authorizing the Manitoba Government Telephone System to place its wires across the C.P.R. at four points;—near Otterburn Station, near Findlay Station; Virden Station, and one mile N.W. of Virden Station, in the Province of Manitoba.

9005—December 7—Authorizing the Chatham Gas Company to lay gas main under C.P.R. at Inches Avenue, Chatham, Ont.

9006—December 22—Extending until the 15th of June, 1910, the time within which the C.P.R. may complete the fencing, erect crossing signals, and install cattle guards along and upon the extension of its Snowflake branch to Windygates, Man.

9007—December 22—Authorizing the village of Brussels, Ont., to install a telephone instrument in the station of the C.P.R. at Walton, Ont.

9008—December 22—Cancelling Order No. 3507, August 15th, 1907, in so far as it approves the location of the G.T.P. Railway from John Street to Spadina Avenue, Winnipeg, Man.

9009—December 22—Authorizing the Ridgetown Fuel Supply Company to lay gas pipe under the M.C.R.R. at southerly extremity of village of Highgate, Ont.

9010 and 9011—December 22—Authorizing the City of Toronto Corporation to lay ducts under freight track of G.T.R. on John Street, and on Wellington Street.

9012—December 22—Authorizing the Ernestown Rural Telephone Company to place its wires across the G.T.R. at Ernestown, Ont.

9013—December 22—Authorizing F. T. Cross, Farm Point, P.Q., to place wires across C.P.R. at Farm Point, P.Q.

9014—December 23—Authorizing the Thedford, Arkona & East Lambton Telephone Company to place wires across tracks of G.T.R. at Thedford, Ont.

9015—December 22—Authorizing the Manitoba Government Telephones to place wires across track of G.T.P. Railway at Treat, Man.

9016—December 23—Authorizing the Oxbow Telephone Company to place its wires across C.P.R. at Oxbow, Sask.

9017 to 9022 Inc.—December 22—Authorizing the Manitoba Government Telephones to place its wires across track of C.N.R., 3 miles north-west Clanwilliam Station; G.T.P. 10 miles west Portage la Prairie, and at Tupper Street, Portage la Prairie; C.P.R. ½ mile south Headingly; 2 miles south of Carey Station, and 2½ miles south of Oak Lake, Manitoba.

9023 and 9024—December 22—Authorizing the Alberta Government Telephones to place wires across C.P.R. between sections 2 and 3, Tp. 24, R. 26, west 4th Meridian and Cheadle, and at point one mile west Cheadle, Alberta.

9025—December 22—Authorizing the Saskatchewan Government Telephone to place wires across C.P.R. at Gainsborough, Sask.

9026—December 20—Authorizing the corporation of Hamilton, Ont., to construct bridge across T. H. & B. Railway at Garth St., Hamilton, Ont.

9027—December 23—Authorizing the municipality of Dungannon, Ont., to construct highway crossing over Central Ontario Railway 300 feet south of Boy's Crossing, Hastings Township.

9028 and 9029—December 23—Authorizing J. A. Steele, Humberstone, Ont., to lay pipe line under G.T.R., Lot 27, Humberstone Tp., Ont.; and on Lot 26, Humberstone Tp.

9030—December 22—Authorizing the C.P.R. to construct spur for J. H. Ashdown Hardware Company, Calgary, Alta.

9031—December 2—Dismissing application of the Jas. Davy, Thorold, Ont., that the N. St. C. & T. Railway refund him $219.83 on shipments from November, 1908, to September, 1909.

9032—Dec. 21—Dismissing application of Montreal Board of Trade, for Order directing that C.P.R. publish tariffs covering milling-in-transit privileges on corn received at Montreal by rail from its Georgian Bay elevators.

9033—December 24—Approving change in location of V. V. & E. Railway at Hedley, B.C.

9034—December 23—Directing Alberta Railway and Irrigation Company to provide station accommodation and facilities for traffic at five stations on its line.

9035—December 24—Authorizing the Director of Surveys of Province of Alberta to construct highway across C.P.R. N.E. ¼ Sec. 3, Tp. 10, R. 10, west of the 4th Meridian, Alta.

9036 to 9038 Inc.—December 27—Authorizing the Esquimalt Water Works, to lay water main under Esquimalt and Nanaimo Railway at three points on said railway.

9039—December 27—Approving and sanctioning location G.T.P. Railway Company's North Portal Branch mileage 50 to 100.

9040—December 27—Authorizing the C.N.O. Railway to use and operate seven bridges on its Smallwood-Gowganda Division.

9041—December 24—Authorizing the G.T.P. Railway to construct branch line on Government Reserve, Edmonton, Alta.

9042 to 9045 Inc.—December 24—Authorizing the Bell Telephone Company to place its wires across the track of the C.P.R. at three points in the Province of Ontario and one in the Provice of Quebec.

9046—December 27—Authorizing T. H. Herrington to place telephone wires across Bay of Quinte within town limits, Napanee, Ont.

9047—December 24—Authorizing the C.P.R. to construct spur across 23rd Street, Saskatoon, Sask.

9048—December 24—Authorizing the C.N.O. Railway to construct bridge over Don River, York Township, York County, Ontario, station 12-00 mileage.

9049—December 27—Authorizing the C.N.Q. Railway to construct ten highways in parishes of St. Jerome and St. Sauveur and town of St. Jerome, Terrebonne County, P.Q.

9050—December 24—Authorizing the Blenheim & South Kent Telephone Company, Limited, to place wires across M.C.R.R. at Charing Cross, Ont.

9051—December 28—Authorizing the Manitoba Government Telephone to cross the C.P.R. at public crossing 4½ miles east of Mowbray, Man.

9052—December 28—Authorizing the Leeds & Grenville Independent Telephone Company to place its wires across the C.P.R. at Hawkins Crossing, Elizabethtown Township, Leeds County, Ontario.

9053 and 9054—December 28—Authorizing the Wroxeter Rural Telephone Company to place its wires across the C.P.R. at Lot 22, Con. A, Howick Township, and at Lot 1, Concession 7, Turnberry Township, Ontario.

9055 to 9057 Inc.—December 28—Authorizing the Manitoba Government Telephones to place its wires across the C.P.R. 6½ miles east Deloraine Station, Man.; at Quinty St., Portage la Prairie, and at public crossing 4 miles west of Neepawa, Man.

9058—December 28—Authorizing the Bell Telephone Company to place its wires across the C.N.O. Railway at private crossing ⅜ mile north Duncan Station, Ontario.

9059—December 28—Approving plan of G.T.R. showing stress sheet No. P-6-629 for four 219-foot truss spans over St. Lawrence River at Coteau, Ont.

9060—December 28—Authorizing the M.C.R.R. to put interlocking plant at east end Windsor Yard, Windsor, Ont., into operation.

9061—December 27—Amending Order No. 8976, dated December 20th, 1909, authorizing the C.N.O. Railway to use, for construction purposes, its tracks where they cross G.T.R. near Brooklin, Ont., by adding three clauses re appointment of watchman.

9062—December 27—Amending Order No. 5973, December 23rd, 1908, authorizing the M.C.R.R. to cross Ross Street, St. Thomas, by substituting new plans.

9063—December 28—Authorizing the C.N.R. and C.P.R. to operate their trains over crossing of each other's railway at Gladstone, Manitoba.

9064—December 27—Authorizing the C.P.R. to construct spur for the Joliette Sand and Gravel Company in St. Felix Parish, St. Martin Con., P.Q.

9065—December 27—Authorizing the St. Maurice Valley Railway to construct spur for Shawinigan Cotton Company, Limited, Shawinigan Falls, P.Q.

9066—December 27—Authorizing the G.T.R. to construct branch line for the Bell Furniture Company, Southampton, Ontario.

9067—December 28—Directing the C.P.R. to clean out and put in good order all ditches leading to and from culvert No. 89.9, near Crookston, Ont.

9068—Decemebr 24—Approving and sanctioning location of G.T.P. Railway Company's line, Prince Rupert easterly, mile 235.675 to 299.15, Coast District, B.C.

9069—December 28—Authorizing the C.N.Q. Railway to construct its railway across public road on Lots 96 and 97, Parish Portneuf, P.Q.

9070—December 28—Authorizing the N. St. C. and T. Railway to use and operate bridge over the Government Raceway at St. Catharines, Ont.

9071—December 27—Authorizing the C.N.Q. Railway to construct its lines and tracks across Savane Road, St. Roch Parish, Quebec Co., P.Q.

9072—December 28—Authorizing the C.N.R. to place the lines or tracks of its Mayfield branch across the tracks of the C.P.R. near Midale, Sask.

9073 to 9077 Inc.—December 28—Authorizing the C.N.O. Railway to construct its railway across five public crossings in Darlington Township, Durham County, Ont.

9078 and 9079—December 28—Authorizing the C.N.O. Railway to construct its railway across public crossings in Hamilton Township, Northumberland County, Ontario.

9080 to 9086 Inc.—December 28—Authorizing the C.N.O. Railway to construct its railway across public crossings in Scarboro Township, York County, Ontario.

9087 to 9094 Inc.—December 28—Authorizing the C.N.O. Railway to construct its railway across eight public crossings in Darlington Township, Durham County, Ontario.

9095—December 29—Approving Supp. 2 to C.R.C. No. 26, Standard Passenger Tariff C.N.O. Railway said tolls to apply between Sellwood Junction and Gowganda Junction, Ontario.

9096—December 29—Authorizing the C.N.O. Railway to open for carriage of traffic that portion of its line from Sellwood Junction to Gowganda Junction, Ont.

9097—December 29—Approving and sanctioning location of C.N.O. Railway west of Grafton, Haldimand Township, Northumberland County, Ont.

9098—December 29—Authorizing the C.N.O. Railway to construct its railway across public road at Hillcrest Avenue, Scarboro Township, Ont.

9099—December 21—Disallowing Supplement No. 3 to Special Tariff C.R.C. No. E. 937 of the Quebec Central Railway in re rates on iron and steel articles.

9100—December 29—Authorizing the C.N.Q. Railway to construct spur line to the Eastern Canada Portland Cement Company, Limited, at Dombourg, P.Q.

9101—December 28—Authorizing the G.T.R. to construct extension of existing siding along Falstaff Street, Stratford, Ont.

9102—December 29—Authorizing the Bell Telephone Company to place its wires across those of the G.N.W. Telegraph Company at public crossing ¼ mile north of Sombra Station, Ont.

9103—December 29—Authorizing the Neal Baking Company to lay drain under C.P.R. at Windsor, Ont.

9104—December 30—Authorizing the city of Brantford, Ont., to place electric wires across G.T.R. on Clarence Street, Brantford.

9105 and 9106—December 29—Authorizing the Saskatchewan Government to place its wires across C.P.R. at Esterhazy, Sask., and between Secs. 13 and 24, Tp. 47, R. 1, west 3rd Meridian, Sask.

9107—December 30—Authorizing the city of Brantford, Ont., to place its electric wires underneath G.T.R. at Elgin St., Brantford, Ont.

9108—December 29—Authorizing the Bell Telephone Company to place its wires across the C.P.R. at public crossing 2¾ miles south-east Windsor Station, Ont.

9109—December 29—Authorizing the C.P.R. to construct spur for Calgary Power and Transmission Company, Calgary, Alta.

9110—December 29—Approving and sanctioning revised location of C.N.O. Railway, Clarke Township, Durham County, Ont.

9111—December 30—Approving proposed new iron bridge at mile post 10.94, near St. Catharines, Ont.

9112—December 30th—Authorizing the C.P.R. to construct industrial spur for the Nomining Pulp Wood Supply Company, Loranger Township, Labelle County, P.Q.

9113—December 30—Authorizing the C.P.R. to construct industrial spur for the Messrs. McJinnin, Holmes, & Company, Limited, Sherbrooke, P.Q.

9114—December 30—Extending until the 1st day of June, 1910, the time within which the C.P.R. may have to construct subway where its railway crosses Iberville St., Montreal, P.Q.

9115—December 29—Directing the G.N.R. Company to erect and maintain station and platform at Port Kells, B.C.

9116—December 30—Authorizing the C.N.O. Railway to construct its line and tracks across public road between Lots 24 and 25, Whitby Township, Ontario County, Ontario

9117—December 30—Authorizing the C.N.O. Railway to construct its line and tracks across public road between Scarboro and Pickering Townships, Ontario.

9118—December 30—Authorizing the C.P.R. to reconstruct bridge over Fraser River, Thompson Section of its line, B.C.

9119 to 9121 Inc.—December 31—Authorizing the C.N.O. Railway to construct its railway across public road at three points in District Nipissing, Ont.

9122—December 31—Extending until 31st May, 1910, the time within which the G.T.R. may install gates at College Street, Lennoxville, P.Q.

9123—December 31—Authorizing the C.N.O. Railway to construct its railway across public road between Lots 26 and 27, Con. D, Stn. 353, Scarboro Township, Ontario.

9124—December 31—Authorizing the C.P.R. to construct industrial spur for the Manitoba Bridge & Ironworks, Limited, Winnipeg, Man.

9125—December 31—Authorizing the C.P.R. to construct industrial spur for H. E. Parent & Company, Campbell Township, Labelle County, P.Q.

9126—January 3—Directing that C.N.R. at its own expense, provide day and night watchman at Pembina Street Subway, Winnipeg, Man.

9127—January 3—Authorizing the C.N.O. Railway to construct proposed bridge over Little Rouge River, Scarboro Township, Ontario.

9128—December 21—Rescinding Order of the Board No. 653, dated July 5th, 1905, directing the C.P.R., G.T.R., and the C.N.R. to establish commodity rates on metallic shingles; by directing them to equalize their freight rates on metallic shingles and metallic siding from eastern points to Manitoba, Saskatchewan, and Alberta, as against the freight rates charged on the unmanufactured material.

9129—December 31—Authorizing the C.P.R. to operate branch line in Etobicoke Township, York County, Ontario, and also connect its tracks with the tracks of the G.T.R.

MARKET CONDITIONS.

Following the quotations of the various articles listed in the markets will be found in brackets numbers, thus (10). These numbers refer to the list number of advertisers on page 3 of this issue and will assist the reader to quickly find the name and address of a firm handling any particular article. Buyers not able to secure articles from these firms at the prices mentioned will confer a favor by letting us know.

Montreal, January 13th, 1910.

It is very encouraging to read reports from the United States to the effect that foundries and agricultural implement factories and other melters of pig-iron are all commencing to be very busy again, business in these lines having been very slack during the latter part of 1909. Manufacturers of cast-iron pipe, however, have been the largest purchasers of pig-iron since the first of the year. Negotiations with steel works, for basic and low phosphorus iron, have not resulted in improved contracts, as yet, this year, although some 40,000 tons are under negotiation for shipment over the first and second quarters. Enquiries do not now extend over the first half. Railways are not placing orders freely for structural steel for shipment for the first quarter, but a large tonnage of steel rails has been negotiated. It is expected that the Montreal Street Railway will shortly place its order for 1,500 tons of heavy sections with United States mills, inasmuch as the company requires the grooved rail, which is not made in Canada.

Conditions in Great Britain are very encouraging, as may be seen from a cable just received from Glasgow, and which reads as follows:—"Market strong and prices advancing. Do not sell more without cabling enquiries." Subsequent advices show an advance of 2s. per ton on Scotch pig-iron. Other cables, dealing with steel material, such as bars, channels and angles, go to confirm the above, so that local importers are fully convinced that higher prices will prevail during the coming summer. A better feeling is to be seen in Germany and Belgium, also, and the outlook on the other side of the Atlantic is in every way favorable.

Prospects for business in Canada are very bright. Consumers of pig-iron are evidently well supplied with orders, and a number of the largest of these are now in the market for supplies for the greater part of 1910, if not all of it. Several large orders have been booked by importers during the past week, and others are now being dealt with. The fact that Canadian furnaces are so placed that they cannot offer foundry iron in any considerable quantity, compels users of these grades to look to outside sources for their supplies. It is expected that the additional blast furnace capacity now being erected in this country will go a considerable distance towards caring for the requirements of the country, after August and September next. The new Mid'and furnace, of about 250 tons per day, is expected to go into blast about May 1st; the 500-ton furnace now in course of erection by the Algoma Steel Company at the Soo will be ready for operation about August or September, and it is expected that the Dominion Iron Company's furnace, of 500 tons, will be ready about the same time. This will add about 1,250 tons per day to the present output of pig-iron in Canada. That these furnaces are not being erected any too soon is shown by the fact that over 100,000 tons of pig-iron were imported into Canada in 1909, and, notwithstanding this, consumers are even now rather short of supplies. Imports this year will probably be still heavier than last year, and consumption in Canada is showing a constant upward trend. In view of the situation, many well-informed people anticipate that the requirements of the country will so increase that additional furnaces will be required within the next two or three years. The product of the new furnaces at Sydney and the Soo will be entirely required by the affiliated steel plants, so that only the increased output of the Midland furnace can be added to the amount previously available for the foundry trade.

The market for finished and semi-finished products holds very steady and almost no alterations are yet quotable. Some few alterations creep in from time to time but they are not generally of much importance. Some alterations were made recently in the discounts on wrought and galvanized pipe, but otherwise nothing new is evident. The market on building paper, tar, pitch, and similar lines has actually shown no alteration for a whole year. It is expected, however, that ere long there will be advances.

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

Bar Iron and Steel.—The market promises to advance shortly. Bar iron, $1.85 per 100 pounds; best refined horseshoe, $2.10; forged iron, $2; mild steel, $1.85; sleigh shoe steel, $1.85 for 1 x ⅜-base; tire steel, $1.00 for 1 x ⅜-base; toe calk steel, $2.35; machine steel, iron finish, $1.90; 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 fibre, 55c. per roll; dry fibre, 45c. (See Roofing; also Tar and Pitch).

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.—Prices are as follows per 100 lbs.:—¼-inch, $4.90; 5-16-inch, $4.40; ⅜-inch, $3.70; 7-16-inch, $3.50; ½-inch, $3.25; 9-16-inch, $3.20; ⅝-inch, $3.15; ¾-inch, $3.10; ⅞-inch, $3.05; 1-inch, $3.05.

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 14 to 14¼c.

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. Double strength fuses, 4-ft., $3.75; 6-ft., $4.29; 8-ft., $4.83; 10-ft., $5.37. Fuses, time, double-tape, $6 per 1,000 feet; explohmeters, fuse and circuit, $7.50 each.

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 outlook is strong. The following prices are for carload quantities and over, ex-store, Montreal, prompt delivery; No. 1 Summerlee, $21.50 to $22 per ton; selected Summerlee, $21 to $21.50; soft Summerlee, $20.50 to $21; Clarence, $19.50 to $20; Carron, No. 1, $21.50 to $22, and Carron special, $21 to $21.50.

Laths.—See Lumber, etc.

Lead.—Prices are about steady at $3.55 to $3.65.

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 better and prices are firmer, $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 is unsettled and uncertain, as dealers are compelled to meet competition from all sources. Prices are easy and approximately as follows:—$31 for 6 and 8-inch pipe and larger: $32 for 5-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 much better and the tone is firm, though prices are steady, moderate-sized lots being: ¼-inch, $5.50 with 69 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, $75.50; 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 $30.50 to $31 is given for 60-lb. and 70-lb.; 80-lb. and heavier, being $30; 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.